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National plan of the Czech Republic in the area of energy and climate

December 2024

Executive summary

Process of preparation

The draft update of the Czech Republic's National Energy and Climate Plan (NECP) is prepared on the basis of the requirement of Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action and includes objectives and policies in all five dimensions of the Energy Union for the period 2021-2030 with a 2050 perspective. The central part of the National Plan is the setting of the Czech Republic's contribution to the EU's climate and energy targets for reducing emissions, increasing the share of renewable energy sources and increasing energy efficiency. The structure and requirements of the National Plan shall respect the above-mentioned Regulation.

The first National Plan under the above-mentioned Regulation was approved by the Czech Government on 13 January 2020, this was a revised version of the draft National Plan, which was noted by the Czech Government on 28 January 2019 and was submitted to the European Commission on 30 January 2019. The national plan is based on two main strategic documents, the proposals for updating the Czech State Energy Policy and the Climate Protection Policy in the Czech Republic. The present document is the final version of the Czech National Plan, which updates the 2020 version and takes into account the results of the iterative process with the European Commission.

The national plan is also significantly linked to the update of the Czech Republic's State Energy Policy (SEK CR) and the Climate Protection Policy in the Czech Republic (hereinafter also referred to as "the POK"), which have been prepared or approved consistently with this document.

Updates input

The substantive proposal for an update of the National Plan responds in particular to the ongoing climate crisis, the expected impacts of which are updated in the Sixth Assessment Report of the UN Intergovernmental Panel on Climate Change and the related increase in the ambition of the European targets in the Fit-for-55 package for 2030. The second major driver is the experience of the energy security and energy-price crisis created by Russia's invasion of Ukraine. The basis for updating the Czech SEC and the related strategic documents was then approved by the Government on 12 April 2023 by Resolution No 257/2023 Coll. The most important input for this draft update of the National Plan is the modelling output of SEEPIA. Discussions and consultations within the Commission and the Platform on Energy and Climate Strategies were equally important. The petitioner also carried out a broad public consultation on the input for the update of the National Plan, the outputs of which were taken into account in the preparation.

Emission reduction targets

In the area of greenhouse gas emission reductions, Regulation 2021/1119 establishing the framework for achieving climate neutrality sets an EU-wide target of at least 55 % reduction in greenhouse gas emissions by 2030 compared to 1990 and climate neutrality by 2050. In the sectors covered by the

Emissions Trading System (EU ETS), under Directive 2003/87/EC, as amended (Directive 2023/959), emissions should be reduced by 62 % compared to 2005 and in non-EU ETS sectors under the revised Regulation (EU) 2018/842 as amended (Effort Sharing Regulation) (as amended) by 40 % and 26 % respectively at Czech level.

The Czech Republic's objective is to achieve a reduction in greenhouse gas emissions by 2 030 in line with the commitments of the Fit for 55 package and to move towards climate neutrality by 2050.

The Czech Republic's strategic objective is to reduce the share of fossil fuels (used without capture technology) in primary energy consumption to 50 % by 2030 and 0 % by 2050 and to completely phase out the use of coal for electricity and heat production by 2033. The modelled scenario shows the reality of meeting these targets, but when setting ambitious policies and measures. Its total emissions will decrease by 68 % in 2030 compared to 1990, by 72 % under ETS1 compared to 2005 and by 34 % outside these sectors (ESR) compared to 2005. The model is moving towards an emission value of 8 Mt in 2050, but further reductions are expected from LULUCF and waste sectors, which are not modelled in sufficient detail. The scenario also confirms the assumption of a complete withdrawal from the use of coal for heat and electricity production by 2033, with a significant decrease already between 2025 and 2030.

Objectives for the development of renewables

The EU Directive on the promotion of the use of energy from renewable sources sets an overall EU target of 42.5 % RES use in gross final energy consumption by 2030 and a further voluntary increase at EU level of 2.5 pps above that level. Furthermore, the Directive sets a number of sub-targets for RES in particular in the industrial, transport, heating and cooling and buildings sectors.

For the overall national target, the Additional Measures (WAM) scenario shows the availability of a 30 % RES share in final consumption by 2030 as a contribution to the EU-wide target (up from 17.7 % in 2021). In transport, the binding target to reduce greenhouse gas emissions by 14.5 % by increasing the share of renewables by 2030 is then met. For some sub-targets, it shows that they are difficult to achieve (and some do not model).

Energy efficiency targets

The revised Energy Efficiency Directive (EU) 2023/179 sets overall targets for increasing energy efficiency and reducing final and primary energy consumption by 11.7 % compared to the PRIMES 2020 reference scenario. In addition, it also includes sub-targets, e.g. providing new energy savings and specifically in the public sector. Other objectives and in particular specific measures are set out in the Energy Performance of Buildings Directive (EU) 2024/1275.

For Czechia, quantifying the overall end-use energy savings target means a decrease from 1 048 PJ (last data from 2022) to 852 PJ in 2030. This is the target set by Czechia, but the modelled scenario shows the difficulty of achieving it. Even with the adoption of ambitious policies and measures, including the implementation of the progressive building renovation scenario set out in the Long-Term Building Renovation Strategy, the development of final consumption leads to a value of 945 PJ by 2030.

Energy security

Since the second half of 2021, Europe has faced a situation where Russia has strategically abused the supply of energy resources as a means of coercion. This situation worsened after 24 February 2024, following Russia's full invasion of Ukraine. The EU's objective, as defined in the REPower EU plan published in May 2022, is therefore to completely phase out Russian fossil fuel imports by the end of 2027.

The baseline modelled scenario clearly shows the shift in cross-border energy management: Czechia will move away from fossil fuel imports from geopolitically unstable or problematic areas, while increasing imports of clean energy (renewable electricity and green hydrogen). In the Additional Measures (WAM) scenario, due to the onset of electrification, electricity consumption is increasing and will need to be produced from domestic sources, or the conditions for importing electricity will need to be ensured. This also needs to be adapted to the electricity grid, ensuring more storage capabilities and other flexibility management features.

Internal market

For a small open economy like Czechia, access to the single internal market is an essential asset of EU membership. This is also largely the case in the energy sector. In view of the internal energy market dimension, the achievement of the electricity system interconnectivity target of 15 % by 2030 can be seen as essential. The Czech Republic aims to maintain the import and/or export capacity of the transmission system for, inter alia, 2 030 in relation to the maximum load at a level of at least 30 % and 35 % respectively, which corresponds to the 15 % target in terms of installed capacity. The Czech Republic's interconnectivity is already close to 30 %, so the Czech Republic does not consider it necessary to introduce further specific policies in this area. Energy market integration and infrastructure development are already significantly harmonised at EU level. Further harmonisation is clear from European legislation, which also enshrines most information, reporting and planning obligations, such as the obligation to draw up ten-year transmission network development plans. The National Plan describes the state of play and expected development of market integration and energy infrastructure development.

Research, development and innovation

The fifth dimension of the Energy Union is the research, innovation and competitiveness dimension. In this respect, the Czech Republic does not have specific quantifiable targets for public R & D & I specifically related to the Energy Union. However, research, development and innovation in the field of sustainable energy are one of the priority areas of key strategic documents such as the National Research and Innovation Strategy for Smart Specialisation of the Czech Republic and the National Priorities for Oriented Research, Experimental Development and Innovation. The Czech Republic also seeks to take into account the priorities at EU level, in particular those of the European Strategic Energy Technology Plan, when setting priorities in this area. It is not possible to quantify the exact level of public funding for research, development and innovation towards low-carbon technologies for the Czech Republic. However, the national plan provides an estimate of the public finances allocated to the energy sector.

Selected areas of action

The following are considered as essential measures for achieving the objectives of the National Plan:

1) An EU-wide market for emission allowances, providing a price signal for carbon discharges, is an essential market-based instrument for decarbonisation. In the modelled scenario, the price of emission allowances rises to a level of EUR 400/tonne over three decades. The correct implementation of this pan-European instrument is therefore important. The use of revenues back to mitigation and adaptation measures makes it possible to finance the transition to emission neutrality.

2) In particular, renewable electricity generation will need to be developed as a result of strong electrification. The development of photovoltaic power plants is on the rise. Basic efforts should therefore be focused on the development of wind energy in line with the requirements for accelerating the permit-granting process. This will be complemented by communication to the local public. By 2030, the model envisages an installed capacity of 10.1 GW of photovoltaic power plants involved

in the grid and 1.5 GW of wind power plants.[1]

3) In addition to the construction of new renewables, the capacity of the grid to manage flexibility and to explore and implement the various elements of the network will need to be strengthened. On a temporary basis, natural gas will also play an enhanced role.

4) Czechia is characterised by a large share of heat production in central supply systems. These systems have the potential to become an efficient and decarbonised source of heat for buildings and industry. Their decarbonisation plan must be based on local strategic planning and take into account future decreases in heat consumption in buildings and fully explore the potential of renewable and ambient energy.

5) The baseline modelled scenario takes into account the progressive scenario of building renovation. It gradually raises the annual quality building renovation rate to 3 % between 2025 and 2030. This is a significant increase, but within realistic limits. In 2050, this scenario leaves 5 % of buildings without renovation, and another 8 % of buildings undergo only shallow renovation (e.g. monuments protected by monuments).

6) The development of nuclear energy is an important element of the decarbonisation strategy. The share of nuclear energy in energy consumption will increase, which will be achieved through the construction of large nuclear reactors and small and medium-sized modular rectors (SMRs). Priority will be given to the construction of additional units in the existing nuclear sites Dukovany and Temelín, aiming inter alia at partial replacement of existing nuclear resources. The construction of small and medium-sized reactors is foreseen with a view to the first SMR becoming operational in the mid-30s.

7) Another important tool to achieve the decarbonisation objectives is the use of biomethane and hydrogen (and other low-emission gases). The national plan is drawn up in parallel with the update of the hydrogen strategy of the Czech Republic, which is why the different objectives are interlinked. In particular, substituting part of fossil hydrogen in industry with low-emission and renewable hydrogen is important for the 2030 targets. The Hydrogen Strategy also places emphasis on future imports of renewable hydrogen. Hydrogen production in the Czech Republic can help with the regulation of the electricity system by making efficient use of the energy surpluses generated.

8) Finally, “last mile” will be needed, especially for hard-to-decarbonise sectors, the use of carbon storage technology and the utilisation of carbon. By 2050, the scenario envisages a total of 7 Mt. So far, the question of storage in Czechia or connection to pan-European activities remains a question to be explored.

Costs and benefits of decarbonisation

The total estimated investment need for decarbonisation and adaptation measures until 2030 will be substantial, with private sources expected to cover most of the investment needs. Although significant investments would also be made in the reference scenario, a lower level of investment can be assumed for several reasons. In addition to costs, decarbonisation also brings multiple benefits in terms of

1It is important to stress that the resulting share of RES must be seen as a minimum commitment and will seek to achieve a higher share.

increased resilience, improved indoor environment in buildings, etc.

Since investments in decarbonisation will be enormous, there is a need to create a predictable environment for investors in all areas, to simplify and shorten investment permits and to communicate in a comprehensible manner to all groups of the public on the objectives and tools contained in this plan.

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Introduction

The National Energy and Climate Plan of the Czech Republic was prepared following the requirement of Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, the draft of [2]which was presented as part of the 'Clean Energy for All Europeans' legislative package published by the European Commission on 30 November 2016. The first National Plan under the above-mentioned Regulation was approved by the Czech Government on 13 January 2020, this was a revised version of the draft National Plan, which was noted by the Czech Government on 28 January 2019 and was submitted to the European Commission on 30 January 2019. This document is the final version of the update of the Czech National Plan, which takes into account the iterative process with the European Commission.

The obligation to prepare the Czech Republic's National Energy and Climate Plan stems from Article 3 of the above-mentioned Regulation. This document is the final version of the National Energy and Climate Plan by the Czech Republic pursuant to Article 3 of the Regulation. The structure of the National Plan is precisely prescribed in the Annexes (namely Annex I) to this Regulation.[3] Pursuant to Article 14, by 30 June 2023, then by 1 January 2033, and every 10 years thereafter, each Member State shall send to the Commission a draft update of the latest notified integrated national energy and climate plan or provide the Commission with a deduction that the plan does not need to be updated.

The declared objectives (or the purpose) of the NECP or of the entire Energy Union governance system are the following: (I) preparing and implementing policies and measures to meet the objectives of the Energy Union and long-term commitments to reduce greenhouse gas emissions, in particular in view of the European Union's 2030 targets for energy and climate; (II) stimulating cooperation between Member States; (III) increased regulatory and investment certainty resulting from the coverage of all five essential dimensions of the Energy Union, supported by planning documents and a robust and comprehensive analytical framework; (IV) effective opportunities for public participation; (v) a structured, transparent and iterative process between the Commission and the Member States; (VI) strengthening cooperation between energy and climate policy makers[4].

2The full title of the Regulation is as follows: Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council;

3The Annex to the Regulation prescribes the headings of the first, second, third (and, exceptionally, fourth order) but also sub-parts preceded by Roman numerals. The headings of the fourth order are not based (with exceptions) on the requirements of Annex I and have been added to better structure the text.

4The above objectives have been formulated on the basis of information from the European Commission.

Section A: National plan

1 Overview and procedure for drawing up the plan

1.1 Summary

1. Political, economic, environmental, and social context of the plan

1.1.1.1 Political context

The Czech Republic is a stable democratic state, being a member of the United Nations, the OECD, the EU and NATO and other international organisations. The Czech Republic has a directly elected President and a bicameral Parliament composed of the Senate and the Chamber of Deputies.

As part of the self-governing system, the Czech Republic is divided into 14 self-governing regions, 76 districts and more than 6200 self-governing municipalities.5 Municipalities and regions are managed by elected councils. The regions are headed by the governors, with mayors at the head of the statutory cities and mayors in other towns and small towns. Prague, which is also a region, a statutory city and a capital city, has a special status.

On 13 January 2022, confidence was expressed to the 16th government (since 1993) led by the Chairman of Prof. PhDr. Petr Fiala, Ph.D., LL.M., on behalf of ODS. The government is composed of two coalition parties of SPOL (ODS, CDU-ČSL, TOP 09) and Pirati and Starost (STAN and Pirati). The Government of Petr Fialy approved the Programme Statement of the Government of the Czech Republic on 6 January 2022. The modified form was approved by the Cabinet at its meeting on 1 March 2023(link). The programme statement contains explicit commitments in the areas of energy and nuclear energy (industry

5In the case of districts, this is a territorial rather than a self-governing division.

and trade) and environment (separate part). On 12 April 2023, the Czech Government approved the process of updating the Czech Republic's State Energy Policy and the related strategic documents, which provide guidance for the preparation of the relevant strategic documents(reference). Between 2023 and 2024, proposals for updating the Czech State Energy Concept and the Climate Protection Policy in the Czech Republic were prepared.

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1.1.1.2 Economic context

The Czech Republic is undergoing a phase of economic downturn. Economic output in 2023 recorded stagnation in year-on-year in constant prices according to newly published revised Czech Statistical Office data issued on 28 June 2024[6] and Czechia has not yet reached pre-COVID levels. The causes were mainly related to high inflation. Companies faced high input and energy prices, weaker demand and labour shortages. As a result of high energy and food prices and falling real incomes, households have reduced their consumption of both goods and services. On the contrary, foreign demand had a positive impact. Gross value added grew by 0.6 % year-on-year, supported in particular by manufacturing, information and communication activities and the trade, transport, accommodation and hospitality group. Construction, professional, scientific, technical and administrative activities, agriculture and financial and insurance activities have had a negative impact.

On the positive side, the economy has increased by 0.3 % year-on-year and 0.2 % quarter-on-quarter in the first quarter of 2024 according to a refined estimate. Quarter-on-quarter growth was supported by household final consumption expenditure and external demand. In the year-on-year comparison, positive developments in household final consumption expenditure, final consumption expenditure and external trade balance outweighed the negative impact of gross capital formation.

The de-escalation of global energy markets has been positive in slowing down the annual rate of price inflation in both industry and construction, even declining in agriculture. Lower output price increases were then translated into consumer prices, which gradually eased the growth dynamics. Rising housing

6 See https://csu.gov.cz/produkty/vysledky-mimoradne-revize-narodnich-uctu

costs and more expensive food were and remained the largest growth path, also due to the weight in the consumer basket. Consumer prices have significantly weakened their annual growth since the beginning of 2024, stagnating at 2 % in March 2024, i.e. the CNB target, but slightly added year-on-year in the following months.

In response to decreasing inflation, the Czech National Bank has started a cycle of degressive monetary-policy rates. The two-week repo rate was reduced by the Bank Board to 4.75 % at the end of the first half of 2024. In doing so, the Bank continued to gradually reduce its rates, which it started in December 2023. The pace of further rate cuts will depend in particular on the assessment of the persistence of the low-inflation environment, the evolution of the rate of the koruna, the impact of fiscal policy on the economy, an analysis of labour market tensions, developments in domestic and external demand, and actions by key foreign central banks.

Persistent mismatches in the Czech labour market are an obstacle to economic growth. Low unemployment means that there is a shortage of workers in technical and labour-related professions, in services, but also in low-skilled occupations. An inadequate professional structure is also a barrier. In the medium and long term, it will be important for economic growth to ensure that the education system better equips graduates with the competences and skills needed to perform certain professions in the context of the digitalisation and robotisation of the economy, including those that are yet to emerge. On the labour market demand side, manufacturing and other processes will need to be modernised to mitigate the necessary intensity of labour participation. The Czech Republic is one of the lowest unemployment in the European Union.

The Czech Republic's balance of payments experienced a marked recovery in 2023, following a slump in 2022. The improvement in the current account was mainly driven by the trade balance, with a significant annual growth rate in goods exports. The primary income deficit also recorded a year-on-year decline. The surplus in the financial account was mainly due to the surplus in the other investment account, where the external liabilities in the loan account fell. By contrast, the surplus in the portfolio investment account declined significantly after the record last year, due to higher purchases of domestic bank and government bonds by foreign investors. The negative FDI account balance declined year-on-year due to a decline in domestic foreign investment, which was the lowest since 2018.

Public finances have also been a major challenge in recent years and have served as a tool to support firms and households in times of pandemic and subsequently during the energy crisis. Global governments have tried to mitigate the effects of the energy crisis, even at the cost of higher indebtedness. This has also led to significant government deficits in the Czech Republic and to a rise in government debt, which, although the EU has a lower level of government debt, is unfavourable to its growth dynamics. The rating[7] of the Czech Republic, which is an assessment of the credibility of the borrower, is at the best ever level with a stable outlook.

Real gross domestic product (GDP) is expected to recover slightly in 2024, with gradual growth in the coming years. Household final consumption expenditure will be negatively affected this year by a continued decline in real disposable income and a restrictive monetary policy stance. However, future growth in the economy should already be driven by a recovery in household consumption and investment by firms that have delayed their spending in times of high inflation and high interest rates. Inflation is expected to be at 2 % over the next two years, i.e. around the CNB's inflation target. However, there are a number of risks, such as the possibility of a sharp acceleration in annual fuel prices in Q2-2024[8], which is on the upside and may put at risk the recovery of the domestic economy.

The crises of recent years have reversed the convergence of the Czech economy towards more advanced countries. While Czech GDP per capita in PPS (Purchasing Power Standard) grew to 93 % of the European Union average by 2020, the pandemic and the subsequent energy crisis caused the indicator to fall to 91 % in 2023. The expected moderate growth of the domestic economy in 2024 compared to moderate growth in the EU will cause a further fall in convergence.

Table 1: *Economic context*

		2019	2020	2021	2022	2023	2024 *PREDIkce*	2025
Nominal Gross Domestic Product	*billion CZK,*	**5 791**	**5 709**	**6 109**	**6 787**	**7 344**	**7 657**	**8 032**
	growth in %,	7,0	—1,4	7,0	11,1	8,2	4,3	4,9
Real Gross Domestic Product	*growth %,*	**3,0**	**—5,5**	**3,6**	**2,4**	**—0.3**	**1,4**	**2,6**
Household consumption	*growth %,*	2,7	—7,2	4,1	—0.6	—3,1	2,7	3,5
General government consumption	*growth %,*	2,5	4,2	1,4	0,3	3,5	1,6	2,2
Gross fixed capital formation	*growth %,*	5,9	—6,0	0,8	3,0	4,0	2,2	2,4
Contribution of net exports to GDP growth	*p.b., s.c.*	0,0	—0,4	—3,6	0,9	2,6	0,2	0,4
Contribution of changes in inventories to	*p.b., s.c.*	—0.3	—0.9	4,8	0,9	—3,3	—1,0	—0,5
GDP deflator	*% growth*	**3,9**	**4,3**	**3,3**	**8,5**	**8,6**	**2,9**	**2,2**
Consumer price inflation rate	*average %*	**2,8**	**3,2**	**3,8**	**15,1**	**10,7**	**2,7**	**2,4**
Employment *(ŠPS)*	*% growth*	**0,2**	**—1,7**	**0,4**	**1,5**	**0,8**	**0,4**	**0,2**
Unemployment rate *(ŠPS)*	*average %*	**2,0**	**2,6**	**2,8**	**2,2**	**2,6**	**2,8**	**2,7**
Volume of wages and salaries *(domain*	*growth in %,*	**7,8**	**0,1**	**5,9**	**9,3**	**7,9**	**6,8**	**5,5**
Current account balance	*% OF GDP*	**0,3**	**2,0**	**—2,8**	**—4,9**	**0,4**	**0,6**	**0,7**
General government balance	*% OF GDP*	**0,3**	**—5,8**	**—5,1**	**—3,2**	**—3,3**	**—2,3**	**—2,1**
General government debt	*% OF GDP*	**30,0**	**37,7**	**42,0**	**44,2**	**44,0**	**45,5**	**46,4**
Assumptions:								
Exchange rate CZK/EUR		**25,7**	**26,4**	**25,6**	**24,6**	**24,0**	**25,1**	**24,7**
Long-term interest rates	*% p.a.*	**1,5**	**1,1**	**1,9**	**4,3**	**4,4**	**4,3**	**3,9**
Brent oil	*USD/barrel*	**64**	**42**	**71**	**101**	**82**	**80**	**77**
Euro area GDP	*growth %,*	**1,6**	**—6,2**	**5,9**	**3,5**	**0,5**	**0,7**	**1,2**

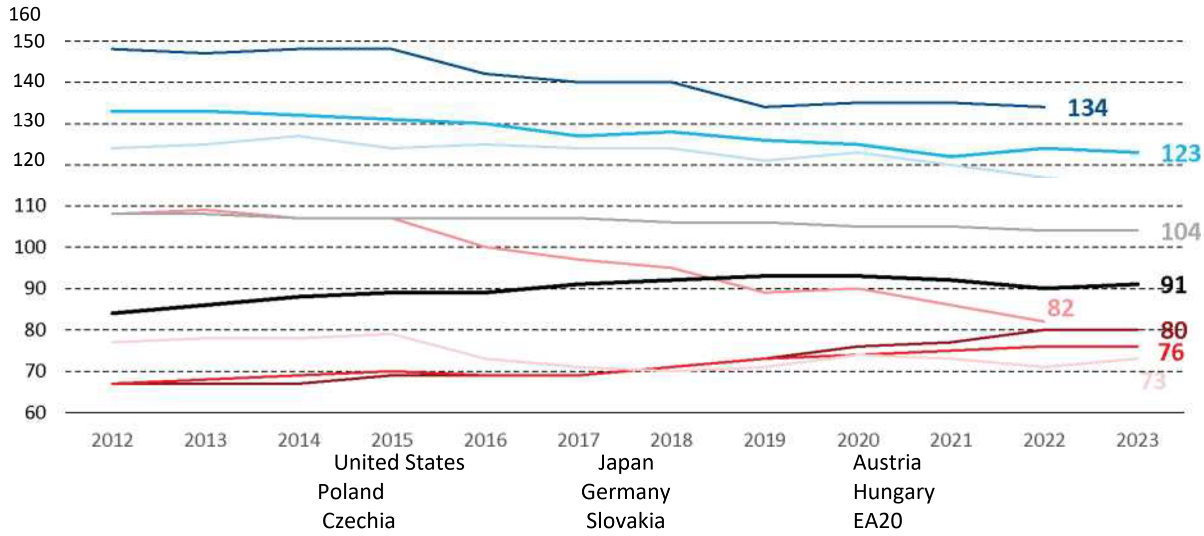
[7] See https://www.mfcr.cz/en/fiscal-policy/state-debt/basic-information/rating

[8] Based on the scenarios of the monetary policy report of the CNB.

Source: Ministry of Finance of the Czech Republic, [Macroeconomic prediction – April 2024](#)

It*was also published on 30 April 2023 by the OECD Economic Survey ([link](#)), which contains more detailed information on developments in the Czech economy and structural changes in the Czech Republic.*

Figure 1: *Comparison of the evolution of GDP per capita in PPS (Purchasing Power Standard; EU 27_2020 = 100)*



Data source: [Eurostat](#) (as of 19) 6. 2024); Graph: MINISTRY OF INDUSTRY AND TRADE
Note: 2023 data is not available for the United States and Japan.

1.1.1.3 Environmental context

The state of the environment has significantly improved over the last 30 years in terms of airborne dust and sulphur and nitrogen oxide emissions from large and medium combustion sources. However, it is still unsatisfactory, particularly in terms of air quality and in terms of hazardous substances, and poses serious risks to human health and ecosystems in the affected areas, as well as premature deaths and other economic damage. The unsatisfactory situation in many municipalities in the Czech Republic is due to emissions from domestic coal-fired furnaces and in intensive transport cities due to emissions from diesel and petrol engines.

The main risks to maintaining or further improving the state of the environment are changes in the landscape linked to the development of settlements (extension of buildings, changes in the functional use of land) and developing road infrastructure, increased traffic intensity, intensive management methods in the landscape and, last but not least, consumption behaviour of households and individuals (heating, consumption of natural resources, etc.). The evolution of environmental pressures will depend heavily on developments in economic performance over the next 10 years, with the specific burdens per unit of economic output continuing to gradually decline. An important aspect for improving household consumption behaviour is the promotion of increased consumer awareness of the issue of sustainable consumption and production and of the impacts of significant consumption behaviour of the population, regardless of resource exhaustion.

The evolution of anthropogenic pressures and the state of environmental compartments may be affected by changing climates and related changes in temperature and rainfall regimes. The mechanism can be expected to affect the sum of emissions from electricity and heat generation, the dispersion of pollutants and air quality, the quality and quantity of surface water and groundwater, biodiversity as well as the condition of forest stands, the quality of soils, the spread of harmful organisms in agriculture and the associated consumption of agrochemicals. Overall, climate extremity is likely to deepen, with more frequent occurrences of hazardous hydrological and weather events such as floods, droughts, strong winds, temperature fluctuations, etc.

Model simulations expect a continued gradual increase in annual average temperature of 0.3 °C over a decade. The total annual precipitation will not change significantly, but the volatility of rainfall will increase both between years and within the year, as well as the uneven distribution of rainfall across our territory. Changes in landscape use may lead to higher risks of water and wind erosion and a reduction in the retention capacity of the landscape, making it more prone to floods due to expected more frequent storm precipitation. In the same vein, droughts are expected to occur more frequently, both due to a lack of rainfall (so-called meteorological drought) and to increased fumes due to high temperatures (so-called agricultural drought).

Greenhouse gas emissions decreased by 40.7 % between 1990 and 2021, including net emissions from the land use and forestry sector (LULUCF) by only 33.7 %. However, compared to the EU average, the Czech Republic has higher specific greenhouse gas emissions per inhabitant (12.1 t $CO_{2\ eq}$/foot vs 7.3 t CO_2 eq in the EU). On the other hand, in the European context, the Czech Republic has a below-average share of total greenhouse gas emissions, which currently stands at around 16 %, but a gradual increase can be expected. The emission intensity, i.e. the emission intensity of GDP generation, is higher in the Czech Republic compared to the EU average, given the higher contribution of industry to GDP formation and the fuel mix, in which lignite still has a significant place.

The main problem currently in the Czech Republic is the pollution of ambient air by benzo[a]pyrene, suspended particulate matter PM_{10} and $PM_{2,5}$ and ground-level ozone. It is also nitrogen dioxide in places where transport is carried. While most of the immission characteristics show a decreasing trend over the period 2010-2021, the concentrations of the above mentioned pollutants with serious impacts on human health still exceed the emission limits set in a number of locations in the Czech Republic. Areas above the emission limit without including ground-level ozone in 2021 accounted for 6.1 % of the territory of the Czech Republic, where around 20 % of the population live. The delimitation of these areas is overwhelmingly due to the exceedance of the annual emission limit for benzo[a]pyrene. The most heavily burdened area in the Czech Republic is the agglomeration of Ostrava/Karviná/Frýdek – Místek for the long term.

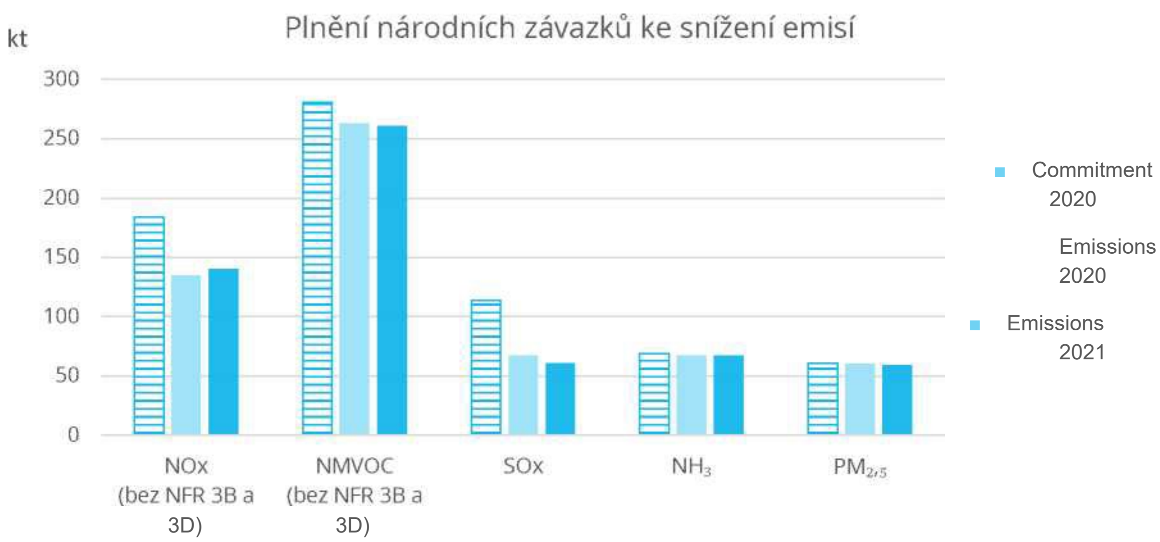
Directive (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants requires Member States to reduce emissions of selected pollutants (NO_x, NMVOC, SO_2, NH_3 and $PM_{2.5}$). These obligations are imposed as 'national emission reduction commitments' and set out in that Directive for the years 2020, 2025 and 2030, as a percentage reduction in emissions of those pollutants to the base year 2005. The commitments for the Czech Republic are set out in the table below. The table below shows, like the graph below, that the Czech Republic has complied with the national emission reduction commitments set for 2020.

Table No 2: *National emission reduction commitments for 2020, 2025 and 2030 (kt)*

	NOx	VOC	SO2	NH3	PM2.5
Emissions in reference year 2005 (kt)7	300 (283)*	378 (343)*	208	74	74
Emissions in 2020 (kt)	154 (135)*	301 (263)*	67	67	60
Emissions in 2021 (kt)	158 (140)*	298 (261)*	61	67	59
Emission reduction commitment 2020 (% versus 2005)	35 %	18 %	45 %	7 %	17 %
Emission reduction commitment 2025 (% versus 2005)	49 %	34 %	55 %	14 %	38 %
Emission reduction commitment 2030 (% versus 2005)	64 %	50 %	66 %	22 %	60 %

**In accordance with Article 3(d), NOx and NMVOC emissions from NFR 3B and 3D (agriculture) sectors shall not be taken into account for the fulfilment of national commitments. The total emissions of pollutants without NFR 3B and NFR 3D are therefore given in brackets.*

Chart 2: *National emission reduction commitments for 2020, progress*



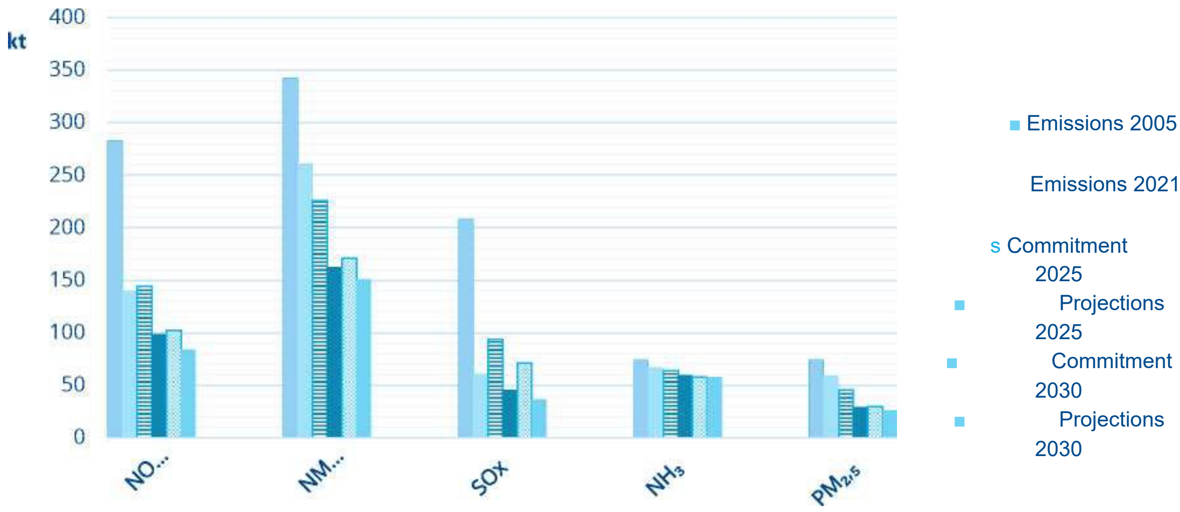
Source: ČHMÚ

In 2023, the national emission projections were updated, predicting the evolution of the amount of pollutant emissions for which national emission reduction commitments are set in the following years. This projection is the basic analytical fund for updating the Czech Republic's National Emission Reduction Programme, the basic air protection concept drawn up by the Ministry of the Environment on the basis of the obligation imposed by Act No 201/2012 on the protection of the environment, as amended, and the obligation laid down in Directive 2016/2284 (EU).

7 National emission inventory data as at 20. 9. 2023, https://cdr.eionet.europa.eu/cz/eu/nec_revised/inventories/envzqqyng/

National emissions of the projection, the preparation of which has been coordinated with that of greenhouse gas emissions, predicts compliance with the national emission reduction commitments for 2025 and 2030. As shown in Figure 3 below, although the national emission projection does not indicate non-compliance with the national emission obligations, for the pollutants NH_3 and $PM_{2.5}$, the result of the projection and the level of the commitment are almost identical. The risks of changing and increasing the production of these pollutants cannot be ignored.

Chart 3: *Comparison of emission projections for 2025 and 2030 and national emission reduction commitments*



Source: ČHMÚ

Water quality in watercourses is gradually improving, mainly due to a decrease in the amount of discharged pollution from point sources. An important factor affecting the quality of the water is the proportion of the population connected to the sewers that are finished by the waste water treatment plant; their number has increased almost twice since 1990, in particular the expansion of tertiary treatment treatment plants (removal of P and N) and significantly smaller municipalities. The requirements of Council Directive 91/271/EEC concerning urban waste-water treatment, which require the connection of pollution-producing municipalities with equivalent production equivalent to 2000 inhabitants or more (equivalent population unit) to waste water treatment plants, are not met only for a small proportion of those municipalities. In 2021, 87.4 % of the Czech population was connected to public sewerage. However, so-called rainfall on single collecting networks remains an important problem. In the long run, it has been very difficult to reduce the level of generalised pollution, mainly due to agricultural activity (use of mineral fertilisers), which in turn leads to eutrophication of watercourses and reservoirs. An equally important element in assessing the status of water bodies is not only their chemical status, but also their ecological value. In this regard, migration permeability and morphological conditions in watercourses, where appropriate and effective, need to be improved. The Urban Waste Water Treatment Directive is currently under revision, which also targets other specific substances (so-called micro-pollutants) entering the aquatic environment in the long term. For example, pharmaceuticals, substances and personal care (PPCP) and microplastics, which enter water reservoirs and streams, which have a negative impact not only on aquatic organisms but also on human health.

Due to changes in landscape use and climate change, ecosystems are less resilient, which is reflected in the adverse condition of ecosystems, many wild species of flora and fauna (including Europeanly important species of flora and fauna), as well as a reduction in the ability to eliminate or absorb external influences, including the spread of alien species and pests. The main reason for the decline in ecosystem resilience is the persistent consequences of intensification of agricultural management, in particular since the 2nd half of the 20th century, accompanied by the unification of the landscape thus used, the persistence of a significant proportion of forest stands with unbalanced species, age and spatial composition, the continued degradation of forest soils affected by immision, the regulation and fragmentation of watercourses, and the increasingly rapid development and fragmentation of the landscape (both transport and construction). These reasons have long led to a reduction in the ecological stability of the landscape, a decline in the volume and quality of ecosystem services provided to human society, a loss of rare species and a reduction in the abundance and vitality of populations of common species, disrupting migratory routes and increasing plant and animal stress and, conversely, the spread of unwanted (non-indigenous and invasive) species.

1.1.1.4. Social context

Inequality and poverty have been low in the last decade compared to other OECD countries. There are large regional disparities in poverty rates, high poverty rates in the North-West and Moravian-Silesian regions, while relatively low poverty rates prevail, reflecting high wage margins due to differences in qualifications and productivity between sectors. The biggest economic inequality is in Prague, with low-income people in Prague being relatively 'better' compared to those from 'peripheral' regions. In the north-west, the higher poverty rate is due to the low wage/income of most workers.

ii. Overarching strategy covering the five dimensions of the Energy Union

The Strategic Framework document Czech Republic 2030 can be identified as an overarching strategy covering all five dimensions of the Energy Union. This document defines the top objectives for the development of the Czech Republic. The Strategic Framework brings together two key concepts: sustainable development and quality of life. The Czech Republic 2030 forms a long-term framework for strategic planning in the state administration and will enable transparent communication of the long-term objectives of the state administration to the professional and the general public. The strategic framework is the implementation of the 2030 Agenda and 17 Sustainable Development Goals (SDGs) in the Czech Republic. A report on quality of life and its sustainability is prepared every three years. Specific measures are then elaborated in the implementation plan.8

In this respect, it should be noted that the Czech Republic's Strategic Framework 2030 has a significantly broader definition of the Energy Union that can only be seen as part of this overall definition. Table 3 ***3*** shows other major top strategic documents, both of an overarching and sectoral nature (including the Strategic Framework of the Czech Republic 2030 referred to above). However, it is not an overall list, but only the most important documents. Key energy and climate protection strategies are further outlined in sub-chapters 1.2.1.1 and 1.2.1.2.

8 More information and relevant materials are available on the website www.cr2030.cz.

Table 3: *Top Strategy Papers*

Strategy Paper	Short description
Strategic Framework Czech Republic 2030	A top document defining the top objectives for the development of the Czech Republic. The document is the Czech response to the adoption of the 2030 Global Development Agenda by the UN General Assembly in New York in September 2015 and translates 17 Sustainable Development Goals (SDGs) into the domestic environment. Out of a total of 6 key areas in the Czech Republic 2030, energy is mainly concerned with the economic model and municipalities and regions. A total of 4 strategic objectives, defined for these two areas, address energy in relation to improving the energy and material efficiency of the economy, decentralisation of resources including community energy development, the need to differentiate energy sources and improving the energy performance of buildings. The Czech Republic also stresses the need to ensure a resilient, competitive and low-carbon energy mix, which will go hand in hand with a double tranche
State Energy Policy of the Czech Republic	A top strategy paper for the energy sector, reflecting the objectives, at a horizon of 25 years, and the State's priorities in the field of energy management, and sets out a long-term vision for the Czech Republic's energy sector, setting out top strategic objectives, strategic priorities within which it defines sub-development strategies for each energy sector and related energy, and defining the instruments for their enforcement.
Climate protection policy in the Czech Republic	The 2030 Climate Strategy and, at the same time, the Roadmap for the Development of a Low-Emission Economy by 2050, with a focus on measures to reduce greenhouse gas emissions. It is complementary to the climate change adaptation strategy in the Czech Republic, focusing on the issue of adaptation to climate change.
Czech Regional Development Strategy 2021+	A basic concept note in the field of regional development, which is a tool for implementing regional policy and coordinating the contribution of other public policies to regional development, linking sectoral aspects (topics and priorities) to territorial aspects. In terms of time, it is a medium-term document which contains a long-term view of the Czech Republic's regional development (long-term vision) as well as short-term implementation steps.
Czech transport policy for the period 2021-2027 with a view to 2050	A strategy whose main objective is to ensure the development of a high-quality, functional and reliable transport system based on the use of the technical and technological characteristics of each

	transport, in accordance with the principles of competition with regard to its economic, social and population effects (social cohesion, public health, living standards), the security and defence of the state and all aspects of the environment, on the principle of sustainable use of natural resources, identifies the main problems of the sector and proposes measures to address them.
Czech International Competitiveness Strategy 2012-2020	A strategy defining measures that the Czech Republic should move towards the world's 20 most competitive economies. The means of achieving this ambition include, in particular, maintaining balanced public budgets in the long term, improving and streamlining public administration, modernising transport, energy and ICT infrastructure, creating a financially sustainable public health model, optimising the education system and the whole national innovation system as key pillars for the development of a knowledge-based society and economy, increasing labour market flexibility or creating favourable conditions for the development of business and business activities.
Czech national R & D & I policy 2021+	An overarching strategic document at national level for the development of all R & D and innovation components in the Czech Republic. The document contributes to the fulfilment of some of the criteria enabling the absorption of European Union funds in the 2021-2027 programming period. Through effective support and targeting ofresearch, development and innovation (R & D & I), it contributes to the prosperity of the Czech Republic, as a country whose economy is based on knowledge and innovation capacity, whose citizens have good living conditions and which is a recognised partner in the community of European countries and globally. In this respect, it should contribute to development and progress in the areas of: governance and funding of the R & D & I system; motivating people to pursue research careers and developing human resources; quality and international excellence in R & D; cooperation in the field of research and application; the Czech Republic's innovation potential. It also responds to the risks and threats of the global nature of the 21st century.
National priorities for research, experimental development and innovation	A strategy paper on R & D & I for the period up to 2030, with gradual implementation, defining priority areas and sub-regions and specific objectives within them. The material contains a description of each priority area and sub-area, indicating the links between them and defining several

	systemic measures. The document also contains a statement on the assumption that R & D & I expenditure is to be allocated from the State budget to different areas, and defines the period during which implementation assessments and updates of priorities will be carried out.
National Research and Innovation Strategy for Smart Specialisation of the Czech Republic 2021-2027 (National RIS3 strategy)	Strategies to ensure coherent and effective targeting of European, national and regional resources to support oriented and applied research and innovation and direct this support to selected priority areas with high potential for creating a long-term competitive advantage for the Czech Republic based on the use of knowledge and innovation.
National Industry 4.0 initiative	A strategy paper aimed in particular at mobilising key industrial departments and representatives to develop detailed action plans in the areas of political, economic and social life. The main benefits should then be reduced energy and raw material intensity of production, increased productivity in production, optimisation of logistics routes, technological solutions for decentralised energy production and distribution systems, or smart urban infrastructure.
Raw materials policy of the Czech Republic in the field of raw materials and their resources	A high-level raw materials strategy, which builds on previous policies and responds to the transformation of the raw materials industry, in particular in the range of raw materials for which modern industry is interested, reflecting in particular the shift towards modern high-tech raw materials used in electronics and other modern industries, and the principles of the European integrated Raw Materials Initiative, created by the increased importance of EU Member States' raw materials security in a pan-European context.
Czech State Environmental Policy 2030 with a view to 2050	An overarching strategic document setting out the implementation of effective environmental protection in the Czech Republic, the main objective of which is to ensure a healthy and high-quality environment for citizens living in the Czech Republic, to contribute to the efficient use of all resources and to minimise the negative effects of human activity on the environment, including transboundary impacts, thereby contributing to improving the quality of life in Europe and globally.
Czech Innovation Strategy 2019-2030	The Strategic Framework Plan, which sets out the government's R & D & I policy and aims to help the Czech Republic to move over a period of 12 years to the most innovative countries in Europe, consisting of nine interlinked countries.

	the pillars containing the baselines, the underlying strategic objectives and the tools to achieve them.
Territorial development policy of the Czech Republic	A national strategy document and a spatial planning instrument binding on the drawing up and issuing of territorial planning documents for regions and municipalities and for decision-making in the territory, the main purpose of which is to coordinate the territorial planning activities of the regions and/or municipalities, and of sectoral policies, strategies and spatial planning documents, and which sets out the regional planning priorities and, in particular, defines development projects (areas and corridors) of transport and technical infrastructure of international and republican importance, or which, by their importance, extend beyond the territory of one region.
The Czech Republic's hydrogen strategy	The Strategy Paper, which builds on the European Hydrogen Strategy and analyses different options for the production and use of hydrogen, and identifies priority areas for further development, considering hydrogen and hydrogen technologies as one of the main tools for achieving the greenhouse gas emission reduction targets as set out in the European Green Deal.
Czech export strategy	Basic strategic document on export promotion and internationalisation of firms aimed at diversifying exports, strengthening the ambition of Czech exporters and improving their position in supply chains, focusing on innovation, production of final solutions and maximising their own added value, as well as ensuring comprehensive support at different stages of export development, from the realisation of the idea, the creation of a product to help secure financing.
Czech Security Strategy	The Czech Security Policy Basic Document, which presents fundamental values, approaches, tools and measures to ensure the security, defence and protection of citizens and the State.
Czech Education Policy Strategy 2030+	A key document for the development of the Czech Republic's education system in the decade from 2020 to 2030, which aims to modernise the Czech education system, prepare it for new challenges and address problems that persist in Czech education

Source: Actual processing of MITs from publicly available information

iii. Overview table containing the main objectives, policies and measures of the plan

Table 4 provides an overview table for the reduction of greenhouse gas emissions. Table 5 shows the renewable energy targets. Table 6 shows the energy efficiency targets.

The main objectives in the other dimensions of the Energy Union (i.e. energy security, internal energy market and research, innovation and competitiveness) and policies and measures in all dimensions of the Energy Union are clearly described in the different sections of this document and it is not possible simply to create an overview table of "reasonable scope" with this information.

Table 4: *Overview table of greenhouse gas emission reduction targets*

2030	2050
Reduction of total greenhouse gas emissions in line with the commitments of the Fit for 55 package. A 26 % reduction in greenhouse gas emissions in the non-ETS sectors compared to 2005. Reducing the share of fossil fuels (used without capture technology) in primary energy consumption to 50 % by 2030.	Moving towards climate neutrality by 2050 and reducing the share of fossil fuels (used without capture technology) in primary energy consumption to 0 %.

Source: Proposal for an update of the Climate Protection Policy in the Czech Republic

Table 5: *Overview table of RES targets (RES share in gross final consumption)*

	2020	**2030** – Roadmap adopted in 2020	**2030** – Roadmap adopted in 2023
Share of RES	13.0 %	22.0 %	30 %

Source: Actual processing of MITs for the purposes of the National Plan

Table 6: *Overview table of energy efficiency targets*

	2020	**2030**
Article 3 (non-binding objective)	Final energy consumption: 1 060 PJ Primary energy consumption: 1 855 PJ	Final energy consumption: 846 PJ9 Primary energy consumption: 1 206 PJ
Article 5 (binding objective)	148.6 I.E.	124,0 I.E.
Article 7 (binding objective)	Annual energy savings: 51.1 PJ Cumulated savings: 204.39 PJ	Annual energy savings: 145 PJ Cumulated savings: 669 PJ

Source: Actual processing of MITs for the purposes of the National Plan

Table 7 *Overview table of targets for replacing fossil hydrogen with renewable hydrogen as required by the Renewable Energy Directive (RED III)*

	2023	**2035**

9This is final consumption in the EUROSTAT methodology, not the so-called 'final consumption 2020-2030'.

Replacement of hydrogen in industry	Under Article 22a of the Renewable Energy Directive, Member States must ensure that industry uses 42 % of RFNBOs for final energy and non-energy purposes. The numerator is the energy value of RFNBOs consumed in the industrial sector for final energy and non-energy purposes minus RFNBOs used for the production of conventional fuels. The denominator is the energy value of hydrogen consumed in the industrial sector for final energy and non-energy purposes, with the exception of hydrogen used for the production of conventional fuels (as an intermediate product) and hydrogen used for the production of biofuels, and with two other exceptions. According to preliminary calculations, this would amount to around 8 000 tonnes per year for the Czech Republic.	Under Article 22a of the Renewable Energy Directive, Member States must ensure that industry uses 60 % of RFNBOs for final energy and non-energy purposes under the same conditions as in 2030. According to preliminary calculations, this would amount to around 12 000 tonnes per year for the Czech Republic.
Reducing emissions in transport	Fuel suppliers shall either achieve a 14.5 % reduction in greenhouse gas emissions from the production of their fuels or at least a 29 % share of renewable energy in the production of their fuels. No**R provides for the use of the emission route referred to in Article 25(a)(ii).** The minimum share of RFNBOs in transport fuel consumption shall be at least 1 %. According to preliminary calculations, this would amount to around 13 600 tonnes per year for the Czech Republic.	The Directive does not yet set a further stricter target for 2035. However, it can be assumed that the increasing number of low-emission vehicles will lead fuel suppliers to increase the share of RFNBOs at the expense of the “greening” of conventional fuel production.

Source: 2021 proposal for a Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council

1.2. Overview of the current political situation

i. National and EU energy system and policy context of the national plan

The policy context of the national plan is described in chapter 1.1.1.1. The description of the European energy system and the policy context at EU level goes beyond this document and is addressed in other documents specifically dedicated to this area.

ii. Current energy and climate practices and measures relating to the five dimensions of energy Union

1.2.1.1 Czech State Energy Concept and other Energy Strategy Papers

The Czech Republic’s State Energy Concept (SEK CR) is a key strategic document containing energy policies and measures and therefore across all five dimensions of the Energy Union. In addition, territorial energy concepts are being developed, which must be consistent with the State energy concept. These conceptual documents are laid down in Act No 406/2000 on energy management, as amended (‘Act No 406/2000’). The State Energy Concept is adopted for a period of 25 years and is binding on the performance of government in the field of energy management. Its processor is the Ministry of Industry and Trade, which evaluates it at least once every 5 years and informs the government of this evaluation.

An evaluation of the Czech Republic's implementation of the State Energy Concept was prepared at the end of 2020 and 2021 and subsequently submitted to the Czech Government for approval. The Czech Government approved the Assessment of the implementation of the Czech Republic's State Energy Policy by its Resolution No 260 of 8 March 2021 and instructed the Minister for Industry and Trade to submit to the Government for approval by 31 December 2023 a draft update of the Czech SEC according to the conclusions contained in document[12]. The implementation of the update of the Czech SEC by 31 December 2023 is also enshrined in the Czech Government's programme statement. The State Energy Concept currently in force was approved by the Czech Government on 16 May 2015 and its horizon is 2040. On 12 April 2023, the Czech Government approved an update of the Czech Republic's State Energy Concept and related strategic documents, which guide the development of the relevant strategies.[13] In the period 2023 to 2024, a draft update of the Czech Republic's State Energy Concept was then prepared with a horizon until 2050.

The main mission of SEK CR is, under standard conditions, to ensure a reliable and environmentally sound supply of energy to the needs of the population and the Czech economy at competitive and socially acceptable prices, while also ensuring an uninterrupted supply of energy in crisis situations to the extent necessary for the functioning of the most important parts of the State and the survival of the population. Accordingly, the Czech Republic's long-term energy vision is a secure, affordable and sustainable supply of households and the energy economy, three principles which together form the so-called energy trilema. On that basis, three top strategic energy objectives of the Czech Republic are defined, namely: (I) security of energy supply; (II) competitiveness and social acceptability (iii); sustainability of energy management.

In order to achieve this vision, the SEC of the Czech Republic formulates a political, legislative and administrative framework which includes, in addition to the top strategic objectives, four main themes of the energy strategy, covering the further direction of energy policy in specific areas, five strategic priorities, as well as legislative and non-legislative instruments for their implementation. In particular, the strategic priorities, which also correspond to the European energy pillars defined under the Energy Union, are: (I) energy security; (II) decarbonisation of the energy mix; (III) energy efficiency; (IV) international cooperation, internal market and infrastructure; (v) energy security. These strategic priorities also define sub-development strategies for each major energy and energy-related area.

In order to give a more specific indication of the direction given by this framework, the Czech Republic's State Energy Concept sets targets and situations, both at a higher level, in the form of a corridor delineation for a diversified mix of primary energy sources and for the composition of a balanced and decarbonised mix of sources for electricity generation, and in a more detailed distinction in terms of values and conditions representing the sub-dimensions of each top strategic objective.

Table 8: *Share of each fuel and energy type in primary energy consumption*

Type of energy	2030	2040	2050
Coal and coal derivatives	10 %	3 %	3 %
Natural gas	21 %	9 %	7 %

[12] The evaluation of the implementation of the Czech Republic's State Energy Policy is published at the following link.
[13] The outcome of the update of the Czech Republic's State Energy Policy and the related strategic documents are published at the following link.

Oil and petroleum products	25 %	20 %	12 %
Nuclear	22 %	42 %	38 %
Renewables	23 %	26 %	41 %

Source: Draft update of the Czech State Energy Concept (2024)

Table 9: *Share of each type of fuel and energy in gross electricity production*

Type of energy	2030	2040	2050
Coal and coal derivatives	9 %	0 %	0 %
Natural gas	15 %	3 %	3 %
Nuclear	44 %	68 %	46 %
Renewables	31 %	29 %	52 %
Others10	1 %	1 %	1 %

Zdroj: Draft update of the Czech State Energy Concept (2024)

Table 10: *Targets for security of energy supply*

Target value and status respectively	Pointer
Have emergency stocks of crude oil and petroleum products in an amount guaranteeing coverage of 95 days of consumption and fresh nuclear fuel stocks for the operation of nuclear reactors for a minimum duration of 36 months and 18 months respectively, subject to the condition for replacement supply.	Standby stocks of primary energy sources
Keep the diversification of primary energy sources below 0.25.	Diversification of primary energy sources
Keep the diversification of gross electricity generation below 0.35.	Diversification of gross electricity generation
Keep the diversification of imports below 0.30.	Diversification of imports

10The other category contains manufactured gases, hydrogen, petroleum products and the non-renewable waste component.

Maintain import dependency not exceeding 65 % by 2030 and 70 % by 2040 when considering nuclear fuel as an import source.	Import dependency
Ensure compliance with the 'N-1' criteria in the operation of the electricity and gas system.	Security of operation of electricity and gas infrastructure
Keep the level of self-sufficiency in electricity supply at a sufficient level in relation to the availability of electricity imports, taking into account both technical constraints and the situation in the region.	Self-sufficiency in electricity supply
Maintain reliability of electricity supply below the reliability standard set according to the applicable methodology.	Resource adequacy of the electricity system

Source: Draft update of the Czech State Energy Concept (2024)

Table 11: *Competitiveness and social acceptability targets and situations*

Target value, respectively	Pointer
Reduce the energy intensity of gross value added generation to the EU average.	Energy intensity of gross value added
Reduce the electricity intensity of gross value added and keep it below the EU average, taking into account the increasing electrification of individual sectors.	Electricity intensity of gross value added
Maintain the import and export capacity of the transmission system relative to maximum load at at least 30 % and 35 % respectively by 2030 and, where appropriate, further increase that capacity after that year in line with current needs.	Degree of integration into international energy networks
Reduce energy price levels to the European Union average and consequently maintain this situation without significant deviations.	Final prices of electricity, natural gas and heat for industry and households
Reduce the share of energy expenditure in total household expenditure and consequently keep it as low as possible below 10 %.	Share of energy expenditure in total household expenditure
Optimise the contribution of the energy sector to gross value added, taking into account the role of the energy sector in the national economy.	Share of the energy sector in gross value added

Increase public spending to support R & D in the energy sector, while keeping its share of total public R & D expenditure at at least 5 %.	Share of energy in public spending on science and research

Source: Draft update of the Czech State Energy Concept (2024)

Table 12: *Sustainability targets and stocks for energy management*

Target value and status respectively	Pointer
Reduce emissions of pollutants and greenhouse gases in accordance with the relevant State strategies in these areas, namely the Czech National Emission Reduction Programme and the Climate Protection Policy in the Czech Republic, and the Czech Republic's international commitments, including the achievement of climate neutrality by 2050.	Emissions of pollutants and greenhouse gases
Reduce the emission intensity of gross value added to the EU average.	Emission intensity of gross value added
Reduce per capita greenhouse gas emissions to the European Union average.	Greenhouse gas emissions per capita
Reduce the share of fossil fuels used without carbon capture technology in primary energy consumption to 50 % by 2030 and 0 % by 2050, and completely phase out the use of coal for electricity and heat production by 2033.	Share of fossil fuels in primary energy consumption
Increase the share of renewable energy sources in gross final energy consumption in line with the Czech Republic's adequate contribution to the European Union's 2030 target and climate neutrality by 2050.	Share of renewable energy sources in gross final consumption
Reduce per capita energy consumption to the EU average and keep per capita electricity consumption consistently below their average.	Energy and electricity consumption per capita
Increase the share of heat from renewable energy sources in heat sold in accordance with the Czech Republic's international obligations within the European Union.	Share of heat from renewable energy sources in heat sold

Keep the share of CHP heat in heat sold above 70 % in the medium term.	Share of CHP heat in sold heat
Increase the share of low-carbon modes of transport in accordance with the Czech Republic’s international commitments within the European Union.	Share of low-carbon fuels and motors in energy consumption in transport

Source: Draft update of the Czech State Energy Concept (2024)

Table 13: *Key Energy Strategy Papers*[15]

Strategy Paper	Short description
State Energy Policy of the Czech Republic	Top strategy paper for the energy sector. The applicable SEC of the Czech Republic was approved in May 2015 and has a horizon until 2040. At the end of 2020 and 2021, the Assessment of the implementation of the Czech Republic’s State Energy Concept was prepared. This evaluation was approved by Government Resolution No 260 of 8 March 2021 and instructed the Minister for Industry and Trade to submit to the Government for approval by 31 December 2023 a draft update of the Czech SEC according to the conclusions contained in the material. On 12 April 2023, the Czech Government approved an update of the Czech Republic’s State Energy Policy and related strategic documents, which guide the development of the relevant strategies. On this basis, a draft update of the Czech SEC was
National Smart Networks Action Plan	It was approved by the Czech Government on 4 March 2015. In particular, it focuses on the concept of network infrastructure development to secure reliable and safe operations in the required development of distributed generation. The update of the National Smart Network Action Plan 2019-2030 was approved by Government Resolution No 149 of 16 September 2019.
National Clean Mobility Action Plan	It is based on the requirements of the approved Regulation 2023/1804 of the European Parliament and of the Council on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council. It was approved on 28 August 2024. Update of the National Clean Mobility Action Plan
National Action Plan for the Development of Nuclear Energy in the Czech Republic	Approved by Government Resolution No 419 of 3 June 2015. The focus of the document is on:

[15] In addition to the strategic documents, mention should also be made of the voluntary commitments of cities and regions (e.g. under the Covenant of Mayors) in achieving energy and climate objectives. The implementation of smart strategies and smart projects at municipal and city level can also be expected to take greater responsibility for achieving climate objectives by local authorities.

	fulfilment of the objectives of the SEC of the Czech Republic with regard to the further
Plan for small and medium-sized reactors in the Czech Republic – use and economic benefit	The material was approved by Government Resolution No 808 of 1 November 2023 and summarises the lessons learned in the small and medium-sized modular reactors sector and the recommendations of a working group led by the Ministry of Industry and Trade. It describes the framework for the possible application of technology in the Czech Republic, defines approaches to economic opportunities, lists
Raw materials policy of the Czech Republic in the field of raw materials and their resources	On 14 June 2017, the Czech Government, by its Resolution No 441 of 14 June 2017, discussed and approved a document entitled 'Raw Materials Policy of the Czech Republic on Minerals and their Resources'. This completed the process of updating the Czech State Raw Materials Policy, which has been ongoing since 2012, with the approval process itself lasting almost a year and a
The Czech Republic's hydrogen strategy	The Czech Republic's hydrogen strategy is being developed in the context of the Hydrogen Strategy for a climate-neutral Europe, which reflects the objective of the European Green Deal – achieving EU climate neutrality by 2050. The updated version of the Czech Republic's Hydrogen Strategy was approved by the Government on 17 July 2024. It sets national targets for the hydrogen

Source: Actual processing of MITs from publicly available information

1.2.1.2 Climate protection policy in the Czech Republic and other climate protection strategy documents

The climate policy in the Czech Republic presents both the 2030 strategy and the roadmap for the development of a low-emission economy by 2050. It focuses on measures to reduce greenhouse gas emissions and is thus complementary to the approved Strategy for Adaptation to Climate Change in the Czech Republic, which focuses on the issue of adaptation to climate change. Climate protection policy in the Czech Republic builds on the Czech State Energy Concept and incorporates and further develops a number of its energy measures. However, it also contains a number of new policies and measures targeting sectors not covered by the EU ETS.

The climate policy in the Czech Republic sets the main objectives for reducing greenhouse gas emissions and sets out long-term indicative targets (see Table 14).

The target of reducing Czech emissions by at least 32 Mt CO2eq by 2020, i.e. by 20 % compared to 2005, has been achieved. An update of the Climate Protection Policy in the Czech Republic is currently being finalised.

Table 14: *Summary of the objectives of the Climate Policy in the Czech Republic*

Horizon Objectives	TargetDescription
2030 headline target	Reduce greenhouse gas emissions in the Czech Republic in line with the Fit for 55 package, reduce greenhouse gas emissions by 26 % by 2030 compared to 2 005 in sectors not covered by the EU ETS
2050 headline target	Moving towards climate neutrality by 2050 and reducing the share of fossil fuels (used without capture technology) in primary energy consumption to 0 %.

Source: Proposal for an update of the Climate Protection Policy in the Czech Republic

The updated Climate Protection Policy will include a new reduction target for 2 030 in line with the Czech Republic's commitments under the Fit for 55 package and the objective of achieving climate neutrality at Czech level by 2 050 in accordance with the European Climate Law.

Table 15: *Key strategic documents in the field of climate protection and the reduction of pollutant emissions*

Strategy Paper	Short description
Climate protection policy in the Czech Republic	The climate policy in the Czech Republic presents both the 2030 climate strategy and the roadmap for the development of a low-emission economy by 2050. It focuses on measures to reduce greenhouse gas emissions and is thus complementary to the approved Strategy for Adaptation to Climate Change in the Czech Republic, which focuses on the issue of adaptation to climate change. The POK currently in force was approved in March 2017, its implementation was evaluated in 2021 and is currently in the process of being updated.
State Environment Policy of the Czech Republic 2030 with a view to 2050	State Environmental Policy 2030 covers environmental protection in its entirety and sets a strategic direction, i.e. targets, for 2030. The document sets out an ideal vision for 2050. It was approved by Resolution No 21 of 11 January 2021.
Climate change adaptation strategy in the Czech Republic	An overarching nationwide climate change adaptation strategy to reduce vulnerability and increase the resilience of human society and ecosystems to climate change and thus reduce its negative impacts. The current strategy was approved by Resolution No 785 of 13 September 2021. Its implementation document is the National Action Plan for Adaptation to Climate Change. The strategy focuses on addressing all major climate change manifestations in Czechia and sectors/areas of climate change impacts in the Czech Republic, including industry and energy.

National Action Plan on Adaptation to Climate Change	It was approved by Government Resolution No 785 of 13 September 2021. It follows on from the updated 2021 Strategy for Adaptation to Climate Change in the Czech Republic and contains specific measures for its implementation, including the responsibility of individual departments and the deadlines for carrying out the proposed tasks.
Czech national emission reduction programme	This is a basic design material for improving air quality and reducing emissions from air pollution sources. The Czech National Emission Reduction Programme currently in force was approved by Government Resolution No 987 of 20 December 2023.

Source: Actual processing of MITs from publicly available information

iii. Key issues of cross-border relevance

The main issues of transboundary importance generally include (i) major strategic documents subject to an international environmental impact assessment (SEA) process; (II) major infrastructure projects, in particular cross-border interconnections for the transmission of electricity, the transport of natural gas and the transport of oil and petroleum products, but also the large-scale construction of major generation resources or resources located close to the border with a neighbouring State (these projects are, in the vast majority of them, subject to an international EIA process); (III) transnational cooperation in the field of science and research; (IV) other activities that may have an impact on another member country.

iv. Governance structure for the implementation of national energy and climate policies

As regards the administrative structure of the implementation of national energy and climate policies, the Ministry of Industry and Trade, which is the central government authority in the field of energy, and the Ministry of the Environment, which is the central government authority in the field of climate policy, play an important role. The Ministry of Foreign Affairs also takes care of the Czech Republic's relations with neighbouring countries by preparing themes and disconcertation of common themes. These ministries are responsible for drafting legislation in the above-mentioned areas as well as strategic material of a non-legislative nature. Measures of a legislative or non-legislative nature are listed in the so-called legislative or non-legislative plan of the Czech Government. Legislative measures and policies are undergoing a standard legislative process involving the Czech Government, the Chamber of Exchange, the Senate and the President of the Czech Republic. The non-legislative material is approved by the Government of the Czech Republic, which adopts the relevant resolutions, which specifically mentions the tasks arising from the resolution. In the vast majority of cases, the preparation of top strategy documents, their content and their binding nature are enshrined in legislation. For example, Act No 406/2000 Coll. on energy management lays down the obligation to prepare, the requirements and the binding nature of the State energy concept.

Consultation and involvement of national and Union bodies and their outcome

On 12 April 2023, the Czech Government approved an update of the Czech State Energy Policy and related strategic documents. This document inspired the creation of the Commission and the Energy and Climate Strategy Platform, where relevant departments and other relevant actors are represented, namely the Chamber of Commerce of the Czech Republic, the Confederation of Industry and Transport of the

Czech Republic, the Green Circle, the Union of Cities and Municipalities of the Czech Republic or the Association of Regions of the Czech Republic. The preparation of the draft update of the Czech National Plan was discussed on this salary. At the same time, the preparation of the document was also discussed in other relevant salaries.

A public consultation on the draft update of the Czech National Plan was carried out between 15 May 2023 and 4 June 2023 using a structured online questionnaire. The public consultation received responses to the following six structured questions.

1) What specific information and/or specific topics in the Czech Republic's national plan currently in force are no longer relevant and should be revised/updated?
2) In your opinion, which specific themes/topics are missing from the Czech Republic's national plan currently in force and should be added?
3) How should national targets be revised to match those defined at EU level?
4) What specific policies and measures in the five dimensions (carbon reduction, energy efficiency, energy security, internal energy market and research, innovation and competitiveness) are missing and should be complemented?
5) What changes should be reflected in the state of play and projections based on existing policies and measures?
6) Is the impact assessment of planned policies and measures sufficient and what specifically should be revised or completed in this section?

In total, 164 responses were received and evaluated from respondents. The evaluated public consultation is published on the website of the Ministry of Industry and Trade (link below).

In May/June 2023, when the public consultation was ongoing, a comprehensive text of the draft update was not yet available. Therefore, a second public consultation was carried out between 9 January and 29 February 2024, using a structured online questionnaire. The public consultation received responses to the following eight structured questions. These were single-choice questions with the possibility to add comments and other open questions.

1) In your opinion, does the draft update of the Czech Republic's National Plan affect all relevant areas and adequately reflect developments compared to the document currently in force approved in 2020?
2) Which aspects or areas are not sufficiently covered/reflected and should be described in more detail in the final version of the document? On the contrary, what aspects or areas are sufficiently covered/accrued?
3) Are the policies and measures in each of the five dimensions sufficient to meet the objectives at Czech level?
4) Is there an additional description of the current situation?
5) Are there any sub-areas missing, or are some areas described imprecisely?
6) Are estimates of the evolution of the five dimensions by 2030 based on existing policies and measures realistic?
7) Is the analytical base sufficient, or is there any sub-areas missing or not sufficiently described?
8) What are the other important insights on content, preparation process, etc. that you would like to highlight? Please be as specific as possible and, if the content is commented, indicate the specific parts covered by your comment.

The evaluation of this public consultation on the update of the Czech National Energy and Climate Plan is also available on the website of the Ministry of Industry and Trade (link below). In total, 1092 responses were received and evaluated from respondents.

i. Consultation of other Member States

The draft update of the Czech Republic's National Plan was consulted regionally in accordance with Article 12 of Regulation (EU) 2018/1999 as follows. On Thursday 27 April 2023, a consultation was held at the level of the Visegrad Four (V4), representing the Czech Republic, Slovakia, Poland and Hungary. Continuous work on draft updates of vntirostan plans was discussed, with a specific focus on renewable energy and energy efficiency. Under the Presidency of the V4, the Czech Republic held a regional consultation on 7 March 2024, focusing on the finalisation and implementation of the national plans. The Czech Republic also discussed relevant parts of the Czech Republic's National Plan on relevant bilateral and multilateral platforms. Consultations with other Member States also took place in the framework of platforms initiated by the European Commission and the European Council respectively.

ii. Iterative process with the European Commission

In December 2023, the European Commission issued a recommendation on the draft update of the National Plan[11]. These are the recommendations set out below. These recommendations have been taken into account as far as possible in the finalisation of this material.

1. Set out cost-effective measures, in particular in the field of transport and buildings, to achieve the target of reducing greenhouse gas emissions in the non-ETS sectors (ESR) by 26 % compared to 2005. Provide updated projections of greenhouse gas emissions that will meet this target. Where appropriate, set out a plan to use the flexibilities to meet this objective. Complement information on specific policies and measures, including their sectoral focus, timeline and, where possible, the impact on greenhouse gas emission reductions.
2. Identify the amount of CO_2 that can be captured annually in 2030, including the source of this information.
3. Set a specific trajectory to reach the 2030 target set by the revised LULUCF Regulation. Add specific additional measures to ensure that this objective is met, including information on the use of EU and national financial resources. Provide information on progress in increasing the tiers of reporting of emissions and sinks according to the LULUCF requirements of the Regulation.
4. Provide relevant additional analyses on climate change vulnerabilities and risks. Complement adaptation measures related to the achievement of the objectives of the Energy Union.
5. Increase the ambition to increase the share of RES in final energy consumption from 30 % to 33 % in 2030, a share corresponding to the calculation formula under the Renewable Energy Directive.
6. Provide trajectories and a long-term plan for the development of RES for 10 years, with a view to 2040, including an indicative target for innovative RES, targets for buildings and industry, and heating and cooling. Also complement the target for achieving the sub-target for advanced alternative biofuels and renewable fuels of non-biological origin (RFNBO) by 2030.
7. Complement policies and measures to meet the 2030 RES target, in particular in the area of speeding up permitting processes and acceleration zones, but also e.g. renewable energy purchase agreements, guarantees of electricity origin and community energy support. They will provide more information on the decarbonisation plan for heating and cooling.
8. Include measures to promote sustainable biomethane.
9. Provide a timeline for steps towards meeting the requirements of the revised Renewables Directive, including its transposition.
10. Complement the data on energy consumption by sector in the public sector and the total floor area of heated buildings owned by public institutions to calculate the required annual savings.
11. Complement information on policies and measures to achieve energy efficiency targets, including a description of support schemes and programmes and measures addressing energy poverty.
12. Further support the set energy efficiency target by providing additional information on policies and

11 https://commission.europa.eu/publications/commission-recommendation-assessment-swd-and-factsheet- draft-updated-national-energy-and-climate-11_en

measures, including sources of financing, estimated costs and the amount of energy saved.

13. Explain in more detail how the Czech Republic will support the reduction of natural gas demand by 2030. Strengthen the resilience of the energy system, in particular by setting a target for energy storage and policies and measures aimed at adapting the energy system to climate change. Specify measures aiming at diversification of nuclear fuel supply, construction of new reactors and long-term management of nuclear waste. Assess the adequacy of oil infrastructure in the light of the need to reduce dependence on Russian oil and move towards low-carbon alternatives.
14. Set clear demand targets to improve the flexibility of the energy system and describe measures towards its integration in line with Article 20a of the revised Renewable Energy Directive. Strengthen the market position of consumers, including the promotion of community energy, self-consumers and collective purchases.
15. Further develop the approach to addressing energy poverty by including an assessment of the current situation of households and setting a specific measurable target and relevant policies and measures in this area. Explain how current energy affordability and energy efficiency measures already reduce energy poverty.
16. Further clarify national research, innovation and competitiveness targets in the context of the transition to a zero-emission circular economy. Set up policies and measures to support projects, including in energy-intensive industries. Describe the regulatory framework for permitting processes and how access to finance will be improved. Complement policies and measures to develop the necessary skills and ensure the availability of key facilities and their components.
17. Specify reforms and measures to mobilise the private investment needed to achieve the energy and climate objectives. Improve and expand the analysis of investment needs to cover private and public financing needs overall and by sector. Complement this analysis with an overview of funding sources at national, regional and EU level. Add a description of the types of financial support schemes and financial instruments used and how private resources are mobilised. Consider possible sales of non-ETS surpluses to other Member States.
18. Describe the consistency of the policies and measures covered with the National Recovery Plan, including the RepowerEU part.
19. Explain in more detail the plans of the Czech Republic to end support for fossil fuels.
20. They will provide detailed information on the expected impacts of the tranche – social, employment and other distributional impacts. Complement measures to support a just transition. Specify the sources of support in this area and information on the consistency with the upcoming Social Climate Plan.
21. Ensure inclusive public participation and broad participation of local governments and civil society in the preparation of the plan. Describe this process and provide a summary of the views of the different actors and how their ideas have been incorporated, if any.
22. Intensify regional cooperation with surrounding Member States. Consider involvement in Central and South-Eastern Europe Energy Connectivity (CESEC) High-Level Group. Add information on the implementation of Article 9 of the revised Renewable Energy Directive on joint projects between Member States in the field of RES.

Regional cooperation for the preparation of the plan

i. Elements subject to joint or coordinated planning with other Member States

The national plan does not contain any parts to be prepared at regional level. Unfortunately, joint programming, at least in sub-parts/topics, was not possible due to the timing of the preparation and the fact that this is the first ever development of national plans. In spite of this, it can of course be noted that coordinated planning is already taking place in a number of aspects, for example in the areas of infrastructure, operation of transmission systems, etc. However, the Czech Republic would like to initiate joint preparation of selected parts/topics with neighbouring or other Member States when drawing up this document for the next period or when it is updated. In this respect, joint preparations are offered in the field of energy security, possibly the internal energy market, but also of course other parts/themes.

ii. Explanation of how regional cooperation is considered in the plan

The Czech Republic prefers a "bottom-up" approach to regional cooperation. The Czech Republic actively cooperates with other Member States on various multilateral or bilateral platforms, depending on the issues involved – electricity, gas, research, development and innovation, etc.

The Czech Republic does not consider it appropriate to initiate a specific regional cooperation platform aimed at discussing the national plan as a whole, also given that the regional dimension is different for different topics. For example, in the field of electricity, a different cooperation platform is important for the Czech Republic compared to, for example, the gas sector.

However, this year, the Czech Republic approached selected Member States with whom it already had bilateral or multilateral cooperation and discussed a national plan with them. More information can be found in Chapter 1.3, in particular in Part I.

2 National targets

2.1 'Carbon reduction' dimension

2.1.1 Greenhouse gas emissions and removals 12

i. The elements set out in Article 4, paragraph 1. 1 (a)

In the area of EU climate and energy policy, the main objectives are set by the European Climate Law (Regulation (EU) 2021/1119 of the European Parliament and of the Council). It has legally enshrined the EU-level emissions reduction target of at least 55 % by 2030 compared to 1990 and the objective of EU climate neutrality by 2050. At the same time, these targets build on the broader 'European Green Deal' initiative, which also includes targets in other areas of the environment, including the 2050 zero pollution ambition.

The Fit for 55 package should ensure that the EU's 2030 target is met. This is a set of revised EU legislation that was part of the previous 2030 Climate and Energy Framework and several new legislative initiatives. The EU greenhouse gas emissions trading target (EU ETS) has been increased to 62 % compared to 2005 compared to the initial target of 43 % by 2030. At the same time, a new emissions trading system has been introduced for other emission sectors, including mainly road transport and the buildings sector, and a new carbon border adjustment mechanism is introduced to safeguard the EU's competitiveness. The Innovation and Modernisation Fund is also being strengthened, and in particular the Modernisation Fund, together with the revenues from the auctioning of emission allowances, should play a key role in the decarbonisation and green transition of the Czech Republic.

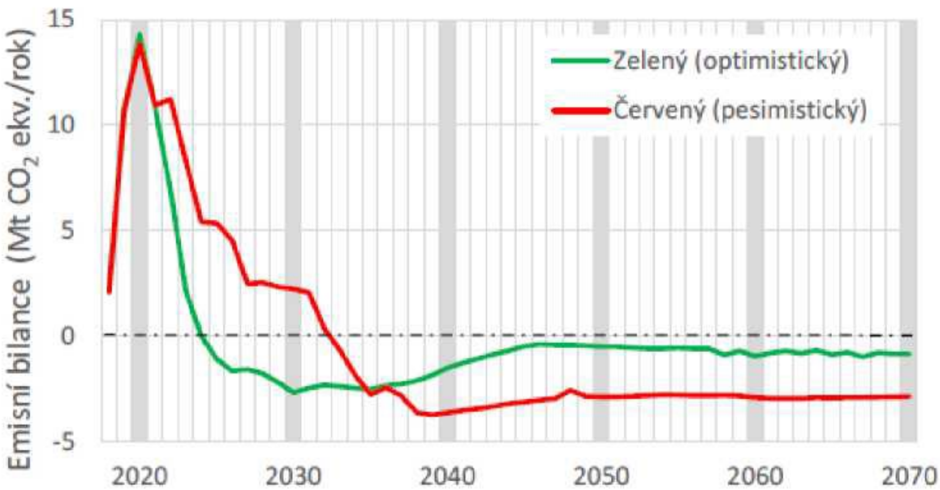
The revision of Regulation (EU) 2018/842 of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 sets a target for the Czech Republic to reduce emissions in non-ETS sectors by 26 % between 2005 and 2030. This is a significant increase from the original reduction target of 14 % by 2030. The overall EU-level target for these sectors has been increased from 30 % to 40 %.

12Consistency to be ensured with long-term strategies pursuant to Article 15.

The model decarbonisation scenario, drawn up for the purposes of updating the National Plan and the related Czech strategic documents, achieves a 34 % reduction in emissions in these sectors by 2030. Based on the modelled sectors, residential buildings and transport are the biggest emitters, with the highest investment needs at the same time. The waste and F-gas reduction sectors should also play an important role in reducing emissions, but not directly modelled and based on previous estimates based on existing regulations and measures. For the more difficult to reduce emissions from the agricultural sector, only a slight decrease is expected by 2030, especially in relation to the implementation of the Nitrates Directive and the promotion of environmental and climate action under the Common Agricultural Policy. The necessary measures in sectors outside the EU ETS were further specified in the update of the Climate Protection Policy in the Czech Republic.

Regulation 2023/839 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/841 sets an EU-level target of 310 million t CO_2 for sinks from the land use and forestry sector (LULUCF) in 2030, while setting targets for each Member State for 2030. The Czech Republic's objective is to increase net sinks by 827thousand CO 2 compared to the average of 2016, 2017 and 2018, i.e. to achieve sinks of approximately 1 228 thousand t CO 2based on the 2020 emissions inventory data. The achievement of this objective will depend primarily on the rate of decline of bark beetle and the rate of forest restoration. In a more optimistic so-called 'green' scenario, the 2030 target can be achieved, but in other scenarios the Czech Republic will still report a certain level of emissions from the LULUCF sector in 2030, as shown in the graph below. Recent developments in the forestry sector tend to confirm the assumptions of the green scenario and, on the basis of the latest updated estimate, we assume that the Czech Republic could achieve LULUCF sinks of around 3.8 million t CO_2 in 2030 and meet the target set by Regulation 2023/839.

Graph 4: *Prediction of the evolution of the forest sector's emission balance*



However, for the period 2021-2025, the obligation that emissions from all land use categories, taking into account flexibilities, do not exceed sinks of greenhouse gas emissions ('no-debit rule') is maintained. For the category of managed forest land, a specific accounting method is established on the basis of the forest reference level, which for the Czech Republic was set at -6 137.19 thousand t CO 2. On the basis of a comparison of this benchmark with the emissions projection for the LULUCF sector, it is clear that the Czech Republic will have significant problems in meeting the 'no-debit rule' and its commitments during this period. In relation to the LULUCF sector and carbon neutrality, it should therefore be pointed out that the role of forestry in the Czech Republic has temporarily changed in terms of sinks of CO_2 because of the incidental harvesting associated with the elimination of bark beetle. As a result, managed forests have become an important source of CO_2 on a temporary basis. Emissions from the LULUCF sector peaked in 2020, with 9.7 Mt CO2eq. In subsequent years, accounted emissions should be reduced following the evolution of bark beetle calamity, the decline in random harvests and the measures implemented. However, based on data from the latest 2022 emissions inventory, they have already decreased to 3.4 million t $CO_{2\,eq}$., and on the basis of the latest data, the Czech Republic is expected to report again net sinks from the LULUCF sector for 2024. However, despite these positive developments, the prescribed way of accounting emissions and sinks from managed forest land will cause a significant shortfall compared to the no-debit rule obligation, which may be around dozens of millions of $CO2_{eq}$over the period 2021-2025. We expect a partial reduction in this deficit on the basis of the technical correction to the forest reference level that the Czech Republic plans to submit by the end of this period in relation to the changes made to the methodology for reporting emissions and sinks from the LULUCF sector. At national level, there is also a debate on the possibilities to use the provisions for accounting for natural disturbances and the use of the flexibilities allowed by the LULUCF Regulation.

In reducing greenhouse gas emissions, priority will also be given to reducing health-risk emissions to the air, which includes the urgent reduction and elimination of local stoves and stoves in coal-fired households and, by increasing the energy efficiency of buildings, efforts will also be made to ensure that emissions of hazardous substances (PAHs) from the burning of wet wood, which are very often exceeded in the Czech Republic, are also reduced as much as possible.

Transport will also, as a matter of priority, reduce greenhouse gas emissions as well as emissions of hazardous substances through the decommissioning of technically and low-energy efficient diesel and petrol engines, where external damage to health and property significantly outweighs external climate damage.

ii. Where appropriate, other national objectives and targets consistent with the Paris Agreement and existing

long-term strategies. Where applicable for the contribution to the overall Union commitment of reducing the GHG emissions, other objectives and targets, including sector targets and adaptation goals, if available

In March 2017, the Government of the Czech Republic adopted the Climate Protection Policy in the Czech Republic, which presents a long-term strategy for the transition to a low-carbon economy and the Czech Republic’s contribution to achieving the objectives of the Paris Agreement. As a long-term low-emission development strategy in accordance with Article 4 of the Paris Agreement, it was sent to the UNFCCC Secretariat on 15 January 2018.

It is therefore a 2030 climate strategy with a long-term perspective for the transition to a sustainable low-emission economy by 2050. It defines the main climate protection targets and actions at national level to ensure that greenhouse gas emission reduction targets are met following obligations under international agreements (UN Framework Convention on Climate Change and its Kyoto Protocol, the Paris Agreement and commitments stemming from European Union legislation).

In 2021, an evaluation of the policy on climate protection in the Czech Republic was carried out. The 2020 targets were achieved and most of the measures were at least partially implemented. Its update is currently being finalised.

The National Climate Change Adaptation Strategy sets national targets for adaptation to climate change in the Czech Republic, the first update of which was approved by the Government of the Czech Republic in September 2021. The strategic objective of adaptation is to increase the preparedness of the Czech Republic for climate change – reduce vulnerability and increase the resilience of human society and ecosystems to climate change and thus reduce its negative impacts.

The strategy further articulates 5 specific objectives:

SC1 Ecological stability and the provision of ecosystem services in agricultural landscapes are ensured, with an emphasis on reducing both degradation and land take and strengthening the natural water regime.

SC2 The ecological stability and provision of forest ecosystem services is ensured, with an emphasis on avoiding soil degradation and strengthening the natural water regime.

SC3 The ecological stability and provision of ecosystem services of water and water-related ecosystems is ensured, with an emphasis on strengthening the natural water regime of the landscape and with a view to meeting the needs of human society and sustainable water use.

SC4 The resilience of human settlements, including their public and green infrastructure, is significantly strengthened, with an emphasis on the protection of human health.

SC5 A high efficiency of the population's early warning and responsible response system is achieved.

In September 2021, together with the Strategy for Adaptation to Climate Change in the Czech Republic, the Government of the Czech Republic approved its implementation document, the National Action Plan for Adaptation to Climate Change, which includes, inter alia, the following measures:

- Ensuring sufficient biomass as an energy resource, taking into account the need to maintain sufficient soil organic matter
- Promotion of renewable energy technologies for cooling and air-conditioning of buildings
- Adaptation of current safety measures (crisis and emergency plans) and risk management systems in industrial installations
- Ensuring energy security in the context of climate change
- Ensuring sufficient biomass as an energy resource and promoting environmentally friendly and economically advantageous energy resources

The main analytical basis for updating the Climate Change Adaptation Strategy in the Czech Republic and the National Action Plan for Adaptation to Climate Change, an updated comprehensive study of the impacts, vulnerabilities and sources of climate change risks in the Czech Republic from 2019 includes a specific chapter on industry and energy. In general, the study notes that climate change poses a challenge to the energy sector in terms of the need to reduce emissions and to face the increasing risks from the multiple impacts of climate change, which may pose a serious threat to energy security. Thus, increasing the resilience of the energy sector does not only protect energy companies, but also the economies and populations that rely on energy services. A wide range of climate change impacts could affect all essential components of the energy sector: production, transformation, transport and storage, as well as demand.

Furthermore, the study contains a summary what-if analysis discussing the potential impacts of specific climate change manifestations (increasing average air temperature, long-term drought, floods, other extreme events) on the industrial and energy sectors. It assesses, for each impact, the probability of the occurrence of a given scenario, the severity of the impact and the vulnerability of the system, on the basis of which it determines the level of subjective risk for each impact. Threats to the energy distribution and transmission system in terms of threats to integrity, functionality and possible more frequent outages (both due to extreme damage and increased energy consumption requirements, e.g. due to increases in average air temperature) are identified as the area with the highest subjective risk. The impact identified as having a lower subjective rating is the risk to the cooling processes of thermal power plants (nuclear, coal and steam-gas) due to drought and combined with higher electricity consumption for cooling in cumulation with planned maintenance of sources and grids, as well as the impact on electricity generation from hydro sources, heating plants, thermal power plants (where water serves as a heat transfer or cooling medium, etc.). The impacts of reducing biomass production used for electricity and heat production are identified as a low subjective risk.

The second analytical basis for updating the Strategy for Adaptation to Climate Change in the Czech Republic and the National Action Plan for Adaptation to Climate Change, Assessment of the vulnerability of the Czech Republic in relation to climate change for 2017, notes that the energy sector is relatively stable in the Czech Republic, but that different types of energy equipment are differently vulnerable to the manifestation of climate change and are most vulnerable to the manifestation of long-term droughts. Nuclear and coal-fired power plants, which depend on cooling water, account for the dominant share of electricity production in the Czech Republic, making the sector vulnerable to water supply. In most cases, this water is cooled in cold towers, which, in the event of extreme temperatures, have reduced cooling efficiency and thus electricity generation efficiency, but are more resistant to the effects of heat than flow cooling in the river. Episodes of long-term drought affect the amount of biomass and thus its combustion, and electricity production in hydropower plants is also at risk at low water flow rates, with the total shutdown of these plants. In periods of extreme temperatures, both electricity generation and photovoltaic plants are seeing reductions, with panels becoming less efficient as a result of overheating.

The vulnerability of electricity generation in the event of extreme precipitation, floods and flash floods is particularly relevant for hydropower plants. Large hydropower plants with dams can prevent smaller floods, but they can only temporarily mitigate the impact of large floods. Small hydropower plants built on lakes are unable to influence the flood. In the event of severe floods, electricity production is shut down for safety reasons, and dams are also at risk of rupture.

Electricity distribution is sensitive to extreme weather events. The occurrence of electricity supply disruptions fluctuates considerably and, according to the available data, individual interruptions cannot be attributed to specific manifestations of extreme weather conditions. However, with the more intense and frequent effects of climate change, higher numbers of unplanned electricity disruptions are to be assumed, which will increase the vulnerability of individual areas, in particular the population.

However, due to energy security, electricity production in the Czech Republic is relatively stable. Even in the case of long-term inactivity of the power plant, the failure can be replaced by other energy sources. However, adaptive capacity is reduced, in particular, by the impossibility of long-term accumulation of stocks.

In July 2021, the Government of the Czech Republic approved the first hydrogen strategy of the Czech Republic, which was subsequently updated in 2024. Hydrogen and hydrogen technologies are one of the main tools for achieving the greenhouse gas emission reduction targets set out in the European Green Deal. Its strategic objectives include reducing greenhouse gas emissions and promoting economic growth. The strategy further analyses different options for the production and use of hydrogen and identifies priority areas for further development in the 2050 timeframe linked to the strategic horizon of the European Green Deal.

One of the instruments for reducing emissions in electricity generation and through electrification in other sectors, and in heat generation, is the use of nuclear power, the share of which is to be increased in the long term through the construction of new nuclear sources and the expansion of the use of nuclear energy for heating.

Table 16: *Main objectives of the climate policy in the Czech Republic*

Horizon Objectives	TargetDescription
2030 headline target	Reduce greenhouse gas emissions in the Czech Republic in line with the Fit for 55 package, reduce emissions by 26 % by 2030 compared to 2 005 in sectors not covered by the EU ETS.
2050 headline target	Moving towards climate neutrality by 2050 and reducing the share of fossil fuels (used without capture technology) in primary energy consumption to 0 %.

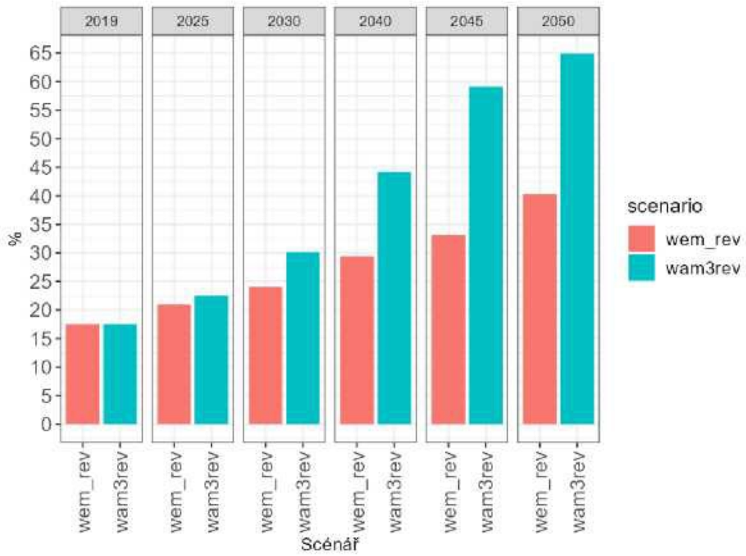
Source: Proposal for an update of the Climate Protection Policy in the Czech Republic

2.1.2 Renewable energy (2030 framework target)

i. Elements set out in Article 4(2)(a)

In its 2019 and 2020 national plans, theCzech Republic set a target of 22 % for the share of renewable energy sources in gross final consumption by 2030, corresponding to an increase of 9 percentage points compared to the national target of 13.0 % for 2020. As a result of recent developments and the introduction of additional measures, the Czech Republic is increasing its contribution to the EU target of 42.5 % resulting from the EU legislation currently in force to 30.1 % of the original 22 %.

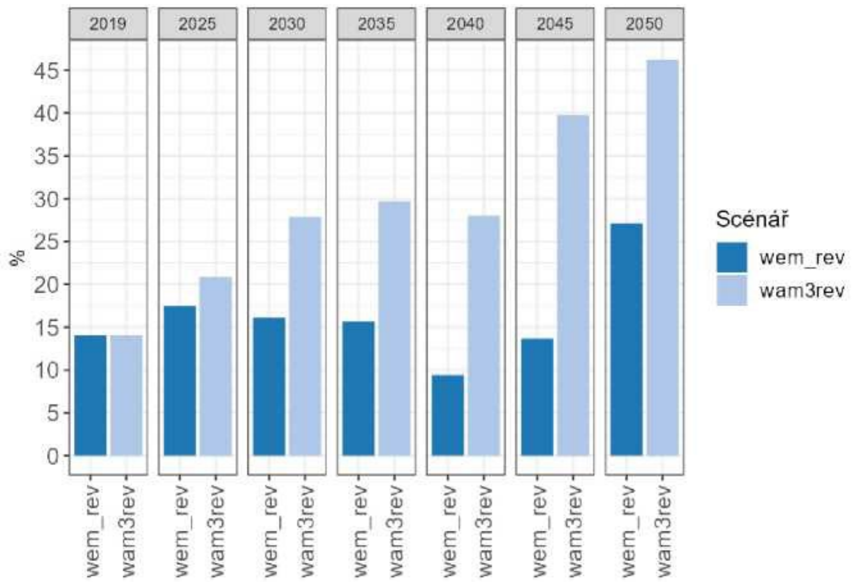
Graph 5: *Expected share of RES by 2030*



Source: SEEPIA project outputs

ii. Estimated trajectories for the sectorial share of renewable energy in final energy consumption 2021-2 030 in the electricity, heating and cooling and transport sectors

Figure 6: *Share of RES in gross final consumption in the electricity sector*



Source: SEEPIA project outputs

Table 17: *Evolution of the share of RES in the heating and cooling sector (%)*

Screenplay	2019	2025	2030	2035	2040	2045	2050
WEM	25,4	29,4	35,4	37,9	45,1	46,5	46,1
WAM	25,4	30,5	40,2	50,0	64,0	69,5	74,1

Source: SEEPIA project outputs

Figure 18: *Evolution of RES share in transport sector with multipliers (%)*

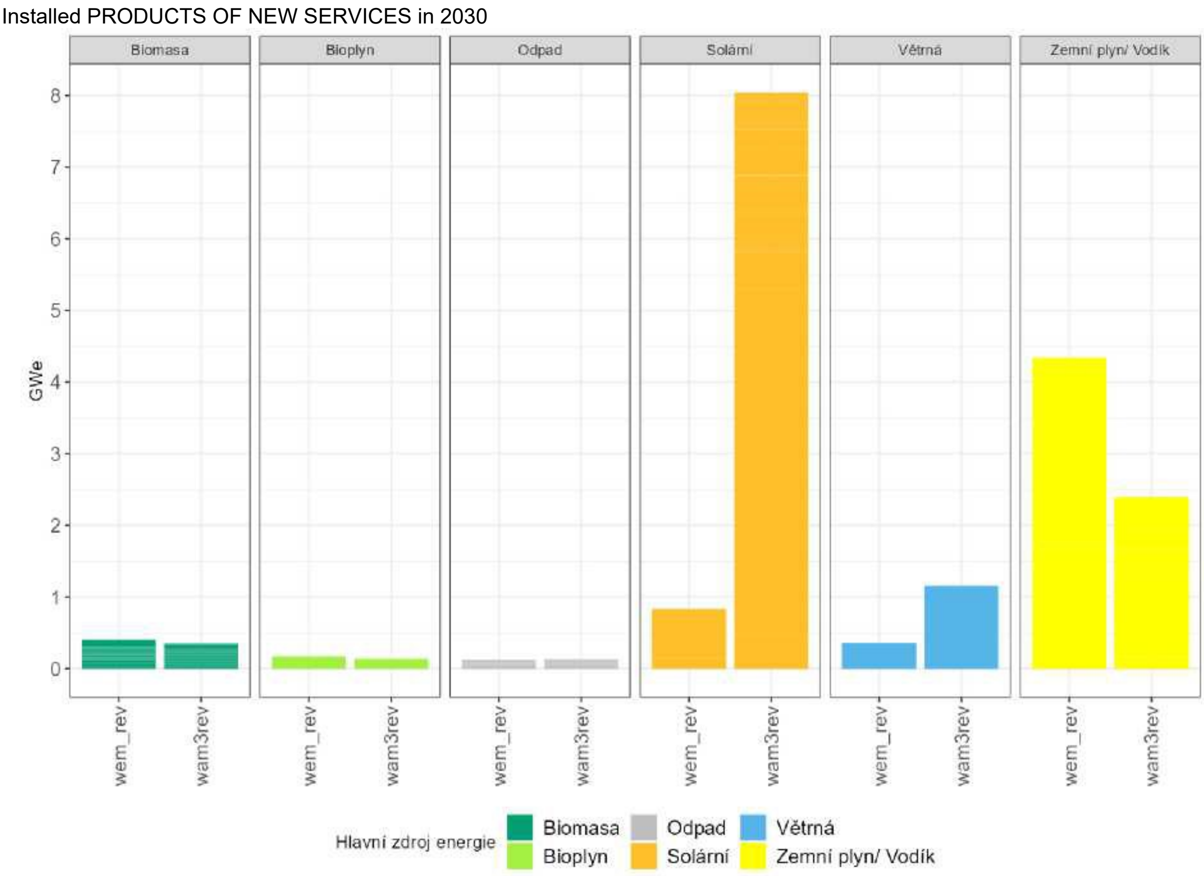
Screenplay	2019	2025	2030	2035	2040	2045	2050
WEM	8,1	9,5	13,7	17,8	30,4	43,7	90,8
WAM	8,1	10,1	18,1	36,0	47,1	142,0	172,6

Source: SEEPIA project outputs

The share of RES in transport already reflects the EU Renewable Energy Directive, which has not yet been approved, and expects greenhouse gas emissions savings to be achieved at 14.5 % and 13.7 % respectively in 2030 (using the deductions allowed by the Directive).

iii. Estimated trajectories by renewable energy technology that the Member State projects to use to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030 including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed capacity (divided by new capacity and repowering) per technology and sector in MW

Graph 7: *Installed electricity generation capacities of new sources in 2030*



Source: SEEPIA project outputs

Renewable hydrogen production targets for 2030 are defined by requirements to replace fossil hydrogen in industry and fossil fuels in transport based on Directive 2023/2413 on the promotion of the use of energy from renewable energy sources of June 2023. It will likely be possible to import only a limited amount of renewable hydrogen by 2030, so most of the renewable hydrogen needed in 2030 will have to be produced within the Czech Republic. The estimated installed capacity of electrolysers to produce the requested amount of 19 333 tonnes of renewable hydrogen per year is in the table below. A total of

19 333 tonnes of renewable hydrogen consists of hydrogen required to cover RED requirements in industry (5 733 tonnes) and transport (13 600 tonnes).

In the context of the new mandatory targets under Directive 2023/2413 on the promotion of the use of energy from renewable energy sources from June 2023 for the development of renewable fuels of non-biological origin by 2030, which includes renewable hydrogen, it is necessary to include the construction of electrolysers for the production of renewable hydrogen (i.e. water electrolysis using electricity from renewable energy sources, so-called RFNBO). The predicted need of 19 333 tonnes of RFNBO would require installed electrolyser capacity at a level of at least 400 MWe (following an expected utilisation ratio of 30 %). The main drivers of the shift towards renewable hydrogen production are mainly international climate change commitments, the global financial community's pressures on systemic decarbonisation and the adaptation of economies, and new and significant reinforcements of energy security (resilience).

From 2030 at the latest, two hydrogen pipelines will be available to be built through the conversion of existing pipelines of the transmission system. One between Lanžhot and Waidhaus to import hydrogen from North Africa, Ukraine and South East Europe. The second between Brandov and Waidhaus, which will serve to import hydrogen from Scandinavia and areas in the Baltic and North Seas, building on the planned Kernnetz hydrogen infrastructure in Germany. Each of these pipelines will have an initial import capacity of around 1.5 Mt of hydrogen/year (50 TWh/year). This capacity is more than sufficient to cover expected consumption in the Czech Republic and can be further increased if necessary. Therefore, in case of demand, it will be possible to import significant amounts of renewable hydrogen from these sites, even beyond the required minimum quantity based on Directive (EU) 2023/2413.

Table 19: *Expected cumulated installed power of electrolysers for renewable hydrogen production (electric)*

Installed power (MWe)	*2016*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*	*2026*	*2027*	*2028*	*2029*	*2030*
Electrolysers	*0*	*0*	*0*	*0*	*0*	*2*	*10*	*60*	*160*	*240*	*320*	*400*

Source: Updated hydrogen strategy of the Czech Republic

iv. Estimated trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply by feedstocks and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink

On the basis of the Council Implementing Decision on the approval of the assessment of the recovery and resilience plan for Czechia, and is one of the milestones conditioning the absorption of funds from the recovery and resilience plan of the Czech Republic, a document entitled: "Assessment of trajectories for sustainable use of bioenergy in the Czech Republic"(reference).

The above-mentioned document contains a quantification or a qualified description of bioenergy demand and resources, with an emphasis on their sustainability, in order to objectively demonstrate the sufficiency of sustainable biomass resources by 2030 to meet demand. It also describes the impacts on land use, land use change, forest carbon sinks, biodiversity and the impact on air quality.

v. Where applicable, other national trajectories and objectives, including long-term and sectoral trajectories and targets

(e.g. share of renewable energy in district heating, use of this energy in buildings, renewable energy produced by cities, renewable energy communities and self-consumers, energy recovered from sludge in wastewater treatment)

The draft update of the Czech Republic's State Energy Concept sets objectives to increase, in accordance with the Czech Republic's international obligations within the EU, the share of heat from renewable energy sources in heat sold, as well as the share of low-carbon fuels and motors in energy consumption in transport.

Particular emphasis will be placed on renewable energy communities ("community energy"), which are behind economic, environmental and social benefits at local and national level. The participation of citizens and local authorities (e.g. municipalities) in community energy projects creates significant added value in terms of local acceptance of renewables and access to private capital. Its development is accompanied by local investment, increased consumer choice and increased citizen participation in the energy transition. In particular, the participation of citizens and local authorities in community energy is linked to the desired increase in renewable energy production and an emphasis on energy savings. Community energy can thus become an important element in achieving the Czech Republic's objectives in individual areas.

2.1.3 Estimated trajectories for renewable and low-carbon hydrogen demand

Renewable and low-carbon hydrogen is an important energy-gonist that can contribute to reducing greenhouse gas emissions and decarbonising transport, industry, services, energy, households, agriculture and other sectors. In addition to clean electricity, hydrogen will partially replace some fossil fuels after their gradual phase-out towards 2050. In these efforts, the Czech Republic coordinates its action within the European Union.

In the view of SEK ČR, hydrogen is a new energy carrier because, at the time of its creation, it was not mentioned in the Czech Republic's energy applications. Based on the hydrogen strategy of the Czech Republic, a gradual increase in hydrogen consumption is foreseen depending on its price. As part of the Czech Republic's Hydrogen Strategy, we aim to ensure that hydrogen and hydrogen technologies play an important role in the process of decarbonising the economy and transforming the Czech industry. The Hydrogen Strategy also reflects the specificities of the Czech Republic, which is one of Europe's most industrialised countries and is a landlocked state, with no access to sea and limited renewable energy sources.

The main role of hydrogen in decarbonising the economy is in the following areas:

- energy carrier and storage, including seasonal energy storage;
- chemical raw material;
- development and production of hydrogen technologies.

In decarbonising the economy, hydrogen will be used as a substitute for fossil fuels because its combustion does not generate CO2 emissions, but only water vapour and nitrogen oxides, thus, if produced with the help of renewable sources, it is a carbon-free alternative to fossil fuels. At present, however, hydrogen as a heat source is more expensive. In order to gradually replace natural gas, hydrogen would now have to fall to a level of around EUR 2/kg. This can only be expected after 2040, when natural gas prices will also rise due to the rising price of emission allowances. Currently, the high price of hydrogen prevents full economic use in all segments of industry. In the meantime, hydrogen must be used where it is economically most appropriate, where the ratio of total costs is best. The chemical industry is the first area where it is expected to be deployed. In this sector, the amount of renewable hydrogen we have to produce is mainly defined by the June 2023 Directive 2023/2413 on the promotion of the use of energy from renewable energy sources. Furthermore, hydrogen is expected to be used in transport, where hydrogen is expected to be used in bus, train and long-distance freight transport. The Czech Hydrogen Strategy prioritises the use of renewable and low-carbon hydrogen by 2030 mainly in the transport and chemical industry.

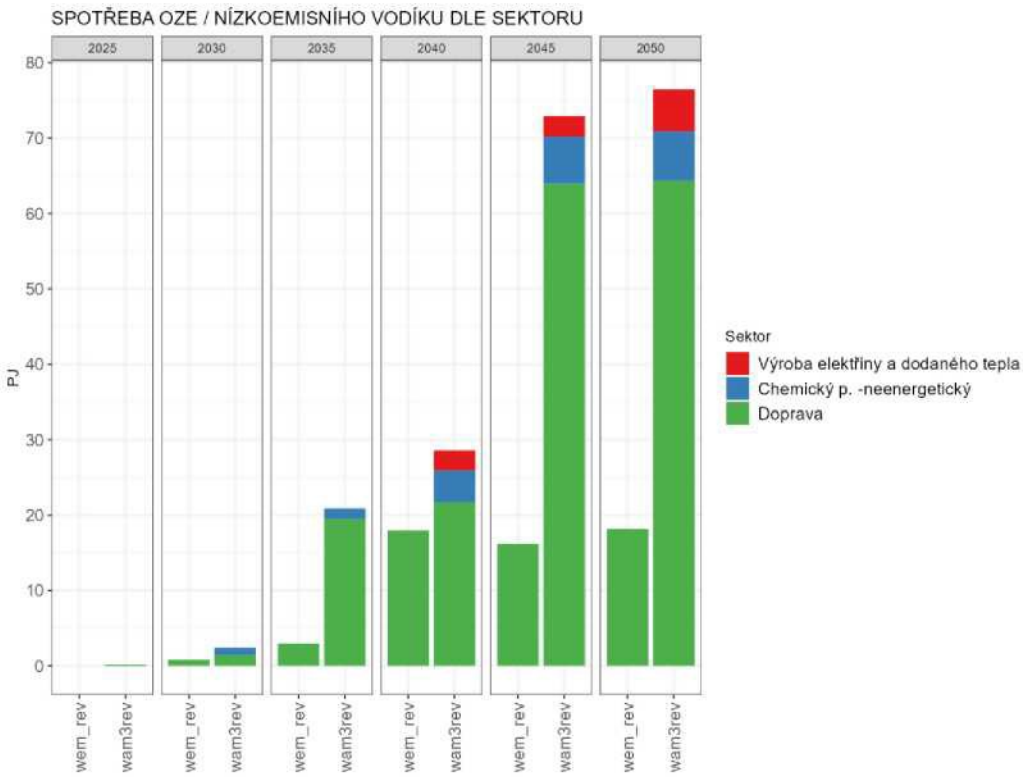
The advantage of hydrogen in transport is that hydrogen can be produced at a different time than it will be fuelled, for example when we have surplus renewable electricity and it is cheap. Both electric and hydrogen vehicles are more expensive than current standard petrol or diesel vehicles. Their operation can only be made cheaper by increasing their utilisation.

This is already being successfully used in hydrogen-powered handling techniques (highlift trucks). Hydrogen is expected to be used in transport, especially for long-distance and freight transport, and for passenger cars, electromobility is likely to be overridden.

Hydrogen will be used to produce heat in applications, depending on which applications will be able to absorb its higher price or when the local price of hydrogen is low due to the surplus of RES production. Given that the seasonality of heat production and the partial seasonality of RES production do not completely overlap, we do not assume that the use of hydrogen in heat production would be a priority area. Given the expected price, we see the role of hydrogen in the heating sector as much as in peak heating plants, possibly limited to cogeneration in winter months. A small hydrogen roll is assumed for local heating.

Many production processes seek to reduce their carbon footprint. It is in these areas that hydrogen could be deployed first.

Graph 8: *Consumption of low-emission hydrogen by sector*



Ofa cruise: SEEPIA project outputs

2.1.4 Greenhouse gas emissions, capture, utilisation and storage

Carbon Capture Utilisation or Storage (CCUS) is another low-carbon technology to reduce emissions. CCS and CCU). In order to optimise the decarbonisation process, the European Commission adopted in 2020 an EU Strategy for Energy System Integration,13 which confirms the importance of CCUS, noting that even a fully integrated energy system cannot fully eliminate CO2 emissions in all sectors of the economy. While reducing emissions through the development of renewable energy sources and increasing energy efficiency remains the top priority of EU climate policies, CCUS, together with other technologies such as solar photovoltaic and solar thermal technologies, onshore and offshore renewable technologies, battery/storage technologies, heat pumps and geothermal energy technologies, electrolysers and fuel cells, sustainable biogas/biomethane, will play a key role in achieving climate neutrality and will require significant targeted support in the next decade.14

CCS is a coherent set of technologies that allow capture of CO_2 instead of release into the atmosphere. The captured CO_2 is then pressed and transported to a site suitable for its permanent storage. There are four basic options for transporting CO_2: pipeline, water, rail and road transport. For the Czech Republic, in view of the existing and highly robust gas transmission infrastructure, it seems to be a cost-optimal option to use pipeline transport. Not all captured CO_2 will be stored permanently. The potential of CCU technology, which offers the possibility of using captured CO_2 as feedstock, e.g. for the production of chemicals, plastics and synthetic fuels, will also have to be exploited on the path to climate neutrality. The revision of the Directive on the promotion of the use of energy from renewable sources will support the production of fuels produced through the CCU. The ReFuelEU Aviation initiative will impose a gradual increase in the share of sustainable fuels (especially synthetic fuels) on aviation fuel suppliers.

Low-carbon CCUS technologies offer the possibility to decarbonise in hard-to-decarbonise sectors (e.g. industrial processes) or electricity and heat generation. The already mentioned EU energy system integration strategy recognises the role of CCS and CCU technologies, especially in these hard-to-abate industries. CCUS technology thus has great potential in decarbonising the emission-intensive Czech industry. Another option to mitigate emissions is the capture of CO_2 directly from the atmosphere, so-called Air-based Carbon Capture and Storage (DACCS), or from the combustion or fermentation of biogenic carbon, also referred to as Bioenergy with Carbon Capture and Storage (BECCS).

The 2023 proposal for a Regulation establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act)15 identified CCUS as one of the key technologies for achieving the EU's climate neutrality objectives. The Net-Zero Industry Act sets the legal environment for CCS investments, including an annual target for the operation of permanent CO2 storage sites in the EU by 2030. The objective is to achieve an annual operational injection capacity of 50 million tonnes of CO_2 by 2030. A significant potential for the storage of billions of tonnes of CO_2 is expected

13 COM(2020) 299 final
14 COM(2021) 800 final; COM(2023) 161final
15 COM(2023) 161 final

in offshore sites offering depleted oil and gas deposits or in underground saline reservoirs (salinic aquifers). According to the European Commission's estimates, the EU might need to capture up to 550 million tonnes of CO_2 per year by 2 050 in order to reach the net-zero target.

However, the necessary infrastructure is not developing fast enough, despite the fact that a legal framework is in place for the storage of CO2in geological formations in the European Economic Area[21], laying down rules for the environmentally safe storageof CO2, or the Emissions Trading System (EU ETS)[22], according to which captured and stored CO2is not considered to be emitted. Despite the incentive of rising CO2 prices,industry faces the risk of not having access to a permitted geological storage site. The EU still lacks a regulatory environment for dedicated CO2 transport and storage infrastructure, e.g. rules on access to infrastructure, CO2 quality standards, regulatory oversight or planning. In view of these shortcomings, the Commission plans to propose an EU strategy for the creation of an industrial carbon management market by 2030, primarily aimed at decarbonising industries. In the upcoming strategy, the Commission envisages the possibility of including storage infrastructure targets for 2040 and 2050 and identifying regulatory needs for developing CO2 transport and storageinfrastructure.

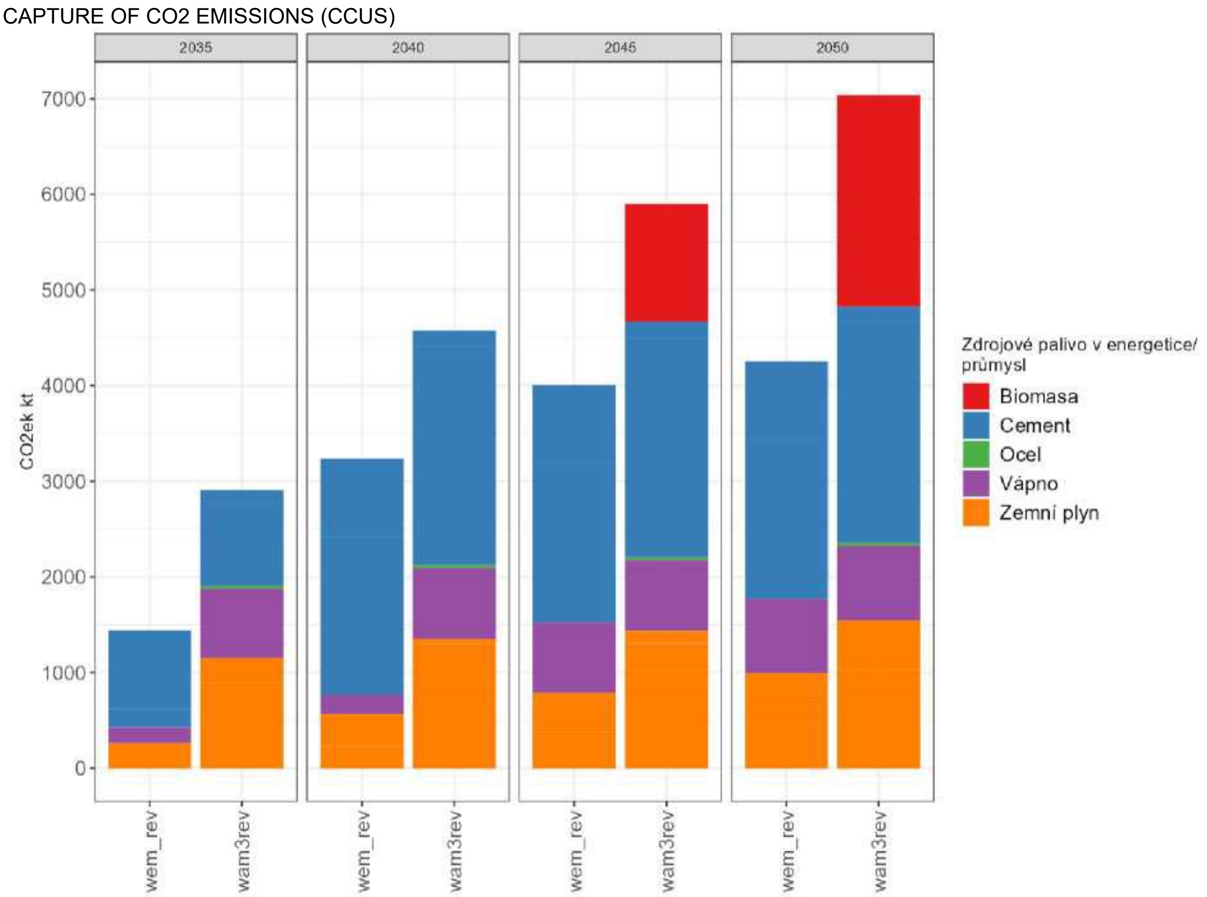
TheCzech Republic does not have a strategy document dedicated specifically to CCS/CCUS technoligia, but the project Building momentum for the long-term CCS degasment in the CEE region" created the "National Roadmap for CCS technology" (link). This Roadmap contains, inter alia, recommendations for the setting up of policies in this area, but it should be stressed that these are not material approved in this form at the level of the Czech Government.

The Ministry of the Environment started the process of preparing the new CCUS strategy in 2024.

According to the expected evolution of the energy mix in the Czech Republic (see SEEPIA scenarios), it will be necessary to ensure the annual capture and storage (or use) of 7 million tonnes of CO_2/year (or this capacity is modelled on the maximum in the 2035-2050 horizon, the use of this technology before 2035 is not modelled). The expected amount of capturedCO2 emissions under SEEPIA scenarios are shown in Grafu No 10.

21 2009/31/EC
22 (EU) 2018/410

Graph 9: *Expected amount of captured CO2 emissions from CCS/CCUS technologies*



Source: SEEPIA project outputs

Given the limited storage capacity of CO_2 in rock formations in the Czech Republic, a significant amount of captured CO_2 emissions may need to be transported to sites outside the Czech Republic. Sites with significant storage potential forcaptured CO2 include the North Sea area. As already mentioned in the introduction to the chapter, the cost-optimal transport option will be through dedicated pipeline infrastructure resulting from the conversion of existing gas infrastructure and the partial construction of a new one.

In the Czech Republic, the Czech Geological Service (ČGS) has been involved in CCS for a long time. Based on this research, the volume estimate of the storage potential of CO_2 in the Czech Republic amounts to 1 200 million tonnes, of which 95 % of the saline aquifers of the Central Bohemia permocarbonic basins and Carpathian regions are due to hydrocarbon deposits. However, the accuracy of this volumetric capacity calculation depends on the level of knowledge of the individual objects, which in particular in the case of aquifers is relatively low.

The forthcoming CCS Moravia project (Moravská diesel mines, Heidelberg Materials CZ, a.s.)16 should be the first to demonstrate a complete functional chain from the capture of CO_2 at the source, the Mokrá cement plant, to the transport by pipeline, to its storage in the south-east Morava aquifers. If supported by the Innovation Fund, the project could store 800 thousand tonnes of CO_2 per year from 2034 onwards, with a total storage capacity of up to 20 million tonnes ofco2. However, no similar project is planned for the period up to 2030.

16 https://www.mnd.eu/projekt/ukladani-co2-do-horninovych-struktur/

Dimension ‘Energy efficiency’

1. Elements set out in Article 4(b)

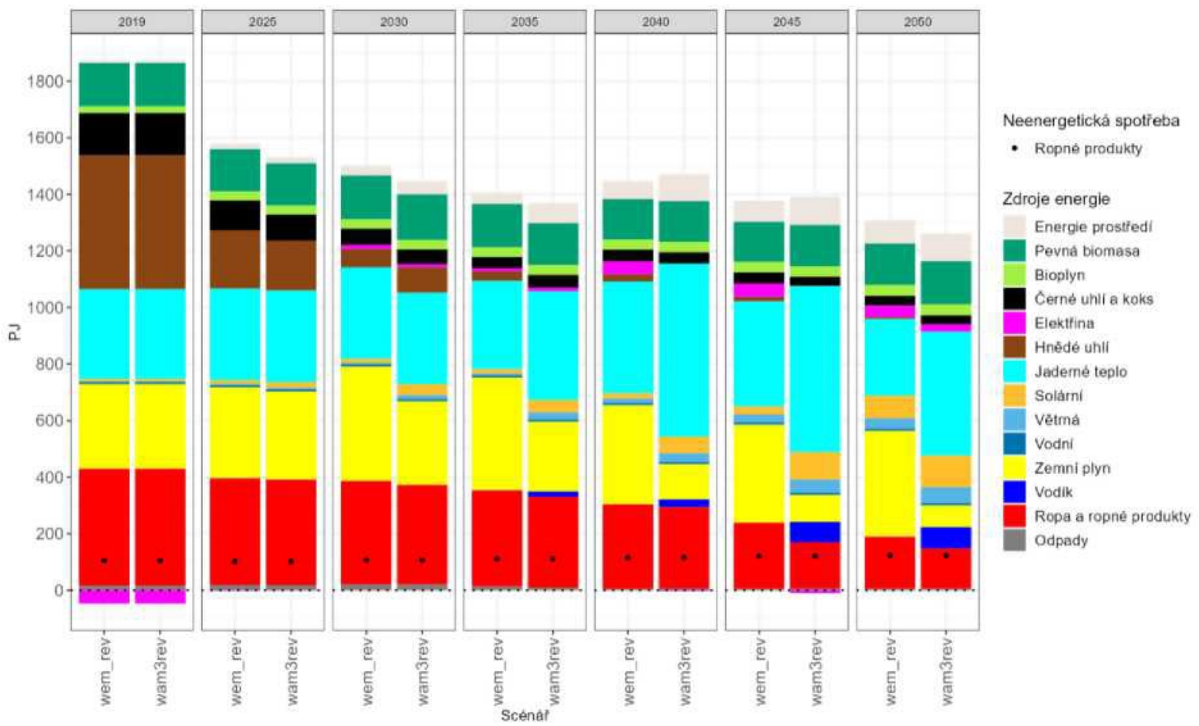
1.1.1.1 National energy efficiency target Art. 4 EED

Directive of the European Parliament and of the Council on energy efficiency, establishes a framework of measures to promote energy efficiency improvements across the EU to ensure the EU’s 2030 energy efficiency target. The Directive allows each Member State to set an indicative national contribution to meeting the EU targets by reducing final and primary energy consumption. However, when setting their contributions, Member States must respect the EU’s 2030 energy efficiency target, which is set at 763 Mtoe (31 945 PJ) of final energy consumption and is binding at EU level. For primary energy consumption, the target is set at 992.5 Mtoe (41 554 PJ) and indicative at EU level. The values set correspond to a reduction in consumption of 11.7 % compared to the reference scenario.

Czech Republic’s contribution to the EU’s non-binding 2030 target

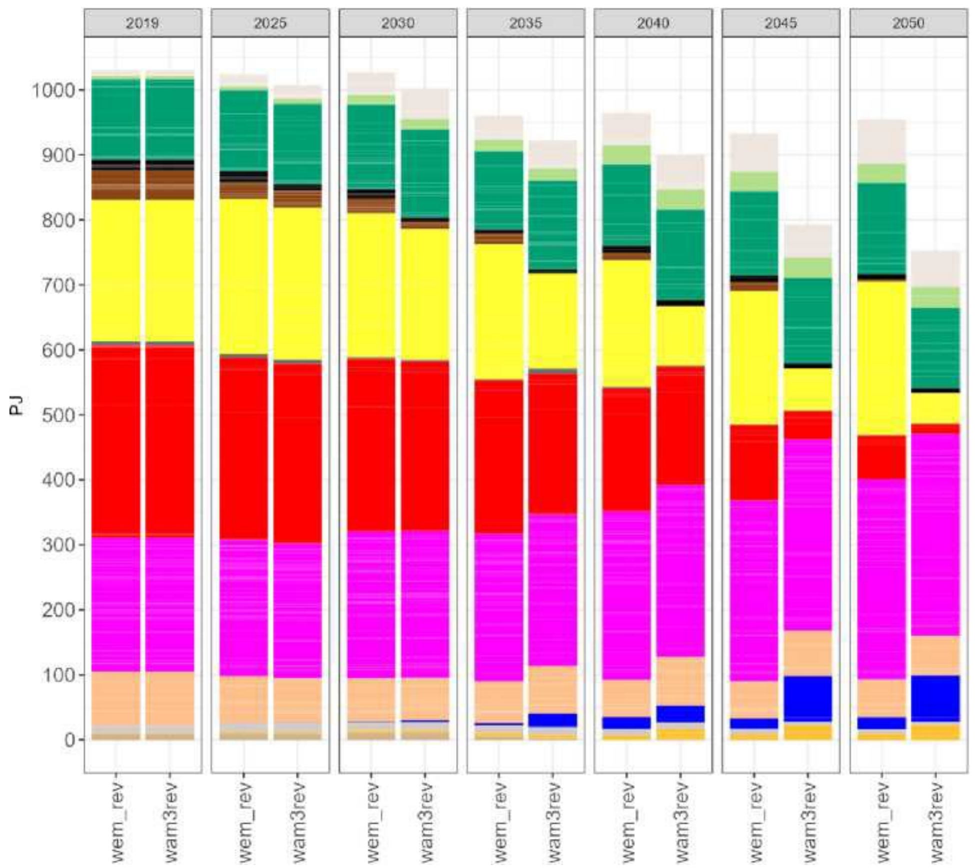
For the purpose of determining the national contribution, Member States may use the formula in Annex I to Directive 2023/1791 on energy efficiency, where the Czech Republic considers it most appropriate to set the contributions in accordance with this calculation for the period 2030 The indicative contribution to the binding EU target for final energy consumption is calculated at 852 PJ. The indicative contribution to the non-binding primary consumption target is calculated at 1 222 PJ.

Graph 10: *Outlook for the development of primary energy sources*



Source: SEEPIA project outputs

Graph 11: *Outlook for the development of final energy consumption*



Source: SEEPIA project outputs

Strategies and policies affecting the level of final energy consumption include in particular:

- The long-term building renovation strategy referred to in Article 2a of the EPBD;
- obligation under Article 5 of the Energy Efficiency Directive
- obligation under Article 7 of the Energy Efficiency Directive
- legislative and regulatory measures resulting from the transposition and implementation of national and EU legislation
- fiscal instruments
- strategies and policies in other areas, including the transport sector and expressed in the following conceptual materials:
    - State Energy Policy of the Czech Republic
    - Czech National Reform Programme
    - State Environmental Policy
    - Climate protection policy in the Czech Republic
    - Strategic framework for sustainable development of the Czech Republic
    - National Clean Mobility Action Plan

    on the transport policy of the Czech Republic for the period 2021-2027 with a view to 2050

In accordance with Article 3 of the Energy Efficiency Directive, the principle of energy efficiency will be taken into account first and foremost in planning, policies and investments. To this end, a consortium has been set up to develop a way of applying this principle in the Czech Republic. The project is currently in the processing phase and is planned to be completed by the end of 2024. It will then be evaluated and prepared for the introduction of the principle into Czech law.

Target of cumulated energy savings under Article 8 of the EED for the period 2021-2030

The new Energy Efficiency Directive sets an obligation for the period 2021-2030 to achieve cumulated energy savings through new energy savings for the 2021-2030 period, in line with the limits of their accounting set out in the Directive.

In accordance with the wording of the Directive and the commitment rules, the Czech Republic has set a target of 145 PJ of new energy savings, i.e. a total of 669 PJ of cumulated energy savings by 2030, pursuant to Article 8 for the period 2021-2030**.** The level of the commitment shall respect the requirement to gradually increase the minimum level of annual energy savings from 0.8 % to 1.9 % of final energy consumption in accordance with Article 8(1)(b).

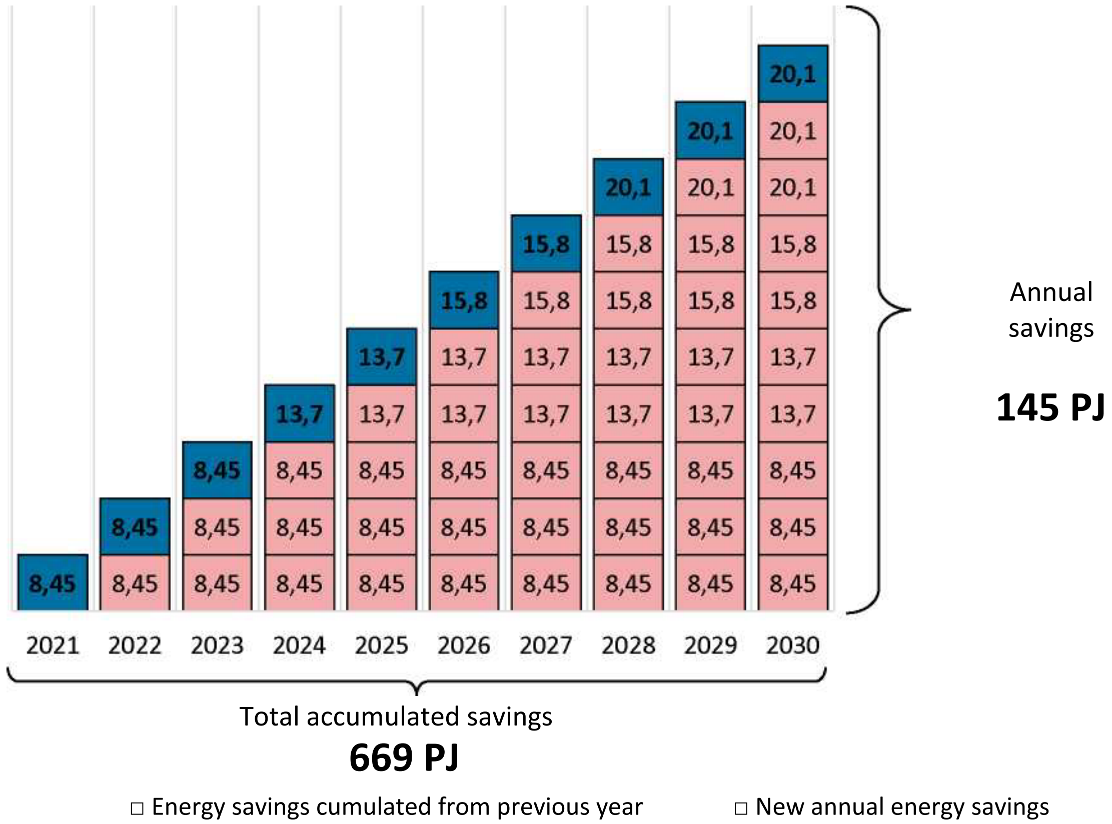
The reference value ('baseline') for the calculation of the target is the final energy consumption from 2016-2018 as reported by Eurostat – Final Energy Consumption Europe 2020-2030. In the period 2021-2030, the Czech Republic does not make use of the possibility of a different baseline deduction or accounting for additional savings under the so-called exemption system in accordance with Article 8(6) to (9).

Figure 20: *Calculation of the energy savings obligation for 2021-2030*

Average final consumption 2016-2018	1 055.9 PJ	
Annual amount of the commitment		
2021-2023	0.8 %	8.5 PJ
2024-2025	1.3 %	13.7 PJ
2026-2027	1.5 %	15.8 PJ
2028-2030	1.9 %	20.1 PJ
Annual savings obligation	**145 PJ**	
Accumulated savings liability	**669 PJ**	

Source: Actual processing of MITs for the purposes of the National Plan

Graph 12: *Determination of the Czech Republic's cumulative commitment under Article 7 for the period 2021-2030 (in PJ)*



Source: Actual processing of MITs for the purposes of the National Plan

2.2.1.3. Example role of public bodies' buildings under Directive 2023/1791 on energy efficiency

On the basis of a preliminary analysis of the data on the initial energy consumption of public bodies, the indicative annual reduction target for energy consumption under Article 5 of the Directive was set at 636 TJ, corresponding to the 1.9 % reduction laid down in the Directive. The energy consumption of public transport and the armed forces were not included in the baseline for energy consumption for target setting.

By 2027, all entities falling under the consumption reduction obligation shall be specified and the buildings concerned shall be properly identified, together with an exact identification of their energy consumption in 2021. On the basis of these data, the final target will be set. The obligation stemming from Article 6 of Directive 2023/1791 will also be specified on the basis of the final list of all public bodies and the buildings concerned.

II. Milestones for 2030, 2040 and 2050, measurable progress indicators set by each Member States, an evidence-based estimate of the expected energy savings and other benefits and their contribution to the achievement of the Union's energy efficiency targets, as set out in the plans included in the long-term renovation strategies of the national stock of residential and non-residential buildings, both public and private, in accordance with Article 2a of Directive 2010/31/EU

Indicative milestones of the long-term building renovation strategy

The strategy analyses the scenario of the renovation of the building stock, its costs and benefits, and proposes policy, legislative and economic instruments to implement it. Based on the outputs of the different parts (overview of the building stock, savings potential in the building stock, investment costs for renovations, definition of individual renovation scenarios), the energy and economic impacts of the different scenarios up to 2020, 2030, 2040 and 2050 were assessed. However, it is more comprehensive in terms of e.g. policy design requirements reflecting identified barriers to building renovations, market failures, etc. It aims to support the cost-effective transformation of existing buildings by setting up adequate financial mechanisms to mobilise private investment.

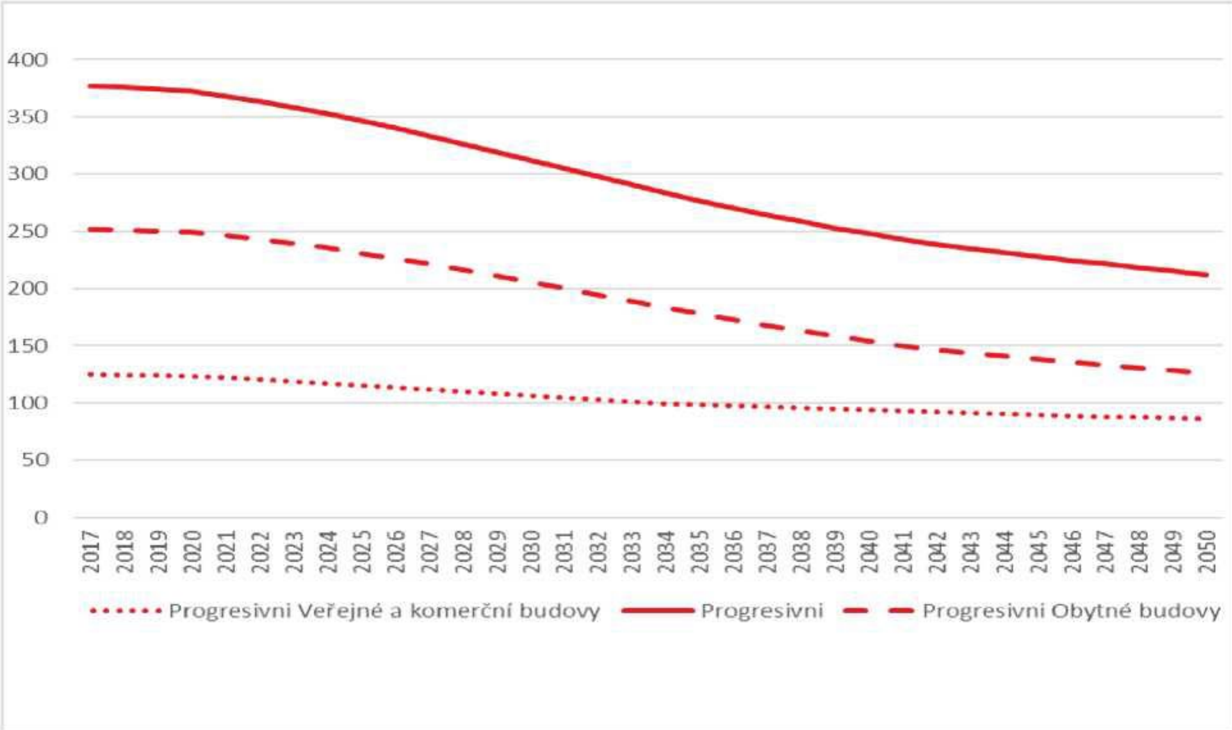
The outcome of the Long-Term Strategy is the design of a cost-effective scenario for the renovation of the Czech building stock, including residential, public and private sectors, with measurable progress indicators with the relevant policies that will achieve the milestones and targets for the renovation of the building stock in the Czech Republic.

In the period 2021-2050, the Czech Republic expects developments in the area of building renovation under the so-called ‘progressive scenario’[24] this is an ideal scenario built on rapid and deep renovations of the building stock. The input data used to calculate the long-term strategy scenario model is based on SLDB 2011 data, which provides the most detailed information on the building stock (number of apartments, ownership structures, age of buildings, floor area of apartments in m², etc.). The 2011 SLDB data was used to map the building stock in the residential sector. For the non-residential sector, the survey ‘Buildings 1-99 Investigation of Non-residential Buildings and Selected Housing Buildings’ was used and supplemented with data from the Register of Territorial Identification, Addresses and Real Estates and Building Offices.

The main modelling output is shown in the following charts. Evolution of energy consumption in the building sector for the consumption types considered in the assessment of the energy performance of buildings in accordance with the Energy Management Act (i.e. excluding appliances). The starting point is 378 PJ. For the residential sector, this is 253 PJ and the non-residential sector is 125 PJ.

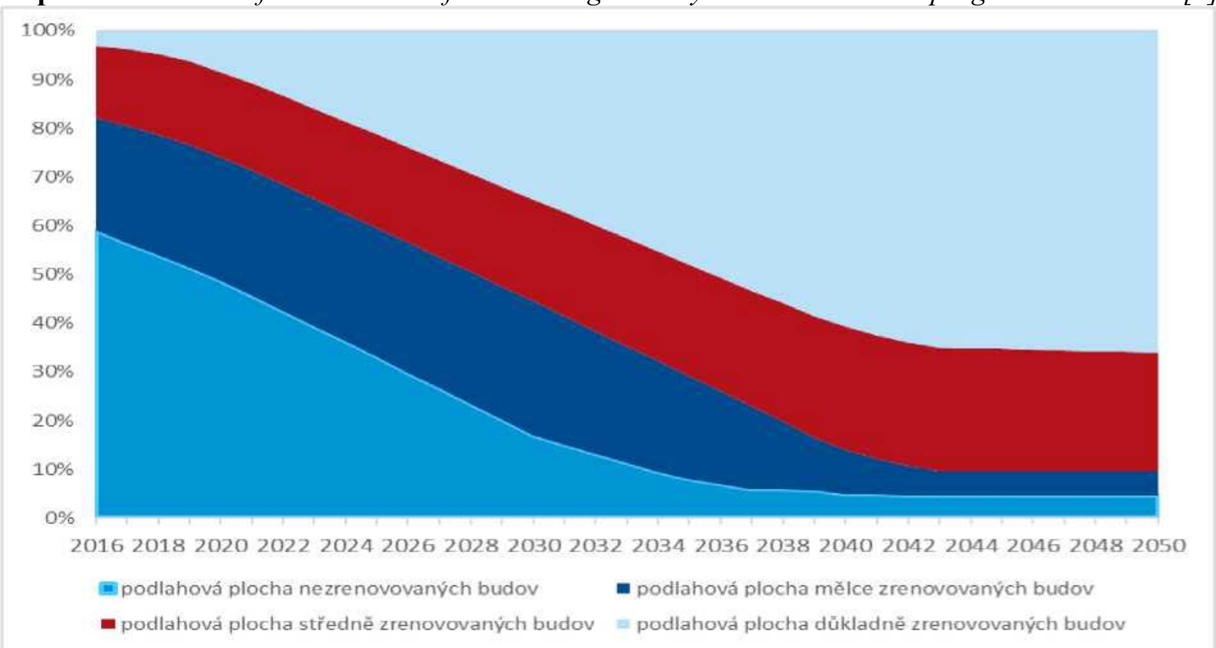
Graph 13: *Model final energy consumption in buildings – progressive scenario[PJ]*

[24] Progressive scenario corresponds to the counterfactual of the last Long-Term Building Renovation Strategy



Source: Long-term building renovation strategy

Graph 14: *Evolution of the structure of the building stock by renovation level – progressive scenario [m^2]*



Source: Long-term building renovation strategy

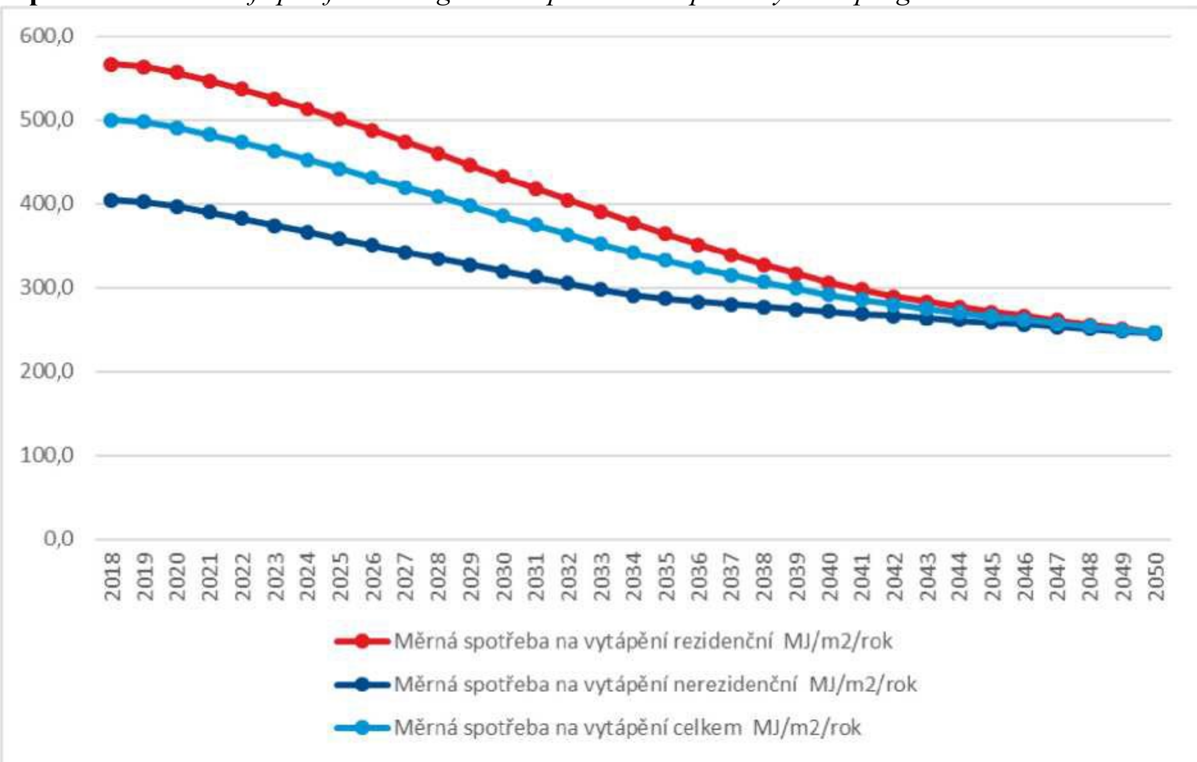
The progressive scenario envisages that the vast majority of buildings (85 %) will be deep renovated from 2025 and 2030 respectively, only buildings where this is not technically possible will remain in shallow or medium renovations. This is essential without significant state intervention. In addition, it is calculated to increase the renovation rate to approximately double, which would mean the renovation of each building over a period of less than 30 years. This increase in depth and renovation rates will lead to a reduction in energy consumption by 166 PJ (44 %) in 2050.

Table 21: *Table of baseline data*

Progressive	2020	2030	2040	2050
final energy consumption in a given year [PJ]	372	312	248	212
family homes	*161*	*130*	*94*	*76*
multi-family buildings	*88*	*76*	*60*	*50*
public and commercial buildings	124	107	94	86
energy saving compared to baseline 378 PJ [PJ]	—6	—66	—130	—166
Specific heating demand [MJ/(m².year)]	**491**	**386**	**292**	**246**

Source: Long-term building renovation strategy

Graph 15: *Evolution of specific heating consumption in MJ per m²/year – progressive scenario*



Source: Long-term building renovation strategy

To report the impact or implementation of the long-term building renovation strategy, a specific heat demand indicator for heating in MJ per m^{2}per year was chosen for each sector. This indicator was chosen with regard to the availability of data (annual reporting of final consumption in households, namely in the heating segment, knowledge of the size of the total floor area of the building stock (annual update of the Czech Statistical Office's data on new construction)). A variable that is identified and there is no detailed number of updates is the rate of demolition. For this reason, the sum of people, houses and apartments will provide accurate information every 10 years that can be used to refine the model's input data.

Table 22: *Indicative milestones of the progressive scenario of the building renovation strategy for 2030, 2040 and 2050*

[MJ/(m² year)]	2030	2040	2050
Specific heat demand for heating	386	292	246
Residential sector	433	306	246
Non-residential sector	320	272	246

Source: Long-term building renovation strategy

Contribution of the implementation of the progressive scenario to reducing greenhouse gas emissions

The adaptation model is taken from the Building Renovation Strategy prepared in 2016. It is recalculated for the aggregated outputs of the current model, i.e. it is not worked here with a breakdown by type of building owner, but gives a good picture of the extent to which carbon dioxide emissions can be reduced according to different scenarios according to the level and depth of building renovation.

Energy renovation of buildings is, in addition to an adaptation measure, a mitigation measure, i.e. one that leads to a reduction of greenhouse gas emissions. These are due to the operation of buildings and their contribution to total anthropogenic emissions is not negligible at all.

As part of the project for the preparation of a national strategy for adapting buildings to climate change, the study 'Potential for greenhouse gas emission savings in the Czech Republic by refurbishment of buildings25' was therefore carried out with the aim of quantifying this potential. The following text is based on this study unless otherwise stated.

According to the National Greenhouse Gas Inventory, in 2021 the Czech Republic produced 96.67 Mt CO_2 excluding LULUCF and 105,01 including accounting for net emissions from the LULUCF sector.

The output table from the comprehensive model created by the building chances in the current version served to obtain input values. The final energy consumption values resulting from the projection of the development of the Czech building stock are quantified for each year, as well as final energy savings values for heating and the increase in final energy consumption for cooling. Furthermore, the energy mix had to be added to these final consumption values. Its development was modelled on a year-by-year basis, separately for residential and non-residential buildings. The current energy mixes were taken as the baseline and another point was predicted energy mixes in 2060, both based on studies on the stock of residential26 and non-residential buildings27. In the context of clarity, simplifications have been applied, whereby the present and 2060 values were linearly interpolated with discrete values for individual years. Given the high uncertainties, the energy mix for this study remains constant in 2060.

Subsequently, emission factors from Decree No 140/2021, which are used for the purpose of energy audits,were used to quantify the energy saved on CO2 emissions:

In the absence of a forecast of the future evolution of emission factors in the Czech Republic, these factors were considered constant for the entire period under assessment (it is foreseeable that the emission factors of individual fuels will be reduced with the emergence of new technologies and a significant reduction in the emission factor of electricity with an increasing share of RES, cogeneration or nuclear energy in the distribution network). This simplification will therefore lead to higher calculated emission production values than will actually be the case. Electricity was considered as an energy source for changing energy consumption for cooling.

On the basis of the calculations made, it can therefore be concluded that **the operation of buildings with their 44.57 Mt CO2 accounts for approximately 44 % of[28][29] emissions in the Czech Republic**.

25Lupisk, Antonín. 2016. *The potential of the Czech Republic's greenhouse gas emission savings by refurbishment of buildings*. ČVÚT UCEEB.

26Survey of the Czech Republic's residential building stock and savings potential, Ministry of Industry and Trade Buildings Scheme, December 2016

27Survey of the Czech Republic's non-residential building stock and savings potential, Ministry of Industry and Trade Buildings School, December 2016

Contributions to energy efficiency targets under Directive 2012/27/EU in accordance with Article 2a of Directive 2010/31/EU

The long-term renovation strategy of the national stock of residential and non-residential buildings, both public and private (hereinafter referred to as the strategy), is one of the tools to achieve a sustainable, competitive, secure and decarbonised system targeting the building sector, which is still responsible for 40 % of the EU's final energy consumption, despite already established policies and investments allocated to improving the energy performance of buildings. Building a coherent framework should increase the number of renovations, increase their complexity and thus help transform the building stock into a highly energy efficient building stock. Buildings in the Czech Republic are one of the sectors with significant energy savings potential, mainly due to a significant share of energy consumption in the residential sector.

The strategy contributes to the objectives of Directive (EU) 2023/17791, which is reflected in more than three articles, namely Article 4, Article 6 and Article 8.

Article 6 deals with the annual renovation of 3 % of the total floor area of heated and/or cooled buildings owned by public administrations into a NZEB standard.

Article 8 mainly uses fiscal measures (both investment and soft support programmes) to support the implementation of the progressive building scenario. At the same time, fiscal measures are a tool for the state to deliver on the energy efficiency commitment of Directive (EU) 2023/1791. However, it is not possible to identify precisely the contribution of the Czech Republic's commitment, which is set at 673 PJ of cumulative final energy consumption savings in the period 2021-2030, as Article 8 of Directive (EU) 2023/1791 is a calculated energy saving, whereas the material is subject to real developments in final energy consumption, which is influenced by many factors.

Finally, the strategy contributes to the objectives of Article 4, which deals with the reduction of the economy's final consumption. Thanks to renovations, it contributes to reducing the final consumption of buildings in sectors such as households, services and industry, thereby contributing to the Union's 2030 headline targets for energy efficiency.

111. Where applicable, other national objectives, including long term targets or strategies and sectoral targets, and national objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling

In this respect, the objective in relation to the heating and cooling sector, as set out in the draft update of the Czech Republic's State Energy Concept, can be mentioned. This is the objective of keeping the share of heat from cogeneration in heat sold above 70 % in the medium term. This objective is currently being met, but its future implementation depends, inter alia, on the promotion of cogeneration. For more information on CHP support in the post-2020 period, see chapter 3.1.2.

[28] Based on 2014 data.

[29] Certification of a healthy indoor environment of WELL. *Healthy building* [online]. 2020. Available from: http://www.zdravabudova.cz/cs/certifikace

2.3 Dimension energy security

i. Elements set out in Article 4(c)

2.3.1.1 Cross-cutting objectives

Diversification objectives are summarised in the target corridors of the Czech State Energy Concept.

Figure 23: *Share of each fuel and energy type in primary energy consumption*

Type of energy	2030	2040	2050
Coal and coal derivatives	10 %	3 %	3 %
Natural gas	21 %	9 %	7 %
Oil and petroleum products	25 %	20 %	12 %
Nuclear	22 %	42 %	38 %
Renewables	23 %	26 %	41 %

Source: Draft update of the Czech State Energy Concept (2024)

Figure 24: *Share of each type of fuel and energy in gross electricity production*

Type of energy	2030	2040	2050
Coal and coal derivatives	9 %	0 %	0 %
Natural gas	15 %	3 %	3 %
Nuclear	44 %	68 %	46 %
Renewables	31 %	29 %	52 %
Others28	1 %	1 %	1 %

Source: Draft update of the Czech State Energy Concept (2024)

The import dependency target is to maintain import dependency not exceeding 65 % by 2030 and 70 % by 2040 when considering nuclear fuel as an import source.29 The draft update of the Czech Republic's State Energy Concept also includes sub-priorities in the field of energy security, both cross-cutting and at the level of individual sub-sectors.

28The other category contains manufactured gases, hydrogen, petroleum products and the non-renewable waste component.

29Within this objective, nuclear fuel is considered as an imported source. For this reason, this value is not directly comparable to that given in the analytical annexes to this document because, according to the energy balance, heat from a nuclear reaction, which is not, by definition, imported, comes from the energy balance.

2.3.1.2 Sectional

At cross-cutting level, the following can be considered as the main priorities of the Czech Republic:

- Create, within the framework of the Czech Republic's foreign economic, foreign and trade policies, the preconditions for the development of mutually beneficial economic relations with countries of interest.
- Ensure the implementation of the Czech Republic's energy policy in accordance with EU energy policy and the Treaty on the Functioning of the European Union, taking into account the Czech Republic's national interests and preferences, and promote the development of foreign economic and foreign relations in order to ensure security of energy supply, while maintaining national sovereignty in the energy mix and the use of indigenous raw materials and energy resources.
- Support projects to further interconnect critical infrastructure with an emphasis on increasing the diversification of transmission routes and security of supply.
- Ensure the use of a mechanism to screen foreign direct investments in critical infrastructure or other major infrastructure projects, as appropriate.
- Ensure and regularly review tools for effective coordination of electricity, heating and gas emergencies at central and regional levels.
- Ensure a full and unrestricted range of energy supplies in the event of short- and medium-term shortfalls of one supplier or loss or breakdown of one cross-border interconnection.
- Ensure that the minimum technological needs of the economy are met and that the necessary consumption of the population is covered in the event of long-term breakdowns of one supplier or one cross-border interconnection and short- and medium-term disruptions to the extent of total cessation of the supply of energy commodities from abroad or in the event of the operation of the relevant Czech network system in island operations.
- Ensure the maintenance of State influence and control in strategic companies by maintaining the State's shareholdings in these companies at least at a level that does not diminish the State's current ability to promote its interests through the exercise of shareholder rights.
- Ensure a reliable supply of fuels and energy at a level that does not restrict the development of the Czech economy and at affordable prices that does not jeopardise its competitiveness, taking into account the security interests of the Czech Republic.
- Support the development and effective functioning of common mechanisms for coordinating the management of energy networks and for jointly addressing emergencies, emergencies and crisis situations.
- Ensure, for existing and newly built nuclear energy sources, nuclear safety, security of nuclear installations and materials and compliance with non-proliferation requirements in accordance with national legislation and international commitments of the Czech Republic.

2.3.1.3 Electro-energy

- the following areas of electricity can be considered as the main priorities of the Czech Republic:

- Ensure a high level of self-sufficiency in electricity generation based mainly on high conversion efficient technologies and low greenhouse gas and pollutant emissions.[30]
- Ensure the necessary level of resource adequacy and create the conditions for the secure operation of the Czech electricity system in order to secure a stable electricity supply in normal and crisis situations.
- Ensure that an operator of nuclear resources holds sufficient nuclear fuel reserves, taking into account the current situation, market factors and ensuring supplier substitutability.
- Support the diversification of nuclear fuel supply and the development of competences of an operator

30The WAM3 scenario assumes an import balance of 10 TWh/year.

of nuclear resources in the development, licensing and use of nuclear fuel from alternative suppliers.

- Support the development of local electricity supply capabilities, including the operation of islands in the electricity system, in the event of system breakdown due to major disturbances caused by natural events, or terrorist or cyber-attack, to the extent necessary to ensure minimum supply to the population and maintain the functionality of critical infrastructure.
- Ensure a high level of safety, reliability, energy resilience and transit capabilities of the Czech Republic's electricity system through the renewal and modernisation of the transmission system and the development of reserve capacities of appropriate size and structure, available regulatory powers, energy storage, elements of flexibility and technical means of defence against the emergence and spread of network disturbances, control of congestion or optimal operation of networks and effective mechanisms for managing them and balancing local or temporal imbalances.
- Ensure the safety and reliability of the operation of distribution systems through their renewal and development, including grid capacity reserves to address emergency situations through the use of crash electricity as a substitute for other fuels.
- Support the development of both central and decentralised energy storage systems for electricity system management and regulation, in particular on a commercial basis.
- Ensure, where necessary from the point of view of the security of the operation of the electricity system, that the construction of intermittent renewable sources is made conditional upon the simultaneous installation of energy storage elements.
- Ensure the integration of renewable and small cogeneration sources in the Czech Republic's electricity balance management mechanisms, in particular through the development of smart grids and flexibility elements, and complementarity of the operation of individual emission-free sources, in particular renewable and nuclear sources.
- Ensure that coal-fired electricity generation is phased out without negative effects on the stability of its supply, on the security of operation of the electricity system and on self-sufficiency in the area, potentially resulting in the replacement of indigenous coal-fired power generation by the supply of equally or more externally loaded electricity.Ensure the designation of renewables acceleration areas and their different types in a way that ensures the achievement of a balanced mix of these sources providing relative stability for electricity generation.

2.3.1.4 Gas

- the following can be considered as the main priorities of the Czech Republic:

- Ensure the continuous restoration and development of the transmission and distribution system to secure bi-directional gas transmission and to cover the increase in gas supply in the context of an increase in consumption.
- Support the development of gas storage facilities in the Czech Republic with a view to increasing the parameter of maximum daily production capacity and the readiness of storage facilities for the storage of low-carbon and renewable gases.
- Ensure the availability of gas supplies to protected customers in emergency situations by setting a safety standard.
- Support the adaptation of the transmission system to changes in gas flows in the EU as a result of the shift away from supply from the Russian Federation and the removal of infrastructure bottlenecks in neighbouring states.
- Ensure effective access to gas transit capacities for Czech consumers.
- Support the improvement of the security and reliability of gas supplies to the Czech Republic and their diversification in terms of source areas, transport routes and the commodity transported.
- Ensure the build-up of gas reserves by maximising the use of available storage capacity.

- Support the use of the potential of the Czech gas system for future transit, storage and distribution of hydrogen and other renewable gases.
- Ensure, in the event of a gas emergency, solutions with minimal impact on the national economy and on the lives and health of the population.
- Ensure the timely development of the production, transport, distribution, import, storage and use of hydrogen, including the implementation of the hydrogen valley concept, to ensure the safety of hydrogen valley decarbonisation.
- Promote the long-term sustainability of existing gas infrastructure for the use of sustainable fuels, respectively natural gas/hydrogen blends (retrofitting) or clean hydrogen (Repurposing).
- Support long-term capacity leasing projects in liquefied gas terminals.

2.3.1.5 Oil sector

In the oil sector, the following can be considered as the main priorities of the Czech Republic:

- Support projects increasing the diversification of transport routes for the supply of crude oil and petroleum products to the Czech Republic and create the conditions for full supply of domestic refineries with oil from diversified non-Russian sources.
- Ensure, in cooperation with other States, that the pan-European oil pipeline system remains operational.
- Support domestic oil processing and the production of refinery products in order to reduce the necessary proportion of imports of their product mix into the Czech Republic.
- Ensure that emergency stocks of crude oil and petroleum products are maintained at a minimum level consistent with the fulfilment of the Czech Republic's obligations and in a structure comprising all suitable types of oil and ensuring an appropriate ratio between oil and petroleum products and their availability for use in crisis situations.
- Ensure the exclusive storage of emergency stocks of crude oil and petroleum products in the Czech Republic, in particular with State-owned transport system operators.
- Ensure active cooperation between the national oil carrier and the operators of oil pipelines, in particular with a view to informing in good time about any commercial or technical complications with the possible consequence of restricting or interrupting oil supplies to the Czech Republic.

2.3.1.6 Heating

In the field of heating, the following can be considered as the main priorities of the Czech Republic:

- Create the conditions for the operation of heat energy supply systems to the extent possible and economically efficient.
- Create the conditions to maintain the stability of heat supply in the context of a shift away from the use of coal for energy production.
- Support an increase in the share of thermal energy supply systems using a multi-fuel or energy mix with the possibility of rapid fuel switching if short-term lock-in is needed.
- Support an increase in the importance of heat sources in addressing electricity crisis situations, including their involvement in flexibility mechanisms and in the operation of islands in the electricity system.

ii. National objectives in terms of increasing diversification of energy sources and supply from third countries

countries to make regional and national energy systems more resilient

Since the last update of the EQS, the international security environment has deteriorated with significant economic and energy impacts. As Czechia is a net importer of oil and gas and has no potential to reverse this situation, it is heavily affected by adverse international developments. Russia is responsible for the deterioration of security on the European continent, which has decided to implement its colonial ambitions by force.

In this spirit, Russia is also deliberately acting against our economic stability. In the energy sector, as a major exporter, he has a particularly strong influence which it exploits for its policy objectives incompatible with Czechia's security interests. This trend precedes Russia's invasion of Ukraine and fully graduates in the course of 2022 by unilaterally cutting gas supplies to Europe. We felt this at our heart when the Russian energy weapon signed up to the unprecedented rise in final energy prices.

Russia has not beenhave for a long time as a rational, let alone a reliable economic partner. On the contrary, it is an immediate and direct threat to Czech security interests. Czechia must therefore be relieved of its dependence on Russian energy exports. Over the last year, we have succeeded in fully replacing Russian gas supplies and we are taking steps to replace Russian oil in a similar way. It is in Czechia's interest to further diversify and extend its independence from Russia to other energy commodities. In line with this, we will also support the strengthening and extension of European sanctions. But we will never put our own energy security at risk. As with all effective sanctions, measures need to burst more on the other side than we alone. We also see the shift away from Russian energy commodities as irreversible. **Regardless of further Russian actions, Czechia must not return to dependent status.** As a landlocked state, Czechia will work closely with European partners to meet its energy needs.

The Czech Republic has a relatively well-diversified energy and electricity mix. The objectives for diversifying energy sources are mainly embodied in the target corridors of the Czech State Energy Concept (see Chapter 2.3.1.1). With regard to the objectives of the supply of energy commodities from third countries, more information is provided in point (iii) of this Chapter.

Hydrogen as an energy carrier can further help to increase the diversification of energy sources, as there are many more places in the world where renewable hydrogen can be produced than natural gas.

iii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems

In the area of reducing dependence on energy imports or increasing the diversification of energy sources consumed and thus imported, the following objectives can be highlighted (or rather quantifiable indicators):

- Keep the level of self-sufficiency in electricity supply at a sufficient level in relation to the availability of electricity imports, taking into account both technical constraints and the situation in the region.
- Keep the diversification of primary energy sources below 0.25, gross electricity production below 0.35 and imports below 0.30.

iv. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage

On 14 March 2023, the European Commission published a proposal to reform the EU electricity market.31 In the framework of the proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942, and Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design.

Article 19c, which deals with the assessment of flexibility needs, enshrines that by 1 January 2025 and every two years thereafter, the regulatory authority of each Member State shall assess the need for flexibility in the electricity system. Article 19d enshrines the obligation to set an indicative national target for demand response and storage.The indicative national target for demand response and storage will

31 The proposal is available on the European Commission's website (link).

therefore be set following the outcome of the legislative process at EU level.

On the basis of the above-mentioned legislative requirement as well as the milestone of the National Recovery Plan, the Report on the Flexibility of the Czech electricity system, which examines the assessment of the flexibility needs of the electricity system of the Czech Republic in the context of decentralisation, decarbonisation and digitalisation of energy, is currently being finalised (June 2024). It focuses on the underlying barriers to the introduction and use of non-fossil flexibility and proposes measures to remove them, in particular in the context of planned legislative changes and technical innovations such as the construction of an Energy Data Centre or the introduction of smart metering in the Czech Republic. To support the development of flexibility, it also recommends speeding up the roll-out of smart metering and introducing a communication strategy on flexibility options. The report shall analyse the impact of the shift away from fossil energy sources, in particular coal, on the flexibility needs and potential between 2025 and 2030.

This report will be followed up by an action plan setting priorities for the development of non-fossil flexibility and defining the objective for flexibility of non-fossil sources, including demand response and energy storage for the next ten years. The Action Plan shall also set out an investment trajectory to reach the identified potential and public financing and identify appropriate private funding sources to support flexibility and storage technologies, including a timeline.

2.4 Dimension Internal energy market

2.4.1 Electricity interconnectivity (2030 Framework target)

1. Level of electricity interconnectivity that the Member State wishes to reach in year 2030, taking into account the 2030 target of at least 15 % of electricity interconnections, together with a strategy setting the level from 2021 onwards in close cooperation with the Member States concerned, taking into account the 2020 interconnection target of 10 % and the following indicators of urgency for action:

   1) price differential in the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones;

   2) nominal transmission capacity of interconnectors below 30 % of peak load;

   3) nominal transmission capacity of interconnectors below 30 % of installed renewable generation.

   Each new interconnector shall be subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs

Interconnectivity target for 2030

The 2030 transmission interconnection framework target corresponds to maintaining the import and export capacity of the transmission system relative to maximum load at a level of at least 30 % and 35 % respectively, and, where appropriate, to further increase that capacity after that year in line with current needs. However, this target is not directly comparable to the European target of 15 % by 2030, as this target is expressed in terms of installed performance. In general, it can be concluded that the target stated in the Czech Republic's State Energy Concept corresponds to a target of 15 %, since the share of maximum load to installed capacity corresponds to approximately 50 % (53 % in 2017)[32]. The Czech Republic is therefore primarily committed to meeting the target expressed in the Czech Republic's State Energy Concept, which

32In 2017, the maximum load (according to the Energy Regulatory Office's data) corresponded to 11 768 MW and the installed capacity (according to ČEPS, a.s.) corresponded to 22 216 MW.

is already being met with a relatively significant overlap, but the achievement of this objective should be consistent with the implementation of the Barcelona Agreement (targets of 15 % by 2030), despite the fact that the evolution of maximum load and installed capacity may vary to a certain extent.

The level of interconnection of the Czech Republic's transmission system is an area which is continuously monitored and assessed mainly by the transmission system operator of ČEPS, on the one hand at national level in accordance with the Czech Republic's State Energy Concept, which directly imposes the requirement to maintain the import or export capacity of the Czech transmission system in relation to the maximum load at a level of at least 30 % and 35 % respectively, and at European level, in the context of the European Ten-Year Network Development Plan, which evaluates compliance with the 2012 Barcelona criterion at the level of 10 % interconnection of transmission systems and the interconnection target for 2030 at 15 %. Table 25 shows the projected level of interconnectivity in 2030 (both export and import direction) related to maximum load, in two scenarios. In both cases, targets of 30 % and 35 % respectively should be reached with a relatively significant margin. Table 26 then shows the expected level of interconnectivity related to the installed capacity. Both scenario A and scenario B assume the same installed performance in this regard, so there are no differences between those scenarios. The current level of interconnectivity is then described in chapter 4.5.1.

Table 25: *Projected level of interconnectivity in 2030 (relative to maximum load)*

	Scenario (a)	**Scenario B**
Interconnectivity (export)	58.0 %	60.2 %
Interconnectivity (import)	50.0 %	51.8 %

Source: ČEPS, a.s.

Table 26: *Projected level of interconnectivity in 2030 under the Barcelona Agreement (relative to installed power)*

	Scenario (a)	**Scenario B**
Interconnectivity (export)	44.1 %	44.1 %
Interconnectivity (import)	38.0 %	38.0 %

Source: ČEPS, a.s.

Calculation methodology

The current model of foreign transmission systems is used to calculate the export and import capacity of the Czech transmission system and, in the case of the Czech Republic, is supplemented by parts of the transmission system with investment projects that will be implemented by the reference year. For the calculation of cross-border capacities, the so-called ENTSO-E NTC is using a methodology modified for the needs of transit systems such as the PS of the Czech Republic (strong link between and interfering between borders). The procedure for determining cross-border capacities is anchored in ČEPS' internal workflow, which is in line with the procedure for determining free tradable capacities for auctions that is listed on ČEPS's website. The calculation of the percentages of export and import capacity of the PSC of the Czech Republic is then based on the proportion of the fixed sum of export/import capacity in MW for a given year and the outlook for the net load for the corresponding year.33

Interconnectivity formula (export direction):

$$P_{ex\%} = \frac{P_{sum\,of\,XPO}}{P_{maxLOAD}} \cdot 100$$

Interconnectivity formula (in the import direction):

$$P_{im\%} = \frac{P_{sumIMPORT}}{P_{maxLOAD}} \cdot 100$$

2.4.2 Energy transmission infrastructure

i. Major infrastructure projects for electricity transmission and gas transmission, as appropriate. projects for its modernisation that are necessary to achieve the objectives and targets under the five dimensions of the Energy Union Strategy

Electro-energy

In accordance with the Energy Act, the transmission system operator prepares every two years the so-called Destival Plan for the Development of the Czech Transmission System, which is approved by the ERÚ following the opinion of the Ministry of Industry and Trade. The Czech Republic's 10-year development plan is published on the website of ČEPS34. The development plan of the Czech Republic meets the requirements of its subject-matter in the Energy Act and concerns measures taken to ensure adequate capacity of the transmission system so that it meets the requirements necessary to ensure security of electricity supply. More information on the expected development of the electricity system is provided in chapter 4.5.2.3.

Gas

In accordance with the Energy Act, the transmission system operator prepares a 10-year plan for the development of the transmission system in the Czech Republic every year. The plan shall cover measures taken to ensure adequate capacity of the transmission system to meet the requirements necessary to ensure security of gas supply. The plan lists, inter alia, the planned investment projects that will increase the capacity of the transmission system over the next ten years, as well as an analysis of the infrastructure security of gas supply. The 10-year plan is approved by the ERÚ following the opinion of the Ministry of

33The load and installed power projections are not fully consistent with those for the purpose of this material, which is due, inter alia, to the detail and purpose of these projections. However, there should be no serious disproportion/non-conformities in this respect.

The Czech34 Ten-Year Transmission System Development Plan can be found at the following link: https://www.ceps.cz/cs/rozvoj-ps

Industry and Trade and is published on the NET4GAS website.35 More information on the expected development of the transmission system is provided in chapter 4.5.2.4.

ii. Where applicable, the main infrastructure projects envisaged other than Projects of common interest (PCIs)36

Electro-energy

The Czech Republic's development plan also reflects the content of the regional investment plan of the CEE region and the 10-year development plan for the EU transmission network, which are adopted by ENTSO-E at a two-year interval. The development plan of the Czech Republic covers not only PCI projects, but also projects ensuring adequate capacity of the Czech transmission system to meet the requirements necessary to ensure security of electricity supply.

Gas

The development of gas infrastructure will be carried out in accordance with the approved 10-year transmission network development plan in the Czech Republic, which is updated every year. The projects aim both at maintaining and upgrading the capacity of the transmission system and at the same time directly at its development.

The current most important challenge for which the transmission system operator is preparing is the possibility of future hydrogen transport. Two hydrogen projects are in preparation, namely the Central European Hydrogen Corridor (CEHC) and the Czech-German Hydrogen Interconnector (CGHI). Both projects have an expected year of entry into operation by 2030. The CGHI project obtained the status of Projects of Common Interest (PCI) in 2024 and the CEHC project is seeking this status. Pipelines for repuposing for hydrogen transport are already available and no sections need to be built. CEHC and CGHI could thus be the first hydrogen corridors to import renewable hydrogen into Europe's central and bottom-up environment.

Another project is the implementation of the Czech-Polish bidirectional interconnection project. Although the Czech Republic is already connected to Poland via the Cieszyn border transfer point, it is only one-way in the direction from the Czech Republic to Poland. The Czech Republic will analyse the possibilities of bidirectional interconnection with Poland with sufficient capacity. This cross-border project includes, at the same time, the implementation of a national pipeline on the Bezměrov-Libhošť route (Moravia Capacity Extension II project). In addition to cross-border and national importance, this project would allow capacity increases for the northern Moravia region. Over the horizon of the 10-year plan, the development of gas infrastructure in line with future trends can be envisaged. The gradual decarbonisation of the European economy could build on a so-called hybrid system that exploits the synergistic effect of both electricity and gas networks.

Gas infrastructure as a whole, i.e. not only transport but also distribution, needs to be prepared in a timely manner for new trends, such as increased pace of decarbonisation (and shift away from fossil fuels), a shift to clean fuels and the associated more frequent interaction between the gas and electricity sectors. The infrastructure will have to handle the transport not only of natural gas, but also of blends of ZP and hydrogen (blending) and, ultimately, clean hydrogen. A CO2 transport requirement cannot be excluded in the future. At the same time, gas infrastructure can be used to increase flexibility in the electricity sector by storing surplus electricity at a given moment.

The Czech35 Ten-Year Transmission System Development Plan is available at the following link: https://www.net4gas.cz/cz/projekty/rozvojove-plany/

36In accordance with Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013 (OJ L 152, 3.6.2022, p. 45).

The operating conditions for flows from the north or west should reach a capacity level of at least 40 million m^3/day. This criterion is currently fulfilled. Both the transmission system and the distribution system will have to be able to supply the energy source base (electricity plants and heat plants) – the expansion of natural gas-fired sources up to 15 % of installed capacity (currently over 8 %) and BAT parameters (Best Available Technology), the expansion of micro-cogeneration sources and the use of gas in transport. This will entail the potential connection of new direct gas customers from both transmission and, in particular, distribution networks (electricity plants, heat plants) and the creation of adequate capacities on these networks. If SEC CZ's policy objectives are to be pursued in a liberalised gas environment, cooperation between all stakeholders is required.

There is already growing investor interest in connecting generation resources to the grid for the deployment of non-electrically connected RES plants or planning to produce hydrogen from surplus electricity, therefore the transformation of the systems into blends or clean hydrogen, including consumption, needs to be ensured. In the context of the development of physical supply, there is a need to put in place a tool for reporting targets stemming from European legislation (the need for a uniform reporting system for obligations and targets based on certificates linked to other carbon emission monitoring and reporting systems, see biomethane and hydrogen tracking).

2.4.3 Market integration

i. National objectives related to other aspects of the internal energy market, such as increasing system flexibility, in particular as regards the promotion of competitively determined electricity prices in accordance with relevant sector-specific rules, market integration and coupling aimed at increasing the tradable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, dispatching, redispatching and curtailment mechanisms for energy from renewable sources and real-time price signals, including a timeframe for achieving those targets

2.4.3.1 Electro-energy

The integration of day-ahead and intraday markets in Europe, on the basis of implicit cross-border capacity allocation, has a history of more than 15 years, where the coupling of these markets was initially carried out only between neighbouring countries37 on the basis of bilateral or multilateral agreements. As a result, these already interconnected markets were further integrated into larger regions.

The main benefits of market integration include opening up a larger single market for electricity. An energy market segmented into individual national markets (although physically interconnected) is inefficient and more risky and therefore expensive to trade. In interconnected markets, participants can better respond to changes in production and consumption. This opens the door for other players, stabilising the market and making the market more transparent. As a result, competition is increasing, leading to downward pressure on prices. In turn, merchants can translate savings from interconnected markets into their pricing policy.

Other benefits resulting from the integration of short-term electricity markets can be summarised as follows:

- optimal use is made of cross-border transmission capacities;
- integration helps to balance each country's electricity grids;
- price indices are stabilised and the volatility of the difference in electricity spot prices between

37For example, 2009 saw the interconnection of the Czech and Slovak day-ahead electricity markets.

EU markets decreases;

- buying often unused capacities of cross-border profiles in explicit auctions is limited;
- the risks associated with the purchase of cross-border capacity without ownership of electricity decrease
on export/import and vice versa.

The adoption of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation) based on Regulation (EC) 714/2009 on conditions for access to the network for cross-border exchanges in electricity was an important step not only to support the creation of a single EU electricity market, but also to demonstrate the importance that the European Commission devotes to the topic of integration.

In line with the requirements of the CACM, OTE, a.s. was on 7. 10. 2015 appointed by the Energy Regulatory Office (NEMO) to ensure single day-ahead or intraday coupling in the Czech Republic38. That provision was further extended by the decision of 1 October 2019 to the period from 10 October 2019 to 31 December 2023 and is not only a clear confirmation and positive assessment of the market operator's activities to date, but above all an undertaking by the market operator to participate actively in European integration activities. Together with the other European exchanges designated as NEMO and the transmission system operators in Europe, OTE a.s. cooperates in fulfilling the obligations to develop and, last but not least, operate the single day-ahead and intraday electricity market in the EU in accordance with the requirements of the CACM Regulation.

As part of the cooperation of all NEMOs in the EU, a plan was developed in June 2017 for the joint deployment and performance of the MCO functions of the MCO for the day-ahead and intraday electricity market coupling. It laid down governance and cooperation rules between NEMOs, defines the relationship with third parties, and further describes the transition of existing day-ahead and intraday interconnected market initiatives to the single connected day-ahead and intraday interconnected market.

Following the CACM Regulation, the following methodologies have been developed and subsequently approved, inter alia:

- methodology for products that NEMOs may include in the single day-ahead coupling
- and intraday markets,
- substitution methodology;
- methodology for harmonised maximum and minimum clearing prices;
- methodology of the matched day-ahead and continuous trading matching algorithm.

These methodologies shall be kept up to date with the requirements of electricity market participants or the Agency for the Cooperation of Energy Regulators (ACER).

At the beginning of 2020, a new version of the joint design of the linked day-ahead market matching algorithm and continuous trading matching algorithm and a new version of the joint product design for SIDCs were approved by ACER to incorporate a roadmap for the development and preparation of intraday electricity auctions, which should be part of the SIDC and complement intraday continuous trading. These intraday auctions should be ready in the first half of 2024. Their primary objective is to be able to value

38 For more information, please refer to the following link: http://www.ote-cr.cz/kratkodobe-trhy/integrace-trhu/all-nemo-cooperation

the available transfer capacity in intraday trading, as there is no market valuation of transmission capacity in continuous trading. During 2022, the design of these intraday auctions was under preparation. The implementation of technical and procedural solutions started in 2022 and testing of technical solutions started in 2023 and will continue throughout the year.

For the respective delivery day, 3 intraday auctions will be held in the following chronological order:

- IDA 1: D-1 15.00 for all hours delivered on D;
- IDA 2: D-1 22:00 for all delivery hours on day D;
- IDA 3: D 10.00 for delivery hours 13-24 days D.

Table 27: *Main national objectives for market integration (e-energy)*

National headline targets	Description
Complete, further develop and finally operate the single day-ahead and intraday electricity market in the EU as required by Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation) and resulting methodologies.	The aim is to implement the single market framework established by Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management based on Regulation (EC) 714/2009 on conditions for access to the network for cross-border exchanges in electricity.
Implement the MCO plan.	The MCO establishes rules for the management and cooperation between NEMOs, defines the relationship with third parties, and further describes the transition existing initiatives connected day-ahead and intraday markets in the single connected day-ahead and intraday markets.
Calculation of cross-border transmission capacities for long-term timing framework coordinated with the other TSOs of the Core capacity calculation region.	The transmission system operator in the Czech Republic shall be prepared for the coordinated calculation of cross-border transmission capacities for the long-term timeframe as determined in the Core Capacity Calculation Region. The introduction of a coordinated calculation at all bidding zone borders of the Czech Republic will achieve the target capacity calculation model for the implementation uniform, Committee in the forward electricity market
Calculation intraday cross-border transmission capacities for the intraday timeframe shall be coordinated with the other TSOs of the Core capacity calculation region.	Transmission operator systems in the Czech Republic the Republic will be prepared for a coordinated calculation of cross-border transmission capacities for the intraday timeframe as determined in the Core Capacity Calculation Region. The introduction of a coordinated calculation at all bidding zone borders of the Czech Republic will achieve the target capacity calculation model for the implementation uniform, Committee in the

Calculation of cross-border transmission capacities for time framework market s Regulatory energy coordinated with others subsidy the transmission systems of the Core capacity calculation region.	Transmission operator systems in the Czech Republic the Republic will be prepared for a coordinated calculation of cross-border transmission capacities for a time frame with balancing energy as determined in the Core Capacity Calculation Region. The introduction of a coordinated calculation at all bidding zone borders of the Czech Republic will achieve the target capacity calculation model as part of the implementation of the single European short-term electricity market
Enable efficient cross-border electricity trading by meeting legislative requirements for minimum cross-border capacities.	Transmission operator systems in the Czech Republic the Republic will take all necessary steps to continue to offer daily cross-border capacities in accordance with Article 16 of Regulation (EU) 2019/943 of the European Parliament and of the Council, i.e. to offer cross-border capacities of at least 70 % of transmission capacity while respecting operational security limits
As part of the **day-ahead electricity market**, ensuring the operation of a connected day-ahead electricity market.	The Czech Republic is connected in the day-ahead electricity market to the rest of the EU In June 2021, the 4M MC region was interconnected to a connected MRC region, creating a single European day-ahead market (SDAC) and implementing the Flow-based method for calculating cross-border capacities in the CORE region in June 2022. The implementation of PCR solutions allows market participants to benefit from the same offer structure as those known to market participants in the EU. Ensuring the operation of a connected single day-ahead electricity market within the SDAC is a key element for maintaining the stability of electricity trading.
Implement the **intraday auction project within the intraday electricity market**, thereby fulfilling the methodology for pricing intraday cross-zonal capacity prepared and approved in the EU under the CACM Regulation.	On the basis of the CACM Regulation and the resulting methodology for pricing intraday cross-zonal capacity approved by ACER on 24 January 2019, the development and preparation of intraday electricity auctions, which should be part of the SIDC and complement intraday continuous trading, started. These intraday auctions should be ready in the first half of 2024. Their primary objective is to appreciate the availability of transmission capacity within intraday trading as there is no market valuation of transmission capacity in continuous trading. Throughout the year

	2022 in preparation design of the following intraday auctions
Joint procurement of FRR with automatic activation of the balancing service (aFRR) with Austria and Germany.	Operator transmission systems Czech the Republic of ČEPS, a.s., together with the transmission system operators from Austria and Germany, will connect their markets in compliance with the rules of the Regulation. Commission (EU) 2017/2195. The implementation project is named ALPACA[41]
Central management of cross-border transmission capacities Capacity Management Function for the European regulatory energy market.	Czech Transmission Operator systems it operates, develops and services the Central Capacity Management Function (CMF) Cross-Border Transmission Capacity Management Function (CMF) tool for the European regulatory energy market. The CMF is a mandatory instrument defined by EU legislation.
Electricity data centre	Operator transmission systems Czech of the Republic of ČEPS, a.s., together with other operators systems in the Czech Republic the Republic, it will build an electricity data centre, which will be a key element for implementing the new market model involving electricity sharing, accumulation and providing flexibility from aggregation stemming from the EU Directive 2019/944 on common rules for the internal market for electricity.
Enabling an independent aggregator	Design of an independent aggregator model that allows for independent aggregation of flexibility (at the demand and transfer point level regardless of voltage level).
Within the **balancing services market,** introduce a 15-minute imbalance closing interval as of 1 July 2024.	In accordance with the applicability of the EBGL Regulation, a 15-minute imbalance settlement period will be introduced in the Czech Republic as of 1 July 2024.
In the **intraday electricity market, the** aim is to introduce 15 minutes products as of 1 July 2024.	Booting 15 minutes products na the intraday market follows on from the obligations arising from the EBGL Regulation and the introduction of a 15-minute imbalance settlement period in the Czech Republic. For the Czech trade area, 15-minute products can therefore be introduced both as part of a continuous trading so within intraday auctions as at 1.7.2024.
As part of the **day-ahead electricity market**, the aim is to introduce 15-minute products by early 2025 at the latest.	The introduction of 15 minutes products on the day-ahead market follows the obligations arising from the EBGL Regulation and the introduction of a 15-minute imbalance settlement period in the Czech

[41] Allocation of Cross-zonal Capacity and Procurement of aFRR Cooperation Agreement

	in the specificities of the interconnected market, the introduction of 15-minute products within SDAC harmonised across all EU countries
Energy data centre	In order to enable faster integration of RES, the concept will be sector Coupling a technologies Power2Gas will be built a data centre for the common management of hydrogen production in Balanced Service (CEPS) mode, on the one hand, and NET4GAS for the operational management of the gas system, on the other

2.4.3.2 Gas

The integration of gas markets (natural gas/methane and, in the future, hydrogen) in the context of the creation of a single gas market within the EU lags far behind the integration of electricity markets. Apart from infrastructure projects, which are aimed more at facilitating capacity booking for gas traders or making areas not directly connected to each other commercially available, no integration projects are currently being discussed to connect organised gas markets in our region.

The Czech Republic intends to help complete the internal energy market, namely the internal gas market by removing narrow infrastructure throats between the Czech Republic and its neighbours. The interconnection with Germany and Slovakia is already robust enough. Although the Czech Republic is already connected to Poland via the Cieszyn border transfer point, it is only one-way in the direction from the Czech Republic to Poland. Physical connections between the Czech Republic and Austria are still lacking. Another project is the implementation of the Czech-Polish bidirectional interconnection project. Although the Czech Republic is already connected to Poland via the Cieszyn border transfer point, it is only one-way in the direction from the Czech Republic to Poland. The Czech Republic will analyse the possibilities of bidirectional interconnection with Poland with sufficient capacity.

Support for the implementation of projects with the status of PCI (projects of common interest) will help to create and subsequently integrate the gas market, namely hydrogen. The market for this commodity is yet to be formed and the promotion of hydrogen PCI projects carried out in the Czech Republic with cross-border implications will contribute to its creation, to the integration of national markets in the area and to the creation of a central European regional gas market and to support the implementation of other (including national) projects of this type. Any cross-border interconnections for the transport of hydrogen are still missing.

The national gas market in the Czech Republic has been fully liberalised since 2007 and the ERÚ regulates only those prices which, for technical or organisational reasons, cannot be shaped by market mechanisms in a competitive environment. The gas market in the Czech Republic has a long-standing presence of dozens of gas traders offering services to customers. The gas market in the Czech Republic operates on a non-discriminatory basis, where any trader can reach any customer and all customers can enter into a contract with any trader. The prices of the supply services and other conditions of supply depend only on mutual agreement between them. The developed competitive environment in the gas market has enabled the emergence of a wide range of offers from traders, both in terms of price and related commercial conditions. Thus, the dynamics of the market depend rather on customers' ability and willingness to switch suppliers in order to secure more favourable conditions for themselves. The Energy Act and its implementing legislation guarantee all customers the right to switch gas suppliers. This amendment is free of charge. Thus, subject to existing commercial conditions, every customer has the right and the possibility to choose his gas supplier.

The internal gas market is then traded either through bilateral trading or through an organised short-term market. For more information see chapter 4.5.3.

ii. Where applicable, national targets for the non-discriminatory integration of energy from renewable energy
resources, demand response and energy storage, including through aggregation, in all energy markets, including a timeframe for achieving these objectives

The integration of renewable energy sources, demand response, energy storage and flexibility aggregation are addressed in the National Action Plan for Smart Grids and its update ‘National Action Plan for Smart Networks 2019-2030’. The national targets, including the timeframe for achieving them, are set out in this document. For more details, see Chapter 3.4.3, Part (ii).

iii. Where applicable, national objectives with regard to ensuring that consumers participate in the energy system and benefit from self-generation and new technologies, including smart meters;

As part of the National Action Plan for Smart Networks (see information in Chapter 3.4.3, part (ii), preparation of the conditions for the introduction of smart metering in the Czech Republic is ongoing. The upcoming solution also takes into account the legislative measures issued as part of the ‘Clean Energy for All Europeans’ package in the area of the internal electricity market (Directive (EU) 2019/944 of the European Parliament and of the Council on common rules for the internal market for electricity).

iv. National objectives with regard to ensuring electricity system adequacy, as well as for the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives are to be met

The Czech Republic’s objective is to ensure resource adequacy assessed under the existing European framework while maintaining the applicable safety standard. Ensuring resource adequacy is the responsibility of the operator of the transmission of the Slide, which in the Czech Republic is ČEPS, a.s., and the State creates the conditions for ensuring such adequacy. The secure operation of the electricity system and the required quality of electricity supply depends, in addition to the reliability parameters of the transmission system and the distribution system, on a balanced mix of generation that is not directly influenced by transmission and distribution system operators. The Czech Republic’s current State Energy Concept envisages risks to ensuring resource adequacy already after 2030 and envisages a sharp increase in import dependency, which can reach almost the maximum safe import balance limit and exceeds the requirement of energy self-sufficiency (covering at least 90 % of consumption with domestic resources).
The transmission retractor shall annually carry out an outlook of the resource adequacy status, including the design of measures to resolve any problems and identify the risks that give rise to those problems. The resource adequacy assessment shall be developed by the transmission system operator in accordance with Regulation (EU) 2019/943 of the European Parliament and of the Council, which replaced Regulation (EC) 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity.

The document prepared by the TSO is then based on an analysis of the systemic risks of the reliability of the EC performance balance, using a probabilistic approach for different consumption periods and scenarios, levels of construction and restoration/living of conventional sources, cross-border capacity options, the alternative share of renewables and decentralised energy sources. The evaluation shall include the development of scenarios for the possible evolution of electricity and the evaluation of potential risks requiring generation and system adequacy measures.

Articles 11 and 25 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June

2019 on the internal market for electricity set out the procedure for quantifying the VOLL (Value of Lost Load) and the LOLENS (Loss of Load Expectation Norma) reliability standard. The relevant provisions of EU legislation further regulate the methodologies proposed by ENTSO-E and subsequently approved by ACER in October 2020,[50] of which are:

- *Methodology for the European resource adequacy assessment*
- *Methodology for calculating the value of lost load, the cost of new entry and the reliability of the standard*

For the calculation of the reliability standard, the ENTSO-E methodology requires that VOLL and CONE values are set first for Member States. The need to establish VOLL and CONE values must then be seen in conjunction with the assessment and possible decision on the implementation of remedial measures in the event of an unsatisfactory state of reliability of the electricity supply.

For the Czech Republic, the most recent official reliability standard was established in 2021.This standard is currently being updated with an expected publication deadline in the second half of 2024 together with the Resource Adequacy Assessment. The current value of the reliability standard corresponds to 15 hours of non-delivery of electricity per year. According to preliminary results, we expect it to be about halved.

A higher degree of integration with other sectors such as heat, gas or transport can also contribute to greater flexibility in the electricity system. In the case of heating, this is particularly the case of power2heat technologies, which have been deployed in the Czech Republic for a long time, but support for their development should be considered. In the case of gas, it is the production of hydrogen by electrolysis (Power2Gas technology) and possibly its methane formation into synthetic methane. Specific measures on the issue of financial support for energy stored in gaseous form in the gas system may depend on the EU legislative framework that will be presented in the “2020 Gas Package” of the European Commission. In the field of transport, this may involve the use of electricity accumulation in electric vehicles and the coordination of charging them up to the period of excess electricity.

The flexibility of the energy system in terms of renewable energy production is specifically addressed in the National Action Plan for Smart Grids and its update ‘National Smart Networks Action Plan 20192030’. The national targets, including the timeframe for achieving them, are set out in this document. For more details, see Chapter 3.4.3, Part (ii).

In the context of the development of intermittent resources, it will also be necessary to invest in the development of electricity storage, demand response (DSR) and, where appropriate, to evaluate the need to put in place a capacity mechanism or other form of support for successful energy transition and decarbonisation, in case such investments are not triggered by the market. The use of hydrogen is also an important aspect of accumulation. Electrolysers can play a key role in the integrated energy system in terms of system services. Hydrogen is also a tool to strengthen energy security by providing a forward-looking emission-free source of flexibility for grid management.

v. Where appropriate, national objectives to protect energy consumers and improve competitiveness retail energy sales sector

More detailed information can be found in Chapter 3.4.3, specifically point (iv), which deals with policies and measures to protect consumers, in particular vulnerable and potentially energy poor consumers, and to strengthen the competitiveness and competitiveness of the retail energy market.

2.4.4 Energy poverty

1. Where applicable, national targets in terms of energy poverty, including a timeframe for their achieving

1.1.1.1 National energy poverty target

The definition of energy poverty is not yet legally enshrined in Czech law. However, under the Energy Efficiency Directive 2023/1791, energy poverty is defined as: "the household's lack of access to essential energy services that ensure a basic standard of living and a decent standard of living and health, including adequate heating, hot water, cooling, lighting and energy to power appliances, in the relevant national context, existing social policy and other relevant policies, due to a combination of factors, including unavailability, insufficient disposable income, high energy expenditure and low energy efficiency of households".

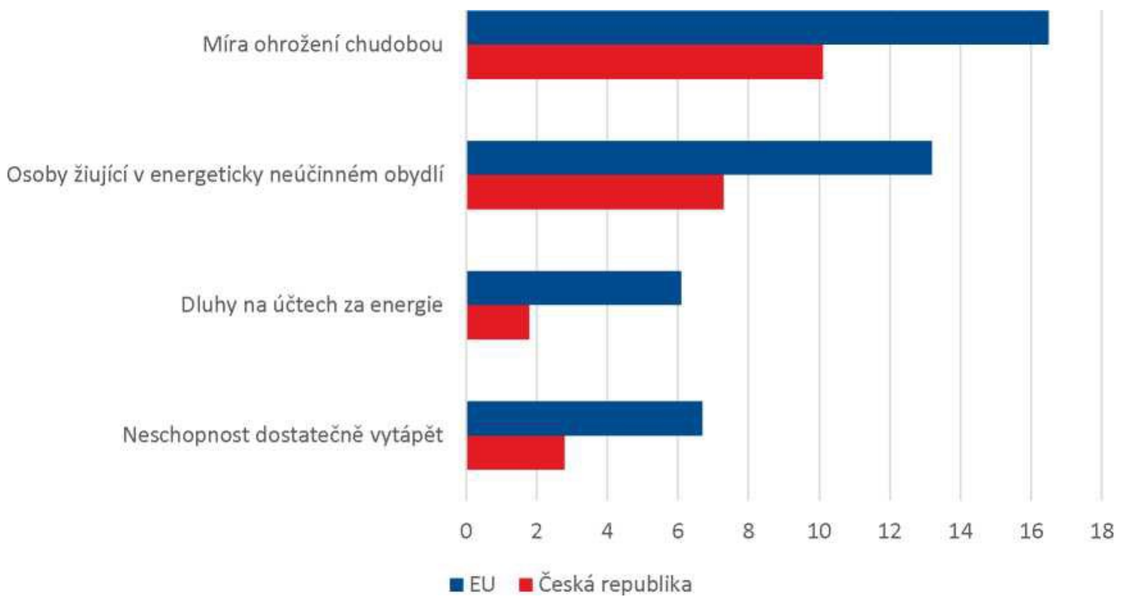
This definition will therefore be transposed into Czech law within the meaning of Directive 2023/1791 on energy efficiency within the prescribed time limit for its transposition. However, the definition will be adapted to the Czech environment.

For the purposes of the provisions on the definition of energy poverty and the related definition of vulnerable households, an expert group on energy poverty was set up under the Ministry of Industry and Trade. This group is composed of experts from relevant ministries as well as from academia or representatives of non-profit organisations. The initial objective of the expert group is to propose a definition of energy poverty for the Czech Republic, to set appropriate indicators for measuring energy poverty and the related definitions and indicators for vulnerable households, stemming from Directive (EU) 2024/1275 on the energy performance of buildings. This target is planned to be met by the end of 2024. On the basis of the established definition of energy poverty, the expert group will aim to continue to coordinate the state's approach to energy poverty, to propose an energy poverty strategy and, where appropriate, to discuss concrete measures to combat energy poverty.

- As part of the fulfilment of the obligation under Article 8 of the Energy Efficiency Directive, the Czech Republic will set the instruments in such a way that energy efficiency improvements are also implemented for low-income groups, in proportion to the cumulative end-use savings in relation to the level of the Member State's commitment and the ratio of Eurostat indicators defined by the Directive, which are: Inability to maintain sufficient heat at home (Eurostat, SILC [ilc_mdes01]);
- Arrears for services (Eurostat, SILC, [ilc_mdes07]) and
- Total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor (Eurostat, SILC [ilc_mdho01]);
- At-risk-of-poverty rate (Eurostat, SILC and ECHP surveys [ilc_li02]) (cut-off point: 60 % of median equivalised income after social transfers.

On the basis of the 2019 figures, this is 5.5 % of the population in the Czech Republic, where the Czech Republic will implement special measures to improve energy efficiency.

Graph 16: Comparison of indicators against the EU average for 2019



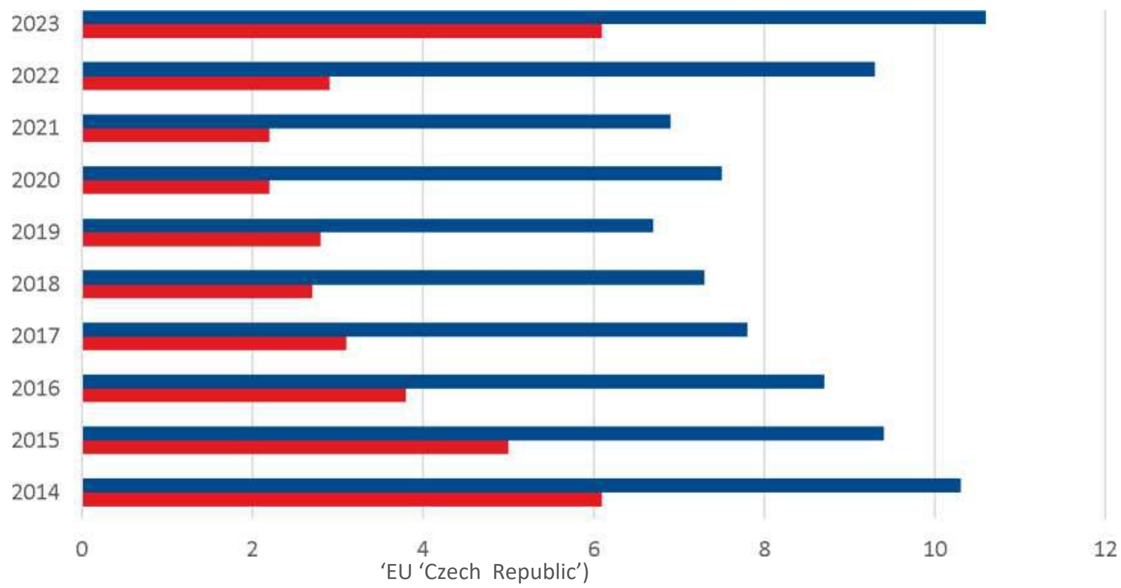
1.1.1.2 Contextual information for energy poverty39

In the long run, the Czech Republic performs better than the EU average of indicators in the household sector. In the case of measuring energy poverty, the most relevant indicators are inability to heat adequately and energy arrears. Around 2.9 % of households were unable to maintain sufficient heating comfort in 2022 and only 1.9 % experienced difficulties in paying their energy bills in the same year. In 2023, the inability to heat sufficiently deteriorated to 6.1 %, but the Czech Republic is still below the EU average. Again, only 1.9 % reported inability to pay energy bills in 2023, placing them second in the EU.

The share of households that could not maintain sufficient thermal comfort is long-term below the EU average (see Chart 17). Since the year 2014 the indicator decreased, until 2019, when it experienced a mild brutal. The renewed increase in the share of people who say they cannot afford to heat sufficiently increased again in both 2022 and 2023. These years are marked in particular by the energy crisis, which may have led to an incentive to heat their homes less due to higher energy prices.

Graph 17: *Comparison of the indicator of inability to heat adequately in the Czech Republic and the EU*

39This information is drawn from the Czech Republic's Energy Poverty Observatory. However, these data will need to be verified and their informative value verified for the Czech Republic, including on the basis of the methodology developed.



Indicators in the household sector indicate that energy poverty in the Czech Republic is mostly a problem for tenants, seniors and single parents with children. However, there are no clear groups according to the type of dwelling or the density of urbanisation, in which energy poverty is most significant, in particular because of the still inconsistent methodology for measuring energy poverty in the Czech Republic, which the expert group referred to above is intended to address.

2.5.Difference ‘Research, innovation and competitiveness’

i. National objectives and target areas of funding for public and, where available, private research and innovation related to the Energy Union, including a timeframe for achieving these objectives

Public expenditure to support energy-oriented R & D has been increasing over the long term and over the past period it has been substantially doubled, with its share of total public R & D spending increasing by about a fifth and exceeding the 6 % threshold. According to the draft update of the Czech Republic’s State Energy Concept, the objective in this regard is to continue to increase public expenditure on support for R & D in the energy sector, while keeping their share of total public expenditure at least 5 %.

The following can be considered as the main priorities in the field of energy R & D and innovation according to the draft update of the State Energy Concept of the Czech Republic:

- Increase funding to support R & D & I in energy and engineering.
- Ensure that the key importance of energy and related disciplines is highlighted in science and research development strategies.
- Ensure effective coordination of research projects involving national authorities, including national priorities for oriented research, experimental development and innovation.
- Support the emergence of a comprehensive long-term support system for research and development in nuclear technologies or the consolidation of existing programmes, in particular in the fields of safety, non-electric applications, the end of the life or fuel cycle and new generations of nuclear reactors.
- Support R & D projects specifically addressing new challenges and trends in energy, in particular in the areas of decarbonisation, decentralisation, digitalisation and democratisation, with outputs contributing to the achievement of the Czech Republic’s medium- and long-term objectives and commitments.
- Ensure that cooperation between basic and applied energy research is improved and deepened.

- Target maximum aid for applied research while respecting a limited number of human resources and the scientific and research potential of the Czech Republic.
- Support, in the framework of fundamental research, areas where current levels are competitive on a European or global scale.
- Ensure that links between research, education, government and practice are strengthened through a long-term strategy defining priority areas and objectives.
- Ensure coordination of state programmes and public support with private funds in order to achieve maximum efficiency.
- Promote cooperation between research organisations and industry.
- Support the development of the work of technology platforms with a focus on setting and achieving specific objectives.
- When setting R & D priorities, reflect the objectives and priorities of the European Strategic Energy Technology Plan (SET Plan) relevant to the Czech Republic.
- Promote the growth of the involvement of domestic research capacities in existing and future international activities and projects, in particular in the direction of maximum participation in European projects under the SET-Plan.
- Ensure effective use of the tools offered in particular by the European Union, the International Energy Agency and the International Atomic Energy Agency, and encourage the conclusion of further bilateral agreements for the involvement of Czech research in the international environment.
- Create the conditions for comprehensive support for domestic energy and engineering producers in order to enhance the transfer of new scientific and technical knowledge into practice, in particular through their involvement in international research energy programmes, membership of international agencies and associations, co-financing of research and development projects from EU structural funds and governmental advisory activities ensuring efficient project administration.
- Support the implementation of demonstration units and pilot projects with a high level of innovation or technological level, both within the framework of permitting and authorisation procedures, as well as through the involvement of state resources in support of R & D & I and the channelling of EU funds.

The strategic objectives are then described in more detail in the relevant strategic documents. This includes in particular the National Research and Innovation Strategy for Smart Specialisation40 and the National Priorities for Oriented Research, Experimental Development and Innovation41.

The National Priorities for Oriented Research, Experimental Development and Innovation identifies a total of six main priority areas where the Energy Union's closest focus corresponds to the priority area Energy and Material Resources Sustainability. This area is subdivided into three sub-areas: (I) sustainable energy; (II) improving the energy intensity of the economy and (iii) the material base. See chapter 3.5 for more information.

National priorities for oriented research, experimental development and innovation contain indicative proportions of funding per priority area that should be earmarked for implementation within the overall R & D & I budget. Based on this strategy paper, around 18 % of total R & D & I budgets should be allocated to the priority Sustainable energy and material resources (see Table 28).

Table 28: *Indicative distribution of funds between priority areas*

Name of priority area	Share of funds
A competitive knowledge-based economy	20 %

40 The document can be accessed via the following link: https://www.mpo.cz/cz/podnikani/ris3-strategie/
41 The document can be accessed via the following link:
https://www.vyzkum.cz/FrontClanek.aspx?idsekce=653383

Sustainability of energy and material resources	18 %
Well-being environment	18 %
Social and cultural challenges	10 %
Healthy population	20 %
Secure society	14 %

Source: National priorities for oriented research, experimental development and innovation

ii. Where available, national 2050 targets for the promotion of clean energy and, where applicable, national objectives including long-term objectives (2050) for the deployment of low-carbon technologies, including decarbonisation of energy- and carbon-intensive industries and related carbon transport and storage infrastructure, where appropriate

The Czech Republic does not have specific national targets for the deployment of low-carbon technologies by 2050 beyond those set out in other parts of this document. The deployment of specific technologies should also be driven in particular by the market. The State can create the conditions for R & D & I or sub-support specific technologies in accordance with State aid rules, but it is questionable whether it is the State's role to specify targets for the deployment of certain technologies and thereby distort the market environment.

iii. Where applicable, national objectives with regard to competitiveness

The national objectives and strategy for the Czech Republic's orientation in this area are set out in specific strategic documents. In this regard, particular reference can be made to the updated State Energy Concept of the Czech Republic, the National Research and Innovation Strategy for Smart Specialisation of the Czech Republic, which aims to effectively target European, national, regional and private funds into priority innovative specialisations in order to fully exploit the Czech Republic's knowledge potential. The strategy thus significantly supports, among other things, strengthening the competitiveness of the economy. For example, the National Initiative Industry 4.0 could also be mentioned. The Czech Republic is also preparing the so-called Economic Strategy, which should define the main objectives for the Czech economy by 2030. In this regard, it will be a key plan for the Czech economy, based on ten pillars from industry and energy, innovation, raw materials policy, transport design, business support and education reform. Furthermore, a National Investment Plan is being prepared to map in detail the investments needed, inter alia, in the energy sector, at a minimum over the next ten years. In addition, the Czech Republic's Innovation Strategy 2019-2030 was approved by Resolution No 104 of the Government of the Czech Republic of 4 February 2019. This is a strategic framework plan that sets out the government's R & D & I policy to help the Czech Republic move towards Europe's most innovative countries in twelve years. The innovation strategy is composed of nine interlinked pillars, which include the baselines, the underlying strategic objectives and the tools to achieve them. These are: R & D funding and evaluation, Innovation and Research Centres, National Start-up and spin-off environment, Polytechnic Education, Digitalisation, Mobility and Building Environment, Intellectual Property Protection, Chytré Investment and Chytra Marketing. The Czech Republic also considers the Competitiveness Council of the EU to be important in this regard, in which the Czech Republic actively participates.

The national competitiveness targets result from the draft update of the Czech Republic's State Energy Concept. The objectives are as follows:

- Reduce the energy intensity of gross value added generation to the EU average.
- Reduce the electricity intensity of gross value added and keep it below the EU average, taking into account the increasing electrification of individual sectors.

- Maintain the import and export capacity of the transmission system relative to maximum load at at least 30 % and 35 % respectively by 2030 and, where appropriate, further increase that capacity after that year in line with current needs.
- Reduce energy price levels to the European Union average and consequently maintain this situation without significant deviations.
- Reduce the share of energy expenditure in total household expenditure and consequently keep it as low as possible below 10 %.
- Optimise the contribution of the energy sector to gross value added, taking into account the role of the energy sector in the national economy.

3 Policies and measures

3.1 'Carbon reduction' dimension

In the case of combustion processes, the Czech Republic has long been confronted with emissions of hazardous substances into the air ($PM_{2.5}$, PM_{10}, PAH polycyclic aromatic hydrocarbons, benzo(a)pyrene, NOx, VOC, ground-level ozone, CO, dioxins, toxic metals and others) resulting from the combustion of coal in domestic furnaces in almost every municipality in the Czech Republic. Emissions from old diesel and petrol engines in transport also pose a health risk. For reasons of both severity and national scale, it is desirable to reduce greenhouse CO_2 emissions from combustion processes in these major areas of domestic furnaces and old diesel and petrol engines as a priority, including as a major multiplier effect, which at the same time authorises state subsidy intervention to protect the health of the population, as damage to health and property in fuel and energy prices is currently far from being internalised.

3.1.1 Greenhouse gas emissions and removals

1. Policies and measures to achieve the objective set by Regulation (EU) 2018/842, as set out in in point 2.1.1, and policies and measures for compliance with Regulation (EU) 2018/841, covering all key emitting sectors and sectors supporting removals, taking into account the long-term objective of becoming a low-emission economy, and ensuring a balance between emissions and removals in line with the Paris Agreement

1.1.1.1 Transport sector

The strategic and conceptual objectives and guiding principles for the development of transport and transport networks are set out in the transport policy of the Czech Republic for the period 2021-2027 with a view to 2050. These are gradually being developed in follow-up strategies. The main objective is to create the conditions for the development of a high-quality transport system based on the use of the characteristics of each mode of transport and on the principles of competition, taking into account its economic, social, environmental and public health impacts. The State Environment Policy of the Czech Republic 2030 also contains requirements regarding the promotion of the use of alternative fuels, the development of environmentally friendly transport or economic instruments to include externalities from all modes of transport with a view to 2050.

Transport policy envisages the gradual replacement of conventional fuels (i.e. oil-based fuels) for alternative energy in road transport and the further electrification of railways and urban public transport, the gradual shift of freight transport from road to rail and/or waterborne transport. A similar sub-target is set for 2030 by the draft update of the Czech Republic's State Energy Policy and the Czech National Emission Reduction Programme (2019).

A number of measures are in place in the Czech Republic to increase the use of different types of alternative fuels. Vehicles for the transport of passengers or goods transport vehicles with a maximum authorised weight of less than 12 tonnes using alternative propulsion (hybrid motors, electric motors, CNG, LPG and bioethanol E85) are exempted from this tax by virtue of Act No 16/1993 Coll. on road tax, natural gas used in transport benefits from a lower rate of excise duty. A certain (albeit lower) advantage in this area also applies to the use of LPG in transport.

An update of the NAP CM was approved in 2024, primarily based on the requirements of the approved Regulation of the European Parliament and of the Council on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council (the so-called AFIR). More detailed information on this programme can be found in Chapter 3.1.3.1 of the National Clean Mobility Action Plan.

In the 2014-2020 period, support for clean mobility is supported by several current Operational Programmes. While the Operational Programme Transport (OPD) aims to support publicly accessible recharging and refuelling infrastructure (CNG/LNG/hydrogen), the Integrated Regional Operational Programme (IROP) supports the development of clean mobility in the field of public transport and the Operational Programme Entrepreneurship and Innovation for Competitiveness (OP PIK) supports the uptake of e-mobility in the business sector. Mention may also be made of the Prague Growth Pole Operational Programme, under which a new specific objective was created for the purchase of fully emission-free electric buses, including the construction of infrastructure for electric buses. The OPs also include other measures with an impact on greenhouse gas emissions savings in all priority axes aimed at developing infrastructure for rail (building the TEN-T network) and other sustainable transport (e.g. modernisation of the electric traction of urban public transport).

Under Act No 201/2012 on the protection of the air, a fuel supplier is required to progressively reduce greenhouse gas emissions per unit of energy contained in the fuel in the complete life-cycle of motor fuel. By the end of 2020, it had to achieve a 6 % reduction in greenhouse gas emissions. Only biofuels complying with the sustainability criteria under Government Regulation No 189/2018 on sustainability criteria for biofuels and the reduction of greenhouse gas emissions from transport fuels may be counted towards compliance with the obligations. The Excise Duty Act No 353/2003 lays down the tax burden on individual motor fuels.

The development of a Strategic Sustainable Urban Mobility Plan (SUMMP) is an important tool for the creation of a sustainable urban transport system. The aim is to comprehensively address the issue of mobility in larger cities linked to peri-urban areas, not only transport but also the possibility of influencing mobility and how it can be met. SUMPs should be developed and regularly updated in cities over 40 thousand inhabitants.

Energy savings in passenger transport are based on increasing the use of public transport and freight transport by increasing rail performance at the expense of road transport. The concept of public transport, prepared as the starting strategic document of the Ministry of Transport for the period 2015 to 2020, with a view to 2030, therefore aims at improving the public transport system. Public transport operators and transport infrastructure managers may apply for support through the Integrated Regional Operational Programme for a wide range of activities related to increasing sustainable forms of transport, such as fleet renewal. This will be necessary if Government Regulation No 49/2015 is to be implemented so that the average age of wagons in regular public transport is not higher than 9 years.

In the field of freight transport, reference should be made to the 2017-2023 Freight Transport Concept with a 2030 perspective, which, in view of the more difficult process of introducing alternative energy in freight transport, highlights this particularly for urban freight transport and citylogistics. According to this concept, the supply of, in particular, historic city centres must be provided by smaller trucks, preferably using alternative energy. In the short term, the use of LNG (possibly also bioLNG) in the long term could then be electricity or hydrogen.

The objective of the agreed Action Plan for the Development of Intelligent Transport Systems by 2020 with a view to 2050 also contributes to fuel savings. Intelligent systems will, inter alia, make it possible to monitor the technical state of transport routes and to prevent serious accidents. The implementation of the National Strategy for the Development of Cycling Transport for 2013-2020 and the Urban and Active Mobility Concept 2021-2023 (MD) are intended to improve coordination of development and the conditions for using this environmentally friendly non-motorised mode of transport.

In order to promote the use of environmentally friendly vehicles, the Czech Republic's National Emission

Reduction Programme contains a measure ‘Conversion of the public administration fleet with alternative powered vehicles’. On 1 December, Act No 360/2022 on the promotion of low-emission vehicles through public procurement and public passenger transport services entered into force, which sets minimum shares of low-emission vehicles by 2025 and 2030.

Low-emission zones are geographically defined areas that limit the access of cars based on their emission levels in order to improve air quality in these areas. The rules for the classification of road motor vehicles in emission categories and on emission plaques were laid down in Government Regulation No 56/2013. The implementation of low-emission zones is also supported under the National Environment Programme. The national programme also aims at promoting alternative modes of transport (e.g. carsharing, bikesharing, alternative propulsion, non-motorised modes of transport). In 2016-2019, under the National Environment Programme, the Ministry of the Environment launched 4 calls for municipalities, regions and organisations set up by them to support the purchase of alternatively fuelled vehicles. The largest call to date, with an allocation of CZK 600 million, was launched in June 2022 and should support the acquisition of 1485 alternatively powered vehicles and 200 charging stations. These calls are complementary to calls in OPPIK and OP TAK for legal persons.

Other measures may include the introduction of the special registration number ‘EL’ (effective from April 2019), which is linked to the waiver of the registration tax, and the exemption from charging for the use of tolled infrastructure (‘motorway vignettes’) from 2020 for electric or hydrogen vehicles with emissions of up to 50 g CO2/km or, for motorway vignettes, the rebate from 2021 for natural gas and biomethane vehicles.

Transport is also an important domain for the use of hydrogen technologies. Hydrogen deployment is mainly envisaged for passenger bus, train and long-distance freight transport. The AFIR prescribes the number of hydrogen refuelling stations that need to be built around TEN-T corridors and in urban nodes.

Following the June 2023 update of the revised Directive 2018/2001 on the promotion of the use of energy from renewable energy sources, fuel suppliers will have to meet a new mandatory sectoral target, in a combined target of 5.5 % with advanced biofuels, biogas and renewable fuels of non-biological origin, with 1 % of total consumption to be met by renewable fuels of non-biological origin only by 2030.

1.1.1.2 Agriculture and forestry sector

The processing of residues of agricultural production in biogas stations is an important way of recovering methane and preventing it from spontaneously. The main instrument to promote the use of biogas was the introduction of feed-in tariffs and green bonuses linked to the amount of electricity produced. The construction of biogas stations has been supported under operational programmes and is also supported in the current period. The construction of biogas plants using bio-waste is supported by the Operational Programme Environment, while the Operational Programme Enterprise and Innovation for Competitiveness can support the diversion of heat from existing biogas plants for efficient use. In addition, the Common Agricultural Policy Strategic Plan 2023-2027 will support the roofing of the final digestate storage of agricultural biogas plants and support for the installation of biogas accumulation.

The Common Agricultural Policy Strategic Plan 2023-2027 and will address the achievement of climate objectives by 2027, in particular through interventions implemented under Specific Objective 4 ‘Contribute to climate change mitigation and adaptation, including by reducing greenhouse gas emissions and promoting carbon sequestration, and further promoting sustainable energy. Some of the interventions under Specific Objective 2 “Enhanc market orientation and increase the competitiveness of farms in the short and long term, including through a greater focus on research, technology and digitalisation” will also have an impact.

An important tool to reduce the consumption of mineral fertilisers is the development of organic farming, in which the use of nitrogen mineral fertilisers is completely prohibited. The organic farming scheme is established by Regulation (EU) 2018/848 of the Council and of the European Parliament of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007. The support provided under the Strategic Plan of the Common Agricultural Policy has a major impact on the expansion of the area of agricultural land under organic farming.

Soil carbon sequestration helps to comply with Good Agricultural and Environmental Conditions (GAEC) standards and statutory management requirements (SMRs), transposed by Government Regulation No 73/2023 laying down rules for cross-compliance with payments to farmers. The payment of support in the form of direct payments and rural development environmental interventions per area or livestock shall be subject, inter alia, to compliance with those standards and requirements. Within the framework of the Common Agricultural Policy Strategic Plan, agri-environment-climate measures have a positive effect on maintaining or enhancing the nitrogen retention capacity by setting up appropriate land management or transitioning to a culture with higher retention potential. Another effect of this measure is the reinforcement of anti-erosion measures with a high sequestration impact, in particular in nitrates of vulnerable zones or along watercourses (promoting, treatment of grassland). Promoting sustainable management of permanent grasslands will also contribute to soil carbon sequestration.

Support for afforestation of agricultural land is another tool to address climate issues by expanding forest areas under the Strategic Plan of the Common Agricultural Policy. Government Regulation No 63/2023 laying down the conditions for implementing a measure of afforestation of agricultural land provides for subsidies for the establishment of forest cover, the maintenance of forest cover for 5 years and the cessation of agricultural production on wooded land for 10 years. The newly introduced support for agroforestry also contributes to the promotion of carbon sequestration and has anti-erosion functions. The establishment of two types of agroforestry systems (arable land and grassland) and the subsequent management of these systems for five years are supported.

It also helps to prevent damage to forests from forest fires and natural disasters and catastrophic events by reducing emissions from forest fires and maintaining carbon stocks in biomass and soil.

2. The National Forestry Programme includes ‘Key Action 6 – Reducing the impacts of expected global climate change and extreme meteorological events’, which is based on 12 specific measures. These measures generally aim at creating more resilient forest ecosystems by promoting diversified forest stands, making the greatest possible use of natural processes, varied woody composition, natural restoration and variability in cultivation practices.

The strategy of the Ministry of Agriculture with a view to 2030 under objective D.2 ‘Competitive forest-based value chain’ aims, inter alia, to: (I) creating conditions for increased domestic use and consumption of wood and wood products; (II) creating the conditions for investments in the forestry sector and downstream value chain leading to the production of higher value-added timber products; (III) reducing exports of wood from the Czech Republic; (IV) promoting R & D towards better use of wood and finding new wood-based product options.

All this should lead to an increased use of wood as a renewable carbon-fixing raw material and to the substitution of other materials whose production is associated with high $CO2_{emissions}$. Reducing exports and processing of wood in the Czech Republic (especially for sawn wood and wood panels) will contribute positively to the Czech Republic’s emission balance.

The National Forest Policy Concept for 2035 was adopted by the Government in February 2020 and its subsequent application document in 2021. The objective of the Framework is to set a course of forest management that is a consensus between the requirements of interest groups with an impact on forest management, drawing on the latest scientific and research knowledge, taking into account the interests of society as a whole. The concept addresses not only the issue of state-owned forests, but the forest management as a whole. The basis for the development of the Application Document is 4 long-term objectives stemming from the Concept: AND: Ensure that all forest functions are fulfilled in a balanced manner for future generations; B: In view of the ongoing climate change, increase biodiversity and ecological stability of forest ecosystems while maintaining production function; C: Ensure the competitiveness of forestry and downstream industries and their relevance for regional development and D: Strengthen the importance of advice, education, research and innovation in forestry.

The application document is not only based on the Government-adopted Concept, but also builds on previously adopted documents (Principles of the State Forest Policy, National Forestry Programme II, National Action Plan for Adaptation to Climate Change), updates, develops and specifies some of the tasks previously assigned. At the same time, it reflects the current state of forest management, the situation in the raw wood market and the current challenges arising, in particular, from bark beetle, including the economic situation in the entire forestry sector. It contains concrete measures for the implementation of the Framework, setting out the related responsibilities, the requirements for the State budget and deadlines for the implementation of the time horizon until 2026.

In particular, the following may be included among other policies and measures relating to the forestry sector.

Adaptation programme

The objective of the Adaptation of Forests to Climate Change Programme is to support non-state forest owners in their efforts to increase the resilience of forest ecosystems to climate change and stabilise forest ecosystems, including in the context of the stable binding ofCO_2 in the LULUCF sector. The programme will require the application of greener forest management, logging and forest restoration practices. To this end, specific forest management requirements are laid down which go beyond the forest owner's obligations under the Forest Act – e.g. reduction of the area of shavings resulting from deliberate spawning, the use of a higher number of plantations suitable for habitation, including an appropriate proportion of woody amelioration and stabilisation species, the retention of certain trees for felling in crops over 60 years of age, and, in the case of larger properties, an increase in the proportion of natural regeneration and the use of sound technologies for the concentration of wood.

Financial contributions to forest management (pursuant to Regulation No 30/2014)

The contributions generally lead to the fulfilment of the forest owner's economic obligations under the Forests Act. The measures generally lead to the fulfilment of forest functions, including the mitigation function and stabilisation of forest ecosystems and the long-term balance of sinks of CO_2. In particular, contributions to the natural and artificial regeneration of forests, their provision and the tending of stands under 40 years of age, which are central to adaptation management in the current forestry environment. The inclusion of amelioration and stabilisation trees in restoration, i.e. woody trees resistant to climate change, the rapid securing of stands, and the strict protection of the forest from disturbances (in particular bark beetles) leading to a reduction in incidental harvests also has an increased mitigation effect.

Raw material policy for wood

The policy follows the objectives of the National Forest Policy Concept for 2 035 in the area of processing and use of wood as a renewable raw material. It identifies wood as a strategic commodity that is permanently renewable and contributes significantly to mitigating negative impacts due to the long-term storage of atmospheric carbon in times of changing climate. The raw material policy for wood is based on the principles of sustainable forest management and sustained and balanced timber production in Czech forests. It focuses on measures setting out steps to remove current barriers to increased use of processed wood and wood products, in particular in the construction sector. Overcoming them will contribute to increasing the use of wood and thus have a major positive impact on carbon sequestration in long-lived products.

Improving the level of accuracy of reporting of emissions and sinks in the LULUCF sector

Regulation EU 2023/839 requires minimum Tier 2 Tier 2 methods for all territorial categories and reporting items for ecosystem carbon stocks at the latest for the reporting year 2026. Subsequently, the use of Tier 3 methodological level procedures is imposed for selected categories of territories and territories under specific protection. At the same time, emphasis is placed on geographically explicit reporting.

The emission inventory of the LULUCF sector of the Czech Republic, given the methodological level of the determination of emissions, is one of the States with a high level of representation of Tier 3 methods, which cover most of the so-called key emission categories. This is mainly due to the implementation of the advanced model solution calibrated by the CBM-CFS3 tool in the Czech Republic.

Table 29: *Methodological level and solutions for forest- and forestry-related emission categories*

Emission category (UNFCCC) or Activity (KP LULUCF)	UNFCCC Carbon pool	Carbon pool KP LULUCF	Methodological tier and comment
FL remaining FL Forest Management	Living biomass	Aboveground biomass	T3, CBM
		Belowground biomass	T3, CBM
	Dead organic matter (DOM)	Deadwood	T3, CBM
		Litter	T3, CBM
	Soil (mineral soils)*	Soil (mineral soils)	T3, CBM
4.A.2 Land converted to FL Afforestation/Reforestation	Living biomass	Aboveground biomass	T3, CBM
		Belowground biomass	T3, CBM
	Dead organic matter (DOM)	Deadwood	T2/T3, CBM
		Litter	T2/T3, CBM
	Soil (mineral soils)*	Soil (mineral soils)	T2/T3, Soil carbon maps
FL converted to cropland FL converted to Grassland 4.D.2.1 FL converted to Wetland 4.E.2.1 FL converted to Settlements Deforestation	Living biomass	Aboveground biomass	T3, CBM
		Belowground biomass	T3, CBM
	Dead organic matter (DOM)	Deadwood	T2/T3, CBM
		Litter	T2/T3, CBM
	Soil (mineral soils)*	Soil (mineral soils)	T2/T3, Soil carbon maps
Harvested Wood Products	Harvested Wood Products	Harvested Wood Products	T2, Production approach

Source: Czech Republic’s National Inventory Report, ČHMÚ 2024

At the same time, geographically explicit reporting requirements are essentially met by the use of cadastral data of the Cadastral Office (ČÚZK) on land use categories, including the conversions between categories addressed by year-by-year conversion. The Czech Republic’s emission inventory therefore addresses the issue of territorial categories in detail of approximately 13 thousand cadastral territories in the Czech Republic. This allows for a relatively detailed geographical analysis and spatial distribution of territorial changes in the time series covering most of the mandatory reporting period from 1990 to present.

At the same time, the revision of LULUCF foresees an increased use of available remote sensing data and available datasets suitable for reporting from the national inventory programmes. In this regard, the Czech Republic is currently dealing mainly with the technically challenging issue of the application of the dates of the National Forest Inventory Programme (NIL) operated by the Institute for Forest Management (ÚHÚL). In this regard, the IFER – Institute for Research on Forest Ecosystems (IFER) and CISTA experts have already developed the basic methodological thesis of the application of NIL data.

The projected use of NIL data instead of the existing data of the Summary of Forest Management Plans (SLHP), which is also managed by the ÚÚL, will lead to a significant refinement of emission estimates for the forestry sector for several reasons of methodological and conceptual nature. This technically challenging task is expected to be fulfilled by the reporting year 2025 at the latest.

3.1.1.3 Waste sector

The basic legislation on the waste and circular economy of the Czech Republic is Act No 541/2020 on waste, Act No 542/2020 on end-of-life products, Act No 477/2001 on packaging, and Act No 243/2022 on reducing the impact of selected plastic products on the environment.

The new Waste Act, the End-of-Life Products Act and the amendment to the Packaging Act were adopted with effect from 1 January 2021, following the necessary implementation of the revised European Directives on waste, packaging and end-of-life products. They include a number of measures to support the development of recycling and the circular economy.

In 2023, a new Decree No 169/2023 laying down the conditions under which solid fuel from waste ceases to be waste was adopted, setting out the rules under which the recovery of waste fuels outside the waste regime will be possible, leading to a simplification of the recovery of fuels from waste and the diversion of waste from landfills towards energy recovery.

In addition, further decrees are being prepared to determine the conditions under which selected wastes may be discharged from the waste regime. These are waste of soil and aggregates, waste of concrete, bricks and mixtures thereof and, third, waste slag and by-products of energy. Setting end-of-waste criteria for selected waste streams will lead to higher material recovery rates and increased circularity.

The Czech Waste Management Plan (WMP) for the period 2015 to 2024 (the Czech Republic's Waste Management Plan) is the basic strategic document and instrument for the management of waste management, which also implements and further develops the Czech State Environmental Policy 2012-2020. The POH of the Czech Republic is designed in accordance with the waste hierarchy laid down in Directive 2008/98/EC on waste referred to above. The strategic objectives of the Plan are to prevent waste generation and reduce the level of waste generation, minimise the adverse effects of the generation and management of waste on human health and the environment, sustainable societal development and move towards a European 'recycling society', maximising the use of waste as a substitute for primary resources and the transition to a circular economy.

In May 2022, the Czech Government approved an update of the Waste Management Plan of the Czech Republic for the period 2015-2024 with a view to 2035. The updated Waste Management Plan of the Czech Republic takes into account the changes in the new Waste Act, sets new ambitious waste management targets and strategies, which are based on the targets of the relevant European Union directives binding on the Czech Republic. At the same time, the adopted update started the preparation of regional waste management plans, which serve as strategic documents for waste management in the territory of each region – the adoption of the regional waste management plans is expected in the course of 2023 at the latest by the end of 2024.

At the same time, as part of the update of the Waste Management Plan of the Czech Republic, the Waste Prevention Programme of the Czech Republic, which forms part of it, has been updated. The waste prevention programme implemented the requirements of Directive 98/2008/EC on waste with regard to waste prevention measures. As part of the update, a new section on reducing quantities and preventing the generation of food waste was added to the Czech Waste Management Plan. Reducing waste also reduces the requirements for its treatment and the associated greenhouse gas emissions.

The Strategic Framework of the Circular Economy of the Czech Republic 2040 (known as Circular Czechia 2040), which was approved by the Czech Government in December 2021, is a sponsoring concept for the Czech Republic's transition to a circular economy by 2040.

Circular Czechia 2040 proposes a vision, targets and concrete measures to help strengthen the circular economy in the Czech Republic. In addition to improving the overall state of the environment and reducing waste generation and better waste management, its aim is to make the Czech Republic, through the circular economy, long-term resilient to future environmental threats, including climate change and biodiversity loss, and to develop an overall sustainable social system, to further enhance the competitiveness and technological maturity of the economy, to increase the security of supply of raw materials and resilience to external shocks, as well as to create new jobs.

In June 2023, the Czech Government approved the Action Plan on Circular Czechia 2040 for the period up to 2027, which develops 10 areas as part of the Czech Republic's transition to a circular economy and sets out tasks and activities for the departments involved which are responsible for their implementation.

Intensive preparation of the new 2025-2035 Waste Management Plan of the Czech Republic was also launched in Q3 2023, which is expected to be effective as of 1. 1. 2025. The plan will set out the necessary network of waste facilities to ensure that binding waste and circular economy targets are met.

3.1.1.4 Industry sector

In particular, the implementation of cross-cutting measures based on EU legislation is key to reducing greenhouse gas emissions in the industrial sector. In addition to the EU ETS, integrated pollution prevention and control, in accordance with Act No 76/2002 on integrated prevention, makes a major contribution to reducing emissions. Emissions of fluorinated gases are regulated by Act No 73/2012 on substances that deplete the ozone layer and on fluorinated greenhouse gases and Decree No 257/2012 on the prevention of emissions of substances that deplete the ozone layer and on fluorinated greenhouse gases and Decree No 243/2023 on the implementation of certain provisions of the Act on Substances that Deplete the Ozone Layer and on fluorinated greenhouse gases transposing the relevant EU regulations.

A separate and highly complex issue is the achievement of climate-energy targets in the manufacturing sector, which includes, for example, the steel, chemical, ceramic, cement, glass, paper, brick and lime industries. It is these sectors that have a significant potential in this regard, which must be considered in the context of national strategies and policy-making. In particular, due to the wide variety of technologies used and developed and the specific needs of the sector, this sector is not addressed in more detail in the material submitted. This presupposes the swift establishment of a separate industrial policy of the Czech Republic for the period 2021-2030 with a view to 2050, addressing the issue of this sector in a comprehensive manner, i.e. maximising support (including state aid) for the development and application of all technologies contributing to the achievement of climate-energy objectives, physical and affordability of energy, maximum protection of competitiveness, etc. In this regard, the so-called National Economic Strategy 2030 is being prepared, including the National Investment Plan.

In the coming years, based on Directive 2023/2431 on the promotion of the use of energy from renewable energy sources of June 2023, Member States will also have to meet a mandatory sectoral target in industry to substitute 42 % of fossil hydrogen consumption from renewable fuels of non-biological origin for final energy and non-energy fuels by 2030 and will be increased to 60 % in 2035. Hydrogen used as an intermediate product for the production of conventional fuels, hydrogen that is produced by decarbonising industrial residual gases, and which is used to replace the specific targets from which it is produced and hydrogen that is ignited as a by-product or derived from a by-product in industrial installations is excluded from the industry target.

3.1.1.5 Energy sector

The energy sector's contribution to greenhouse gas emissions and reductions is described in detail elsewhere in this document. However, it is useful to highlight the role of individual energy sources in the energy mix in reducing greenhouse gases. By 2030, photovoltaic and wind power plants will play a crucial role in the decarbonisation of electricity. In the longer term, it is useful to briefly describe the role of nuclear energy as a stable, manageable, emission-free energy source with a high value for the[45] network (role and expected development of other emission-free sources, in particular renewables, is described in other parts of this document), so the combination of nuclear and renewable sources has lower system costs and thus represents a cost-effective decarbonisation. At the same time, nuclear energy represents an important contribution to energy security and independence, thanks to its high energy density and the possibility of reserving fresh fuel in the years.

It is of strategic importance to support the new construction of renewables. A new 8 GWe installed capacity of photovoltaic power connected to the grid and 1.2 GWe of installed wind capacity by 2030 are expected to be built. However, the implementation of lower hundreds (around 300) of new wind turbines already requires the preparation of higher hundred projects (600-800) by 2030.

In the Czech Republic, a total of 6 nuclear units, 2 units at the Temelín power plant and 4 units at Dukovany are currently in operation, with a total installed capacity of 4240 MWe. In addition, 4 research reactors are in operation in the Czech Republic. Key National Strategy Papers confirm the continued operation of existing nuclear units and the strengthening of the current share of nuclear energy in the energy mix and its further development. The Government approved by the Government of the Update of the Czech Republic's State Energy Concept envisages the completion of the construction of a new nuclear source in Dukovany 2036 and other JZs in the Dukovany and Temelín sites by the 1940s and maintaining the installed capacity at least at the current level and seeking to increase the share of the core in the energy mix by 2050 and the use of heat from the Temelín and Dukovany NPPs.

In accordance with Government Regulation No 349/2022, ensure that the top objectives of SEK CR in the field of electricity generation from nuclear power plants, including corridors, are met with an increase in the share of nuclear energy in primary energy sources to 25-33 % (from around 15 % currently) and an increase in the share of gross electricity production to 46-58 % (2022: 37 %).

At the same time as the construction of new nuclear units, ensure the reliable operation of the Temelín NPP hotline for the supply of heat by České Budějovic and the implementation of the Dukovany to Brna heat pipeline (COD 2030) in accordance with Government Resolution No 1059/2022. For the safe and reliable operation of the Dukovan-Brno hotline, ensure the construction of two new nuclear units on the site to ensure the availability of at least 2 nuclear units from 2047 onwards:

Nuclear resources have lower demand for support services and network investments compared to intermittent sources. In the context of emission reductions, they may thus mitigate the need for large-scale construction of gas resources for the provision of ancillary services in a system with a high presence of intermittent sources.

shut down the last unit of an existing power plant, due to the regular replacement of fuel on one of the units, with the need to ensure the operation of at least one unit during this period, especially during the winter season.

The largest source of greenhouse gas (and pollutants) emissions in the energy sector is coal mining and, in particular, coal-fired combustion in power plants, heating plants and local heating sites. The strategic objectives of the National Plan are, according to Government Resolution No 257 of 12 April 2023, approving the process for updating the Czech State Energy Policy and related strategic documents (Climate Policy in the Czech Republic and the National Energy and Climate Plan of the Czech Republic).

Reduce the share of fossil fuels (used without capture technology) in primary energy consumption to 50 % by 2030 and 0 % by 2050, and completely phase out the use of coal for electricity and heat production by 2033.

Achieve and further increase the share of RES at gross final level corresponding to the EU's 2030 target by 2 050 in line with climate neutrality

Decarbonising the heating industry

On the basis of these strategic objectives, it is necessary to prepare concrete plans to replace coal-fired power plants by 2033, to switch coal-fired to other sources by 2033 and to replace coal boilers and stoves by 2033. Similarly, it is necessary to envisage the end of lignite extraction, which has no use other than in the energy sector and makes no sense to import it for economic reasons.

Regional cooperation in the field of nuclear energy may aim at promoting science and research, sharing experience and best practices where appropriate.

ii. Where relevant, regional cooperation in this area

The Czech Republic does not consider this area to be relevant at the level of the National Plan. Or understands that regional cooperation is set up in detail at EU level, or at the level of international structures, such as the UNFCCC.

iii. Without prejudice to the applicability of state aid rules, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable

Support from EU funds for developing renewable energy sources and improving energy efficiency, as described in chapters 3.1.2 and 3.2 below, contributes to reducing greenhouse gas emissions in transport through the Operational Programme Transport 2021-2027, which mainly supports the development of transport infrastructure, leading to a reduction in fuel and energy consumption. The Common Agricultural Policy Strategic Plan 2023-2027 contributes to reducing emissions and increasing sinks in the agricultural and forestry sectors through support for agri-environment-climate measures and modernisation of agricultural and forestry operations. Among the national programmes, the above-mentioned New Green Savings programme, which reduces greenhouse gas emissions mainly in the household sector, is key. Support from the Modernisation Fund will play an essential role in the decarbonisation of the Czech Republic by 2030.

Energy from renewable sources

i. Policies and measures to achieve the national contribution to the binding Union 2030 target for renewable energy and trajectories referred to in Article 4, point (a)(2), and, where applicable, or where available, the elements referred to in point 2.1.2 of this Annex, including specific sectoral and technological measures46 47

3.1.2.1 Existing policies for the promotion of renewable energy sources

The following table summarises existing renewable energy policies. This is only a snapshot.

Table 30: *Most important existing renewable energy policies*[47]

Policy/Measure	Characteristics
Indirect support (reduction of administrative entitlements)	Reduction of administrative requirements to connect and operate small resources up to 10 kW
Indirect support (mandatory installation assessment)	Mandatory assessment of the installation of alternative systems to meet the energy performance requirements of buildings
Indirect support (energy guarantees)	Issuance of guarantees of origin
Indirect support (overview of efficient heat supply systems)	An overview of efficient thermal energy supply systems pursuant to Section 25(5) of Act No 165/2012 on supported energy sources and amending certain acts.
Indirect support (spatial planning)	Amendment to the Energy Act and related acts, introduced by Act No 19/2023 Coll., so-called LEX OZE I, with effect from 24. 1. 2023 brought the following changes: - In Section 2(2)(a)(18) of the Energy the Act added that RES power generating facilities with a total installed capacity of 1 MW or more are set up and operated in the public interest; - In Section 2(1)(m)(2) of the Construction Act the definition of technical infrastructure has been adapted to include also renewable power-generating facilities; - — as a result of the above changes, the plant they regard RES electricity with a total installed capacity of 1 MW or more as public technical infrastructure and thus benefit from the advantages referred to in Section 18(5) of the Construction Act – it may be placed in a non-built territory, unless the planning documentation expressly excludes it for reasons of public interest and if this is consistent with the nature of the territory; this achieves the potential to locate a 1 MW or more RES generating plant in a large part of the territory of the Czech Republic without the need for prior amendment of the territorial planning documentation
Indirect support (simplification of permitting processes)	The amendment to the Energy Act, the so-called LEX RZE I, approved by Act No 19/2023 Coll. with effect from 24 January 2023, introduced the following

46When planning these measures, Member States shall take into account the end of life of existing installations and the potential for repowering.

47It is not a full list, but rather the most important policies or policies specifically aimed at renewable energy sources.

	– definition of power-generating facility and business definition in the energy sectors, it has been adapted so that renewable electricity production is in the <u>public interest from a spatial planning point of view;</u> – modification of the provisions allowing customers to produce electricity for their own <u>use without a licence, so that the limit is increased from 10 kW to 50 kW</u> This amendment also included an amendment to the Construction Act: <u>RES up to 50 kW do not require zoning</u> or consent – regardless of whether FVE is on a building or land, FVE's construction in the municipal land-use plan μυστ νοτ be excluded. – for those located in the free area, the necessary delimitation of the area in the municipal land-use plan – it must not be a cultural monument, a monument reserve, a zone or a special protection area. <u>RES up to 50 kW (on roof) without notification and building permit</u> – if it does not interfere with the structure of the structure – the manner in which the building is used does not change – No environmental impact assessment required – fire safety requirements are met
Direct aid – Operating aid	Operating aid in the Czech Republic is legally enshrined in Act No 165/2012 Coll. on supported energy sources.
Direct aid – Investment aid – (State programmes)	New green savings (Ministry of the Environment); OP Environment 2014-2020 (Ministry of the Environment and Regions); The Modernisation Fund.
Direct aid – Investment aid – (operational programmes)	Operational Programme Technology and Applications for Competitiveness 2021-2027 OPTAK (Ministry of Industry and Trade) 2021-2027;
Direct aid – Investment support – (European Agricultural Fund for Rural Development)	However, the European Agricultural Fund for Rural Development – Rural Development Programme RDP (Ministry of Agriculture) has already come to an end.

Investment aid – heat (European Agricultural Fund for Rural Development)	However, the European Agricultural Fund for Rural Development – Rural Development Programme RDP (Ministry of Agriculture) has already come to an end.
Tax instrument (exemption, reduction or refund)	Exemption from electricity tax for electricity from renewable sources which is consumed at the demand point where it was produced and the installed capacity of the power-generating facility does not exceed 30 kW in accordance with Section 8(1)(a) of Part 47 of Act No 261/2007 on the stabilisation of public budgets.
Tax instrument (exemption, reduction or refund)	Exemption from the tax on immovable property.
Promoting the use of biofuels through mandatory reduction of greenhouse gas emissions from transport fuels	Promotion of the use of biofuels through the mandatory reduction of greenhouse gas emissions from transport fuels contained in Section 20(1) of Act No 201/2012 on air protection, as amended.
Promotion of biofuels (mandatory blending)	Mandatory blending of biofuels into petrol and diesel fuels.
Acceleration zones	Based on the European Commission's plan to accelerate the transition away from Russian fossil fuels and the transition to clean and cheap energy sources (REPowerEU), Member States should identify and designate so-called 'acceleration zones', areas where the construction of renewable energy sources is simplified and thus accelerated by the state. This requirement is also enshrined in the pending revision of the Renewable Energy Directive.

Source: Actual processing of MITs for the purposes of the National Plan

3.1.2.2 Policies to ensure the 2030 renewable target

The measures listed in Table 42 of Chapter 3.1.2.1 Existing policies in the field of renewable energy sources can be considered as the main policy to meet the national contribution to the European RES target of 42.5 % by 2030 referred to in Chapter 2.1.2.

To ensure the production of renewable hydrogen necessary to replace fossil hydrogen in the chemical and transport industry as required by Directive 2023/2413 on the promotion of the use of energy from renewable energy sources of June 2023, it will be necessary to create the conditions for the construction of electrolysers with a total installed capacity of around 400 MWe and relevant renewable electricity sources.

Link between the new aid scheme and the national plans

Operating support for renewable and other supported resources beyond 2020 is linked to the implementation of the National Energy and Climate Plan (2021-2030). State aid is granted in such a way as to achieve the trajectory, target point and checkpoint specified in this document.

The Ministry of Industry and Trade will be the initiator for the use of appropriate RES support instruments (including other energy sources supported) on the basis of the identification of the possibility of non-compliance with the Czech Republic's national plan. In this respect, it always chooses which form of support is most appropriate at a given time to ensure that the national RES target is met. For the sake of predictability of the planned aid to investors, an expected timetable will be established by the Ministry of Industry and Trade in 2023, 2025 and 2 027 in relation to the expected allocation of total public support (investment and operating aid, both in the form of officially established aid and in the form of auctions), covering the following three years. This schedule and an estimate of all aid granted for RES (as well as other supported energy sources) for the following 3 years will be specified in the Government Regulation. The Government Regulation will be updated annually to "activate" the different forms of support for new resources according to the needs of development and achievement of the objectives. The definition of the development of supported energy sources for 2022, 2023 and 2024 is laid down in Government Regulation No 189/2022 Coll. on the definition of the development of supported energy sources.

Figure 1: *Link between the aid scheme under the amendment to Act No 165/2012 and the national plans*

Source: Actual processing of MITs for the purposes of the National Plan

ii. Where appropriate, specific measures for regional cooperation as well as (optional) estimated surplus production of renewable energy that could be transferred to another Member State in order to achieve the national contribution and trajectories referred to in point 2.1.2.

The following measures can be identified as specific regional cooperation measures: (I) statistical transfer; (II) projects of common interest; (III) the EU RES Fund; (IV) opening support schemes and (v) National Energy and Climate Plan; (VI) cross-border cooperation projects.

Statistical transfer

In 2021 and 2022, the Czech Republic benefited from the voluntary statistical route of domestic renewable production to another Member State. In particular, in 2021, a statistical transfer from the Czech Republic to Slovenia was made, namely energy of 465 GWh, and a statistical energy transfer of 208 GWh between the same countries was carried out in 2022.

Projects of common interest (PCI)/Connecting Europe Facility (CEF) projects

The Czech Republic also welcomes the potential involvement in projects of common interest (PCI) in the field of RES or projects supported under the Connecting Europe Facility (CEF). Of course, projects of common interest also depend significantly on the interest of investors and the suitability of the sites. The TSO is currently preparing two hydrogen projects, the Central European Hydrogen Corridor (CEHC) and the Czech-German Hydrogen Interconnector (CGHI), which seek to obtain PCI status in 2023. Both projects have an expected year of entry into operation of 2030.

European RES Fund

The Czech Republic does not exclude its involvement in the activities of the European Fund for RES. However, at this point in time, this is not necessary to achieve the above mentioned contribution.

Opening support schemes

The legislative framework for opening support schemes is enshrined in Directive 2018/2001 on the promotion of the use of energy from renewable sources, namely Article 5 thereof. The Directive states that Member States may allow participation in support schemes for electricity from renewable sources to producers located in other Member States. When opening participation in support schemes for electricity from renewable sources, Member States may provide that support for an indicative share of the newly-supported capacity, or of the budget allocated thereto, in each year is open to producers located in other Member States. Such indicative shares may, in each year, amount to at least 5 % from 2023 to 2026 and at least 10 % from 2027 to 2030, or, where lower, to the level of interconnectivity of the Member State concerned in any given year. The Czech Republic reflected the above legislative framework in preparation of the amendment to Act No 165/2012 on supported energy sources (the Directive was not effective at the time of preparation).

National Energy and Climate Plan

As a measure for regional cooperation in the field of RES, the Czech Republic also prepares a national energy and climate plan as such. On the basis of this planning document, it will be possible to compare Member States' planned approaches and, where appropriate, identify opportunities for joint RES projects and, where appropriate, cross-border impacts of different policies.

Cross-border cooperation projects

The RESINDUSTRY project, which aims, inter alia, to exchange best practices in setting up subsidy programmes, can be mentioned as a concrete project. The project involves the Czech Republic, Spain, Malta, Austria, Poland, Estonia and Finland48.

iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport

Financial support for the development of renewables can be divided into three core groups:

- **Measures paid by building owners and builders without aid – measures** and instruments based on the option of 'mandatory' or 'forced' installation of RES power plants by building owners and building developers in order to meet the energy performance requirements of buildings and gradually tighten those requirements, up to the achievement of NZEB value.
- **Investment aid** – maximum use if sufficient EU funds are available to the Czech Republic, e.g. ring-fenced financial resources (see chapter 3.2 for more information). Furthermore, the Modernisation Fund consisting of the sale of emission allowances and other instruments linked to the EU ETS will be used to support RES investments (and other investments including decarbonisation of industry,

48 For more information, please refer to the following link.

energy efficiency, development of the hydrogen economy, etc.). (for more detailed information on the proceeds from auctioning emission allowances and their potential use, see Chapter 3.2, part viii.).

Operating aid – aid will be considered for certain types and types of RES where the cost of generating energy is currently higher than the market price of energy and only investment aid will not ensure their further development. For sources using biomass and biogas, the maximum possible energy efficiency of the use of this primary fuel will be promoted, i.e. biomethane production and energy production in a high-efficiency cogeneration installation using useful heat of at least 50 % of the heat produced. This aid serves to cover the difference in fuel costs, since the amount of aid will be set in such a way as to compensate for the increased costs of purchasing RES fuel compared to fossil fuel or to compensate for the increased costs of producing RES energy compared to the market price of energy49. More information on financing RES development can be found in section 5.3.

iv. Where applicable, an assessment of support for electricity from renewable sources required by Member States
to be implemented under Article 6(4) of the Directive on the promotion of the use of energy from renewable sources

The assessment of the effectiveness of support schemes for electricity from renewable sources is carried out annually in the Czech Republic through the preparation of Government Regulation No 189/2022 on the definition of the development of supported energy sources, which sets out the values and capacities of the supported resources with a horizon of the following three years, defining the types and extent of energy sources supported and amending it annually. This government regulation is supplemented by an additional year each year in order to maintain a 3-year horizon for investors. The Energy Regulatory Authority is also involved in the process of determining this scope, assessing, inter alia, the effectiveness of the type of aid in question in relation to other support programmes, in particular public aid in the form of investment grants. The public is also included in the set-up as part of the process of providing comments and suggestions in the standard comment process.

v. Specific measures for the introduction of one or more contact points, simplification administrative procedures, provision of information and training and facilitation of the use of power purchase agreements

Summary of policies and measures that are part of the enabling framework to be put in place by Member States in accordance with Articles 21(6) and 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of renewable self-consumption and renewable energy communities

Simplifying administrative procedures

1) Legislative changes enshrining simplification of administrative procedures

New Construction Act No 283/2021. (NSZ) regulates the specific time limits for issuing the permit. The building authority shall take a decision on the application no later than:

a) 30 days from the date on which the procedure is initiated in the case of a single construction,

b) 60 days from the date on which proceedings are initiated in other cases

The above period may be extended by up to 30 days in particularly complex cases, or if an oral hearing is

This is the so-called maintenance support for electricity or heat, which has been introduced since 2 021 in Act No 165/2012 pursuant to Sections 6a and 25a.

ordered, or by 60 days in proceedings with a large number of participants, or if it is necessary to be served by public order on persons who are demonstrably unable to be served or if they need to be served abroad.

The failure by the authority concerned to issue a binding opinion within the time limit shall be accompanied by a fiction of a positive binding opinion, unless the binding opinions of the authorities concerned are attached to the application, it shall be requested by the building authority itself from the authority concerned.

Furthermore, the amendment to the new Construction Act refrains from applying the appeal principle to judicial review of decisions. The procedures and procedures initiated shall be completed in accordance with existing legislation.

The range of buildings that do not require the assessment of the building authority (e.g. selected RES constructions, forest kindergartens, connections up to 25 m) is also extended.

On 23 January 2023, Act 19/2023 amending Act No 458/2000 on business conditions and the performance of state administration in the energy sectors and amending certain acts (the Energy Act), as amended, and other related acts was published in the Collection of Acts. With effect from 24 January 2023, this amendment has facilitated the construction of renewable energy sources by allowing the operation of renewable energy sources with an installed capacity of up to 50 kW without a licence from the Energy Regulatory Office. The amendment also introduces an amendment to the Construction Act, which provides that for small renewable sources up to the same limit, with the exception of the construction of a water structure, if they are located in built-up areas or in a stopable area, no decision on the location of the construction or land consent is required. In the case of a part of a building which does not interfere with the structure of the structure and does not change the way the construction is used (e.g. PV on the roof) if it meets the conditions for the safety of the installation, there will be no need for a building permit or notification to the building authority. The definition of a power-generating facility and the definition of business in the energy sectors have been adapted so that a renewable electricity generating facility of 1 MW or more is in the public interest.

2) Procedural integration

In cooperation with the Ministry of the Environment, a new JES (single environmental opinion) is established in the form of a binding opinion to coordinate public interests in the environmental sector as a whole (in accordance with the individual component regulations). From the point of view of the Construction Authority (SÚ), this is a binding opinion.

A coordinated binding opinion, including the JES, will be issued to the planning authority (ORP) and, in the case of buildings in the administrative district of several municipalities, to the regional authority (KÚ).

In the event that the construction project does not require an EIA, the KÚ will issue a coordinated binding opinion including the JES (the fiction of a positive binding opinion can be applied without conditions).

Where a construction project requires an EIA, the issue of a coordinated binding opinion, including the JES, will depend on whether the developer has a binding EIA opinion before the application for development consent is submitted.

If a binding EIA opinion has been issued, the KÚ issues a coordinated binding opinion, including the SES (the fiction of a positive binding opinion can be applied without conditions). In the absence of a binding EIA opinion, the Coordinated Binding Opinion and the JES will be self-contained and any fiction of a positive binding opinion without conditions will be applied in relation to the Coordinated Binding Opinion.

Sanitary stations (health protection) and Fire Rescue Service (fire safety requirements) will continue to issue separate binding opinions (the fiction of a positive binding opinion can be applied without conditions).

The Regional Authority will issue a coordinated binding opinion including the JES, the coordinated binding opinion and the JES for the proceedings conducted by the Transport and Energy Construction Authority (DES).

The Ministry of the Environment (MŽP), the Ministry of Agriculture (MZE), the Ministry of Culture (MK) will be the review (appeal) bodies for binding opinions (IBs).

3) Digitalisation, efficiency and transparency of the permit-granting process

With the introduction of a completely new electronic system, the building authorities will be responsible for a significant part of their activities electronically, allowing the electronic submission of forms and documentation and other documents for the proceedings. The harmonisation of all document formats used and the creation of an IT system for the electronicisation of proceedings at building offices will reduce the administrative burden and streamline the activities, both in financial and temporal terms. At the same time, this will increase the efficiency of public administration and thus increase the Czech Republic’s competitiveness in the international environment. These adjustments will increase the transparency of the entire process of the implementation of the Agenda throughout the Republic, but will also bring about coordination between the various authorities concerned, the persons concerned and the possibility of monitoring statistical data.

By standardising and building a single information system, a higher level of service for building offices will be ensured as a result. The new Construction Act No 283/2021 has already entered into force on 29 July 2021. This Act was amended by Act No 152/2023 Coll., which entered into force on 5 June 2023.

Areas necessary for the Czech Republic’s contribution to the RES objective and areas for accelerating the introduction of RES

The areas necessary for the Czech Republic’s contribution to the RES objective are areas where the construction of renewable sources is possible. RES acceleration areas are areas where the state simplifies and speeds up the construction of renewable energy sources. This is a subset of essential areas. Their definition is part of the European Commission’s plan to move rapidly away from Russian fossil fuels and switch to clean and cheap energy sources (REPowerEU). By the end of 2023, it is also expected to be a legal obligation for EU countries stemming from the entry into force of the revised Directive 2018/2001 on the promotion of energy from renewable sources. An analysis of possible territories for acceleration zones was carried out. The binding definition of acceleration zones is the subject of spatial planning.

Government Resolution No 272 of 24 April 2024 established the basic procedure for the designation of the areas necessary for the Czech Republic’s contribution to the overall 2030 renewable energy target of the European Union and renewables acceleration areas. In this context, the Government also assigned the task of preparing an update of the Territorial Development Policy of the Czech Republic for reasons of overriding public interest with a view to defining the areas necessary for the Czech Republic’s contribution to the overall European Union target for renewable energy sources by 31 December 2024.

The definition of acceleration zones will be ensured by the State, regions and municipalities, depending on the importance of each zone. The zones may not be established in the NATURA 2000 network, in national parks and in the 1st and 2nd zone of protected landscape areas. Other public interests, such as in the field of aviation or state defence, will also be considered in the definition.

The changes to the rules in these territories concern, in particular, the acceleration and simplification of permitting processes for RES projects, including a simplified environmental impact assessment (EIA), provided that the projects meet the specific conditions laid down for the areas concerned. The permit-granting process for renewable energy projects in renewables acceleration areas shall not exceed 12 months. The permit-granting procedures for the repowering of energy generation plants, for new installations with an electrical capacity of less than 150 kW, for energy storage on the same site, including energy and thermal installations, as well as for their grid connection in suitable areas shall not exceed six months. For projects located outside renewables acceleration areas, the permit-granting process shall not exceed two years.

At the time of finalisation of this document, a consultation procedure was launched on the draft Act on Accelerating the Use of Renewable Energy Sources and amending related Acts.

Strengthening grid capacity to connect RES and accelerating the connection process

In order to ensure sufficient infrastructure capacity for seamless connection and operation of RES, the State will incentivise and accelerate investments in both the optimisation of the distribution network and the reinforcement of networks. According to the NAP SG, measures on automation, voltage control and reactive power flow control will become much cheaper than conventional network reinforcements. Software solution is a key element, the grid can be adapted more quickly and cheaply. However, investment in classical strengthening (infrastructure) is inevitable.

A transparent system for displaying connection capacities free of charge via the PDS website with all the necessary technical data will be put in place. Any lack of capacity or threat to reliable and safe operations shall be demonstrated in writing by the operator to the applicant for connection, supported by the underlying data and calculations. In the case of connection of a power-generating facility with an installed capacity of up to 10 kW, the exemption of the lack of capacity of the distribution facility shall not apply when assessing the connection request. Speculation with spare capacity will be avoided, whereby PDS will have the right to cancel a booking if the customer does not meet the terms and timing of the connection.

Legislative anchoring of energy communities, renewable energy communities and active customers

Energy and renewable energy communities

Act 469/2023 Coll., which entered into force on 1 January 2024, introduces a definition of an energy community in line with Directive 2019/944 on rules for the internal market for electricity and a definition of renewable energy communities in line with Directive 2018/2001 on the promotion of the use of energy from renewable sources.

It is a legal person which is based on voluntary and open participation and is effectively controlled by members or partners, which are natural persons, small enterprises, local authorities or legal entities established or controlled by local authorities. The main purpose is not to generate profits, but to provide environmental, economic or social benefits to its members or in the territory where it operates. The definitions deliberately do not define the specific legal forms that a community would have to adopt in order to carry out its activities. However, this does not mean that the freedom of legal forms in the community is unlimited. The chosen legal form must always ensure the openness and voluntary nature of participation, a primary purpose other than profit-making and the verifiability of compliance with the condition of effective control.

The Energy Community shall be entitled to:

Consume electricity at its consumption point for self-consumption
Generation of electricity
Sale of electricity produced in a power-generating facility operated by a community or a member of a community to share electricity produced in a power-generating facility operated by a community to the demand point of its member

For the purpose of sharing electricity, the community is obliged to register with the data centre the attribution and termination of the allocation of its members' handover points and handover locations; there is no fee for registration. In sharing, the community shall have the right to use the distribution and transmission system. Members of the Community may share electricity with each other and with members towards the community. The Communities and members shall have the right to continuous measurement.

Active Customer

Furthermore, the above-mentioned amendment allows self-generating customers to collect their electricity generated at another demand point using the distribution system. In addition, an active customer is entitled to share electricity generated in the generation facility operated by an active customer to another customer, provided that those customers have delivery points in the same building and that the distribution system is not used for the sharing of electricity. It is also authorised to sell the electricity produced in its production facility to the electricity trader.

The Decree on the Electricity Market Rules, the amendment of which has been in force since 1 January 2023, introduces an adaptation of the procedure for distributing the electricity produced in the apartment building among the customers or residents of the apartment building on whose premises the power-generating facility is installed. Any customer who chooses to participate in this 'specific form of sharing' in an apartment building retains all rights, such as the right to choose and change electricity supplier. In addition, that customer has the possibility to choose the proportion in which he will consume, within the cooperating customer group, the electricity generated in a common power-generating facility, mostly a solar power plant (for example, supplemented by storage systems for the electricity produced), normally installed on the roof of the apartment building. Customers save both commercial and regulated payments per MWh, i.e. the volume of electricity consumed, on the basis of self-generated electricity consumed. The consumption of the electricity produced and the recording of the progress will be carried out by the relevant distribution system operator, who shall record, process, evaluate and subsequently pass to the market operator and the trader for settlement to each of the customers.[50]

Support for the creation of energy communities/RES communities (possibly community energy projects)

Modernisation Fund

In general, support for the creation and implementation of citizen energy communities and RES communities is prepared under the Modernisation Fund. This fund should support primarily the resource component of energy communities ("common" resources outside the housing sector) and the integration elements of energy communities (connecting individual RES into larger units through smart metering and advanced networks, local energy sharing, greater energy storage, etc.).

Some additional information on funding in this area can be found in Section 5.3.

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50 More information is available on the Energy Regulatory Office website (link).

National Recovery Plan/New Green Savings

Component 2.5 of the National Recovery Plan foresees support for51 the development of community energy in the residential sector. Therefore, the New Green Savings 2030 programme will support the installation of new RES in order to avoid barriers to their future participation in the wider energy community. The New Green Savings 2030 programme will also support smaller common multi-house energy storage sites or the creation of energy communities within individual apartment buildings (this could indeed allow at least a partial solution to the administrative barriers linked to the approval of energy renovations of apartment buildings by residents – the issue of a community of owner-occupied housing), or other investment measures linked to community energy. Non-investment measures could support, in particular, the establishment of energy communities, as well as awareness-raising, education, etc. aimed at developing community energy. The principle of equal opportunities, in particular in terms of inclusive job creation, gender equality and taking into account the perspective needs of all households, including low-income ones, will be taken into account when supporting the establishment of energy communities. Component 2.5 will therefore also contribute to the creation and development of energy communities in the Czech Republic through the New Green Savings Programme 2030.

Under the National Recovery Plan, a call has already been made to support the establishment of energy communities. An evaluation is ongoing to select a minimum of 40 projects to be submitted to the second evaluation round.

Some additional information on funding in this area can be found in Section 5.3.

vi. Assessment of the necessity to build new infrastructure for district heating and cooling produced from renewable sources

Thermal energy supply systems are energy infrastructure that is necessary for the efficient use of heat from renewable and secondary energy sources that cannot be extracted or used separately at the level of individual buildings (less valuable biomass, biogas obtained from biowaste, geothermal energy, waste heat from industrial processes, etc.). The use of locally available heat sources contributes to the decentralisation of energy, reduces dependence on fossil fuel imports and strengthens the local economy.

The Czech Republic has a developed heating system which needs to be gradually transformed for the use of low-carbon energy sources, including energy from secondary sources and waste heat, and their transport to consumers, especially in urban agglomerations.

In particular, the development of the use of renewable energy sources in existing heat supply systems will be crucial for achieving the Czech Republic's 2030 target. Therefore, the Czech Republic plans to support mainly the modernisation of existing heat supply systems to meet the requirements for efficient heat energy supply systems under the Energy Efficiency Directive. However, there is also scope for the creation of new (especially smaller) systems for the supply of heat produced from renewable sources, for example through the use of heat from biogas plants, which today mostly serve electricity only and potentially have significant amounts of heat produced from renewable sources. The solution can be the conversion of existing biogas power plants to a biomethane plant and the use of biomethane for CHP on-site using heat.

vii. Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account: (I) biomass availability, including sustainably sourced biomass: domestic potential as well as imports from third countries; (II) other uses of biomass in other sectors (agricultural and forestry sectors), as well as measures for the

51 More information is available on the website of the National Recovery Plan (link).

sustainability of biomass production and use

On the basis of the Council Implementing Decision on the approval of the assessment of the recovery and resilience plan for Czechia, the document ‘Assessment of trajectories for sustainable use of bioenergy in the Czech Republic’ has been prepared52. This document is one of the reforms, or one of the milestones, conditioning the absorption of funds from the Czech Recovery and Resilience Plan, namely components 2.2, 2.3 and 2.5, as well as bioenergy investments in the areas of energy, transport, environment, climate change, forestry or agriculture financed by other EU or national funds in full compliance with the legal requirements, including DNSH requirements.

The objective of this assessment shall be to quantify and, where appropriate, describe in a qualified manner the demand for and resources of bioenergy, with an emphasis on their sustainability, in order to objectively demonstrate the sufficiency of sustainable biomass resources by 2030 to meet demand. And at the same time describe impacts on land use, land use change, forest carbon sinks, biodiversity and the impact on air quality. It also aims to provide guidance for investment in the use of biomass and waste residues from the use of biomass, both from private and public funds.

The Czech Government’s programme statement of January 2022 further enshrines the task of processing strategic material that will deal more closely with woody biomass as a raw material. As a result of this task, the establishment of a Standing Working Group on Raw Material Policy on Wood under the Government’s Energy and Raw Material Strategy Council was initiated. The work of this working group started in mid-2022. The summary material should be prepared by the end of 2023.

More detailed information on biomass availability is provided in Chapter 2.1.2.

3.1.3 Other elements of this dimension

i. Where applicable, national policies and measures affecting sectors covered by:
the EU Emissions Trading System (EU ETS) and an assessment of the complementarity and impact on the EU Emissions Trading System

The promotion of renewable electricity generation and end-use energy savings, leading to a reduction in demand for emission allowances in installations in the EU ETS, have a partial impact on the EU ETS.

ii. Policies and measures to achieve other national targets, where applicable

Policies and measures to achieve the national targets are detailed in other parts of this material. The Czech Republic considers it relevant to refer to adaptation strategies, plans and measures in this section.

The strategy for adapting to climate change in the Czech Republic (‘the Czech Republic’s Agenda Strategy’) was approved by Government Resolution No 861 of 26 October 2015 and updated by Government Resolution No 785 of 13 September 2021. The document is drawn up for 2021-2030. It was prepared within the framework of inter-ministerial cooperation, with the Ministry of the Environment as coordinator for the preparation of the overall material. The aim of the Czech Republic’s Adaptation Strategy is to increase the preparedness of the Czech Republic for climate change – reduce vulnerability and increase the resilience of human society and ecosystems to climate change and thus reduce its negative effects.

In order to ensure a systemic approach, the strategy is structured according to the seven main manifestations of climate change in the Czech Republic, which identify the key sectors affected by the manifestation of climate change and describe the main impacts, vulnerabilities and risks. The main manifestations of climate change in the Czech Republic are long-term droughts, floods and flash floods,

52 The material is available on the website of the Ministry of Industry and Trade (link).

heavy rainfall, temperature rises, extremely high temperatures, extreme winds, vegetation fires. The Czech Republic's strategy also identifies priority impact areas (sectors) for which the greatest impacts of climate change are expected. These sectors are forestry, agriculture, landscape water and water management, urbanised landscapes, biodiversity and ecosystem services, health and hygiene, tourism, industry and energy, transport, cultural environment and safe environment.

In the design part of the strategy, it sets out the basic principles of adaptation, the 2050 vision and the 2030 targets, and summarises management and implementation tools and communication strategies, including public engagement, in the implementation section. The strategy also provides a framework for adaptation measures for 2021-2025 and links between adaptation objectives and sectoral and other Czech strategies, examples of good practice, etc.

The continuous implementation of the Czech Republic's Adaptation Strategy will be evaluated in 2025 and every 5 years thereafter.

The National Action Plan for Adaptation to Climate Change ('the Action Plan') is the Czech Republic's Adaptation Strategy and its first update was approved by Government Resolution No 785 of 13 September 2021 (the previous version was approved in January 2017).

The Action Plan elaborates the 2021-2025 framework of actions set out in the Adaptation Strategy into specific tasks, which it assigns responsibility, delivery deadlines, relevance of actions to individual climate change manifestations and sources of financing. The action plan contains 108 adaptation measures, divided into 322 specific tasks, which are imposed on the relevant ministries and specifies the deadlines for implementation, the relevance of the measures to the individual climate change manifestations, the sources of financing and the projected costs until 2025. Compared to the previous version of the action plan, there has been a reduction in the total number of actions and tasks, despite the fact that over 60 tasks were proposed or redefined based on needs. The number of specific actions and the tasks assigned to them are due to the wide cross-departmental overlap of climate change impacts and adaptation needs, and by the fact that the vast majority of actions (over 80 %) are, in some sense, already included in other strategic materials of national importance.The Czech Republic, as an EU Member State, has committed itself to common EU objectives and is actively involved in negotiations on adaptation policy within the EU. The Czech Republic's adaptation strategy is in line with the EU Adaptation Strategy.

iii. Policies and measures to achieve low emission mobility (including electrification of transport)

3.1.3.1 National Clean Mobility Action Plan53

National Clean Mobility Action Plan

Policies and measures to support the development of low-emission mobility are included in particular in the National Clean Mobility Action Plan (NAP CM).

The Czech Republic has already drawn up a National Action Plan for Clean Mobility since 2015. It has been revised over time to reflect developments in this area. In 2020, it was updated on the basis of new EU legislative and non-legislative documents on reducing emissions in transport and requirements for the share of renewable energy sources in transport. It was approved on 28 August 2024. Update of the National Clean Mobility Action Plan54, which is primarily based on the requirements of the approved Regulation of the European Parliament and of the Council on the deployment of alternative fuels

53 The material is available at the following link: https://www.mpo.gov.cz/cz/rozcestnik/pro-media/tiskove- of the right/cista-a-udrzitelna-transport-control-approved-up-up-narodni-accni-planu-ciste-mobility- 282792/

54 https://www.mpo.gov.cz/cz/rozcestnik/pro-media/tiskove-zpravy/cista-a-udrzitelna-doprava--vlada-schvalila-update-narodni-akcni-planu-ciste-mobility-282792/

infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council (the so-called AFIR). The update includes new predictions on the number of passenger cars and predictions of publicly available infrastructure. The new NAP CM will focus more on non-road transport. In August 2024, the Government approved 2 by its Resolution No.590. Update of the CM NAP.

The so-called European Green Deal and the Fit for 55 package of legislative proposals, which are expected to lead to a 55 % reduction in European greenhouse gas emissions by 2030 compared to 1990, can be seen as the most significant change in the context of the development of clean mobility since the original NAP CM was approved. This objective is an intermediate step towards achieving carbon neutrality by 2050, to which the European Union has legally committed itself. Achieving climate neutrality at EU level in 2050 requires ever-increasing greenhouse gas emissions from transport to be reduced by around 90 %. Together with the Fit for 55 package, the European Green Deal brings concrete steps to achieve the objectives.

In order to meet the strategic objectives of the update of the NAP CM, it is crucial that financial support, in particular from EU funds, will be ensured also for the period 2023-2027. Substantial investment, around 8.3 billion. CZK, for example, is intended to support the purchase of vehicles for public transport from the Integrated Operational Programme (IROP) of the MMR. Another part of the funds (CZK 600 million from the National Recovery Plan) is allocated by the Ministry of the Environment to support municipalities, regions or non-profit organisations for the purchase of alternatively powered vehicles – electric vehicles, hydrogen-powered vehicles, including charging points.

NPO funds under the New Green Savings programme support the construction of charging stations in apartment and family buildings (CZK 144 million). The Ministry of Industry and Trade has launched a call to support the purchase of zero-emission vehicles (el, H2) and the construction of non-public infrastructure for businesses with an allocation of around EUR 2 billion. CZK. The Ministry of Labour and Social Affairs issued 2 calls for a total of EUR 0.228 billion. For the purchase of low-emission vehicles for companies providing social services.

Another important source is the Transport Operational Programme, from which around EUR 6 billion will flow. CZK to support the construction of public charging and refuelling infrastructure. Additional funds will be used from the Modernisation Fund.

The implementation of the NAP CM is continuously monitored and evaluated; the results of this evaluation are included in annual reports, which are submitted to the Government of the Czech Republic for information once a year. The following table provides a summary summary of the development of clean mobility based on material Information on the implementation of the measures of the National Clean Mobility Action Plan (NAP CM) for 2022.

Table 31: *Indicators for the development of clean mobility*

Pointer	Number foreseen under NAP CM for 2022	Actual situation for the year in question
Number of Battery Electric Vehicles	13800-19 500*	14 161 + 939
Number of recharging points	2900-3 800	1364 DS/2643 DB

Electricity consumed at publicly accessible recharging points (MWh)**	11 800	

Number of CNG vehicles	28200 to 30100	30 085
Number of LNG buses	65-120	159
Number of public CNG filling stations	233-238	230
Numbers of LNG filling stations – public/mobile		5
Consumption of CNG in transport (million^3)	141,7	97,434
LNG consumption in transport (million^3)		3,796
Consumption of bioCNG in transport (million^3)		14,926

* medium and high scenario

** MIT statistics based on data sent from DS owners/operators

Source: Information on the implementation of the measures of the National Clean Mobility Action Plan (NAP CM) 2022

3.1.3.2 Electromobility

The new update of the NAP CM envisages a baseline scenario for e-mobility development by 2030 and 2035 respectively.

Expected development

Target number of BEV, PHEV in passenger vehicle category

Table 32: *Target number of BEV, PHEV in passenger vehicle category*

Year	2030	2035
Target number (BEV + PHEV) [ks] (from – to)	119000-330 000	208000-971 000

Table 33: *Target number of light commercial vehicles*

Year	2030	2035
Target Number (BEV) [ks] (from – to)	8200-15 330	18400-61 200

Table 34: *Target number of buses under MHD*

Year	2030	2035
Target Number (BEV) [ks] (from – to)	330-800	500-1 630

Expected development

Recharging infrastructure

Table 35: *Target number of recharging infrastructure(s)*[55]

Year/number of recharging points with recharging capacity	2030	2035
up to 50 kW [pp]	5700-16 800	8700-54 000
50-150 kW [pp]	100-450	184-1 200
150 and kW [pp]	130-380	340-1 480
Target number [ks]	**5930-17630**	**9224-56 680**

Development of electromobility from the perspective of network infrastructure development

Another relevant document for the future development of electromobility is the National Action Plan for Smart Networks and Accompanying Materials. This includes, in particular, a study for the purposes of the National Smart Network Action Plan, which, among other things, aims in detail at analysing the necessary measures to ensure the preparedness of distribution networks.

3.1.3.3 Natural gas

The evolution of the CNG car fleet, despite the decline in sales in 2018 and 1st half of 2019, due to the shortage of CNG cars on the Czech market, has been around 30 % of annual growth in the long term. Around 23 thousand natural gas vehicles (vifrom *Table 37) are currently operated in the*Czech Republic. The average annual growth rate of the car fleet remains at 32 % in the long term. The number of CNG buses is growing every year thanks to the use of subsidies for their purchase, and currently around 1300 are already in operation, representing more than 6 % of the Czech fleet. One of the significant barriers affecting the development of CNG cars remains the issue of parking in mass underground garages.

[55] The source of that information is the working version of the update of the National Clean Mobility Action Plan, which is being processed when the update is being prepared. These values will, where appropriate, be updated as part of the finalisation of the update of the Czech Republic's National Plan.

The CNG refuelling station infrastructure is developed annually. There are currently 199 public CNG refuelling stations in the Czech Republic, as well as around 50 non-public CNG service stations and around 200 domestic slow-fuel filling plants. More than 60 % of public dispensing points are in pumping stations, others are accessible at company premises or as stand-alone outlets. Non-public CNG refuelling stations, which are more than 50, are operated by private companies and certain transport undertakings. Businesses and small-scale traders also use slowly filling CNG facilities (domestic fillers) of more than 200. Average annual growth is 25 %.

The development of LNG infrastructure in the Czech Republic is still in its early stages. There is one public LNG station and several mobile LNG refuelling points, mostly used by firms to test LNG trucks. An important fact, however, is that project preparation is currently ongoing with the subsequent implementation of 13 new public LNG refuelling stations, which will be created by 2022 thanks to the Ministry of Transport's subsidy support under the Operational Programme Transport.

The potential and use of biomethane, both in the form of bioCNG and bioLNG, is an integral part of the challenge. In the long term, this is crucial as biomethane has significantly lower greenhouse gas emissions than fossil CNG/LNG. A gradual replacement of biomethane instead of fossil CNG/LNG is necessary for the environmental benefits of this alternative fuel.

Table 36: *Evolution of the number of CNG vehicles in circulation in the Czech Republic in 2010-2022*

Year	Total Vehicles	OA and LUV	Busses
2016	15 500	13 970	1 020
2017	18 900	17 160	1 120
2018	22 600	20 660	1 234
2019	25 310	23 036	1 453
2020	27 748	25 043	1 714
2021	29 610	27 303	1 830
2022	30 085	27 895	1 800

Source: Information on the fulfilment of the 2022 NAP update;

Table 37: *Evolution of the number of public CNG refuelling stations in the Czech Republic in 2014-2022*

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
number of public fillers on CNG	75	108	143	164	185	207	219	228	230

Source: Information on the fulfilment of the NAP update of ČM 2022, Czech Gas Association

3.1.3.4 Hydrogen mobility

The NAP CM declares the Czech Republic's interest in including hydrogen in the national policy framework for alternative fuels in transport under Directive 2014/94/EU on the deployment of alternative fuels infrastructure. This is consistent with the Czech Republic's objective here for the development of hydrogen refuelling stations. According to this document, 5 hydrogen refuelling stations should be created in the Czech Republic by 2025. This is the primary objective, since the NAP CM foresees that it may be increased in the future, on the basis of a study assessing more comprehensively the potential of using hydrogen mobility in the Czech Republic. The NAP CM also notes that hydrogen mobility should be supported by the same measures as electro-mobility, as this is called hydrogen electromobility. Therefore, for example, the development of hydrogen refuelling infrastructure should be stimulated in the form of investment aid. Similarly, hydrogen vehicles are expected to benefit from the same benefits as electric vehicles, be they urban parking or preferential lanes. It is also envisaged to exempt these vehicles from the payment of motorway charges. In order to realise these advantages, hydrogen vehicles will be included in the category of "electric vehicles" for which special registration plates (starting with the letters "EL") will be issued free of charge. The issuance of these special number plates (including for hydrogen vehicles) started in 2019.

The task of the original NAP CM with regard to the study of hydrogen mobility opportunities in the Czech Republic was completed in 2017, when the study was carried out by Grant Thornton Advisory for the Ministry of Transport55. This study contains 4 scenarios for possible long-term developments in the field of hydrogen mobility in the Czech Republic. Based on the simulation of possible future scenarios for the development of the hydrogen vehicle market, the study includes prediction of the number of vehicles and hydrogen refuelling stations for 2025, 2030 and 2050.

The NAP CM foresees the possible deployment of 4000 hydrogen passenger cars, 1200 light commercial cars, 250 buses, 600 trucks and 6 regional hydrogen-powered trains in 2030.

In July 2024, the Government approved its Resolution No 496 on the 2024 Hydrogen Strategy of the Czech Republic. This document is available on the Ministry of Industry and Trade website.56 The NAP CM prediction of the development of hydrogen mobility and measures to support the development of hydrogen mobility are based on this strategy.

3.1.3.5 Other alternative fuels

Other alternative fuels include in particular LPG/bioLPG, synthetic fuels and ammonia-based fuels. The update of the NAP CM addresses these fuels in more detail, in particular in the context of the accompanying analytical material. The following provides information on expected/possible development for bioLPG only, which is the fuel most likely for development in terms of other alternative fuels, at least in the medium term, compared to other alternative fuels, such as synthetic fuels and ammonia-based fuels. Alternative fuels from renewable sources can, on a transitional basis, play a very important role in reducing CO2 production in the Czech Republic, given the age of the fleet, which is being renovated at an insufficient pace.

LPG/Bio LPG

Fossil LPG

With regard to the method of extraction of LPG (generated as a 'residue' from oil refining or extracted as a 'secondary gas' in the extraction of natural gas, in both cases between 3 % and 4 % of the product produced), LPG is counted as a stable product on the market for as long as additional fossil fuels are available. A decrease in availability can only be expected in the context of a reduction in the supply of fossil fuels to the European market.

BioLPG

55 The English version of the study "Use of Hydrogen Powered Vehicles in Transport in the Czech Republic" is available here: https://www.mdcr.cz/Dokumenty?lang=en-GB&mssfd=Strategie

56 https://www.mpo.gov.cz/cz/prumysl/strategicke-projekty/vodikova-strategie-cr-aktualizace-2024-schvalena-compliant-282165/

A gradual increase in the supply of bioLPG to the market is expected after 2020. BioLPG is generated as a by-product in the production of HVO (i.e., like classical LPG, it is essentially waste). Technologies for the direct production of bioLPG from waste cellulose are also being tested and it is foreseeable that other production methods will follow.

Specificities of LPG/bioLPG use on the Czech market

The advantages of LPG on the Czech market are fully developed distribution infrastructure (around 900 refuelling stations) and the high popularity of this fuel (around 170000 vehicles).

The main fuel potential is in the conversion of older vehicles with less emission performance. LPG can thus partly address the emissions of the older vehicle fleet in a large part of a company that lacks sufficient resources to purchase a "clean" vehicle and uses vehicles of above-average age on a permanent basis.

Currently LPG is used almost exclusively in passenger cars and small municipal vehicles. Some development projects (e.g. Spain, USA) test additional LPG use also for heavy-duty vehicles (e.g. buses). It can be assumed that such vehicles will also appear very quickly in the Czech Republic, since, unlike other alternative technologies, there is no need to develop a supply infrastructure.

LPG (propane – butane) as an energy source for households

LPG is used in households as a source for the production of heat (tables, in limited cases bottles) or cooking (bottles), which in the Czech Republic amounts to around 80 000 tonnes per year. LPG is an efficient alternative at locations not connected to natural gas distribution systems. The advantage of using LPG is again lower emissions (compared to local solid fuel furnaces) and simple handling. The availability of the product, as well as experience from other countries (UK, Spain, France, Italy...), suggests that LPG can see an increase in consumption in this area if consumers are incentivised to switch to cleaner fuels.

The future of bioLPG 2050+

BioLPG development projects focus on waste recovery. It is therefore an emission-neutral source from a GHG perspective. The current LPG RDE tests also show very low emissions of harmful substances, i.e. it is a source that can also be used in populated areas in the long term. Good fuel shelf life, long vehicle ranges and minimum technical constraints in production/conversion (relatively light and well-positionable tanks compared to CNG) are also uploaded to easy use

Possible restriction

Like any other alternative fuel, LPG is accepted by the market only thanks to tax relief (the current tax rate in the Czech Republic follows the minimum EU requirements). The prediction of consumption is prepared on the assumption that the existing tax burden is maintained or that the ratio of LPG taxation to other available conventional or alternative fuels is maintained. Any unilateral increase in the tax burden of LPG would have the effect of reducing the consumption of that fuel.

3.1.3.6 Requirements of the revised Directive 2018/2001 of the European Parliament and of the Council on the promotion of energy from renewable energy in transport

Directive 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, which also regulates targets for the use of renewable sources in transport, allows Member States to choose between a binding target to reduce the greenhouse gas intensity of transport by 14.5 % through the use of renewable sources by 2030 and a binding target of at least 29 % for the share of renewable energy sources in the final consumption of energy in the transport sector by 2030.

The interim agreement also sets a binding combined sub-target of 5.5 % for advanced biofuels (generally derived from non-food raw materials) and renewable fuels of non-biological origin (mostly renewable hydrogen and hydrogen-based synthetic fuels) in the share of renewable energy supplied to the transport sector. As part of this target, a requirement of a minimum share of 1 % of renewable fuels of non-biological origin (RFNBO) in the share of renewable energy supplied to the transport sector in 2030.

Through the forthcoming amendments to the national legislation, the Czech Republic seeks to break down or divide this objective into suppliers of each type of transport fuel, for which certain mandatory percentages of RES in the fuel in question will be prescribed. In doing so, first-generation biofuels will be used to the maximum extent possible, while respecting both the technical parameters of the quality of the individual fuels as defined in the normative documents and the possibilities for real use of the fuels concerned by the fleet in the Czech Republic, which is largely outdated (in 2022 the average age of the fleet was 15.73 years) and its renewal is slow.

Car manufacturers, where Regulation (EU) 2019/631 of the EP and Council Regulation (EU) 2019/631 sets average emissions of 130 g CO_2/km for cars sold by them in the EU, from 202 195 g CO_2/km from 2025, a reduction of 15 % compared to 2021 from 2025 and 37.5 % compared to 2021,will also have a significant impact on the use of individual fuels in transport in the coming years. Similar targets are defined for manufacturers of light commercial vehicles and with a time lag (from 2025), but similarly ambitious for heavier trucks (in the revision of Regulation (EU) 2019/1242 of the European Parliament and of the Council in 2022 it is foreseen to extend the scope to trailers, buses and other groups of trucks). The targets for manufacturers will decisively influence the composition of the vehicle fleet and thus the potential for alternative fuels and propulsion. Given that the emission targets for manufacturers are set at EU level and not at national level, it is essential that relevant measures are implemented in the Czech Republic to support the development of the market for alternative fuels vehicles. At the same time, if the fleet is not sufficiently renewed (in particular as a result of the failure to introduce sufficient aid), imports of older second-hand vehicles may increase with all the negative consequences under the conditions of the market for passenger cars in the Czech Republic. The prerequisites that the targets set for manufacturers will automatically contribute to the renewal of the vehicle fleet may not be met in the Czech market conditions. EU requirements for car manufacturers and fuel suppliers are not compatible with each other. For this reason too, as it is currently very difficult to estimate future real developments in these areas, national legislation will allow fuel suppliers to fulfil their RES commitments in transport not only directly, but also to exploit the potential of using RES by other fuel suppliers by pooling them in a similar way as is already possible under national legislation in the field of emissions savings.

3.1.3.7 Voluntary commitments by municipalities and cities

Municipalities and cities are among the major emitters of greenhouse gases, with energy consumption (buildings, public lighting, new construction) and transport being the main sources of pollution. As part of their strategic planning, a number of cities and municipalities are beginning to recognise this problem and, within their self-governing remit, make commitments to reduce greenhouse gas emissions on their territory, which go beyond national or European legislation. An example is the Covenant of Mayors. In the future, this trend should be taken into account and supported by the national level of activity of municipalities and cities in the transition to a low-emission regime.

IV. Where applicable, national policies, timelines and measures planned to phase out energy subsidies, in particular for fossil fuels

The list of energy and fossil fuel subsidies is set out in Section 4.6 in particular under (iv). These subsidies are key to meeting the EU’s climate objectives, reducing air pollution, increasing the share of viable energy sources and reducing energy intensity. Therefore, the Czech Republic does not intend to phase out these subsidies in a systemic manner, also in view of the EU’s increased ambition in these areas by 2030.

Information on the expected phasing out of fossil fuel subsidies and fossil fuel subsidies is also provided in Section 4.6(iv).

Dimension 'Energy efficiency'

Planned policies, measures and programmes to achieve the national energy efficiency contribution for 2030, the implementation of the Long-term Building Renovation Strategy and the fulfilment of the energy savings obligation under Article 8 of Directive (EU) 2023/1791 on energy efficiency and other objectives mentioned in Annex I to Regulation 2018/1999

The Czech Republic bases its energy efficiency obligation policy in accordance with Article 8 on the experience of the 2014-2020 programming period. The design of individual measures is based on knowledge of the energy savings potential of the different sectors, the cost-effectiveness of these measures and the reality of implementing them in national circumstances. In the 2014-2020 period, the Czech Republic has encountered limits for the application of certain alternative measures, while at the same time identifying the potential for using other measures which it has not yet implemented.

In the light of the above, the Czech Republic will fulfil its obligation under Article 8 of the Energy Efficiency Directive with alternative policy measures including financial mechanisms to promote energy saving measures, regulatory measures, voluntary agreements with energy suppliers and distributors in the field of energy efficiency improvements, energy taxes, behavioural measures. The choice and set-up of measures to deliver the commitment maximises the potential for achieving synergies between the different actions.

Table 38: *Measures to implement Article 8 of the 2021 Directive (to date non-approved legislation)*[58]

Type of measures	Share of accumulated savings
Financial mechanisms	45 %
Voluntary agreements	3 %
Regulatory measures	50 %
Taxation measures	2 %

[58] Ratio may vary depending on the specific areas of support (in particular with regard to the set-up of the Modernisation Fund).

Table 39 contains a proposal for the implementation of measures meeting the criteria of Article 8 of the Energy Efficiency Directive, including estimated new and cumulated energy savings in the period 2021-2030, which should ensure that the Czech Republic fulfils the cumulative savings commitment by 2030.

Overlaps are taken into account in the calculation of the benefits of individual measures and double counting of savings is eliminated. Detailed information meeting the requirements of Article 8 and Annex V of the Energy and Efficiency Directive and Annex III of the Governance Regulation is provided in Annex 4 to this document.

In view of the level of ambition, the options for implementing the measures in the 'Additional measures' section of the table, as well as unidentified measures to be ready for implementation, will continue to be developed, not least in the event that the measures chosen prove to be insufficient.

Table 39: *Overview of measures to fulfil the energy savings obligation obligation and estimated energy savings for 2021-2030*

Title of measure	Estimate of accumulated savings (PJ)
Financial measures	
OP Competitiveness Technologies and Applications 2021-2027	2,7
OP Enterprise and Innovation for Competitiveness 2014-2020	30,0
OP Environment 2021-2027	9,5
OP Environment 2014-2020	15,5
Integrated Regional Operational Programme 2021–2027	2,7
Integrated Regional Operational Programme 2014-2020	7,0
OP Transport 2021-2027	30,0
New green savings 2021-2030	62,0
New Green Savings 2014-2021	17,0
New green savings Light	4,0
NPO 2.2 – Public sector	6,0
NPO 2.4 – Sustainable mobility	3,0
EFEKT programme	12,5
Modernisation Fund	80,0
Taxation measures	
Environmental tax on fuels	15,0
Regulatory measures	
Prohibition of operating solid fuel boilers of emission class 1 and 2	50,0
Energy audits	3,0
Crisis measures to reduce energy consumption	65,0

Maximum masses of trucks	10,0
Structural technical requirements for construction and renovation	90,0
Heating rules	70,0
Modal change in transport	50,0
Voluntary agreements	18,5
Additional measures59	
Compensation	—
Exceptional accelerated depreciation	—
Energy consulting	—
Minimum energy standards for buildings	—
Total	**663,7**

59 The potential for energy savings will be analysed and the calculation methodology notified

Measures to achieve the objectives of the Long-term Building Renovation Strategy

Those measures are in line with the fulfilment of the commitment of Article 8 of the 2021 Directive.

Renovation barriers and measures to overcome them

Family homes

Owners of single-family houses most often renovate themselves, for their own money, and gradually. Owners are not accustomed to using the services of construction firms, borrowing money or applying for a subsidy. They renovate gradually, in part, as we have enough resources. On the part of the group of such owners, the aim is to carry out renovations with minimal administrative tasks.

The most important factor in the renovation decision was the increase in housing comfort, savings in energy expenditure and the technical state of the house.

The aim in this group is to improve the quality and complexity of renovations. Achieving a change in the general public's attitude towards efficient energy management and energy saving is key to achieving the objective. Without changing attitudes, the application of other support mechanisms for delivering quality renovations will be inefficient or not used. Despite efforts to promote the issue of improving the energy performance of buildings and reducing household consumption, efforts need to be stepped up. A possible way to reach homeowners is, despite their incentives to renovate. For the period 2020-2030, the Czech Republic will therefore focus on raising awareness of the issue of improving energy efficiency and adopting efficient energy management (regulation, ventilation, efficient use of energy-saving appliances, etc.) as part of everyday life. Non-investment measures will be complemented by investment aid from the State. As appropriate instruments to achieve the above objective, the Czech Republic will adopt a change to the current aid scheme with a greater emphasis on the use of non-subsidising financing mechanisms such as soft loans and guarantees. Finally, as the survey shows, it is necessary to focus on ensuring 'administrative simplicity' of the renovation, both in terms of legislative requirements and when preparing an application for support.

Support programmes for the energy renovation of single-family houses will continue to include special conditions for low-income households, so that no one is excluded from receiving support and improving the energy performance of their housing.

Multi-family buildings

Cooperative houses have a more comprehensive approach, with more measures being implemented more often, i.e. a full building envelope – windows, envelopes, roofs. This is also likely to result in a higher financial intensity of the renovation, a longer period of time needed for the preparation and implementation of the renovation, as well as more frequent complications in approving the renovation and with its project if they wished to use subsidies for funding. Unlike other categories, saving energy costs prevails as the main incentive. Other categories are more likely to renovate gradually. The vast majority of buildings are renovated from their own resources from the Correction Fund.

The category of individual owners is least frequently renovated, has a significantly lower proportion of commercial lending in its financing, and almost half of the renovations will take place without a tendering procedure for the supplier and without the presence of the construction manager, which is lower than for the other categories. It is in this category that there is a significant low incentive to renovate due to the use of the building, which is often the rental of dwellings. In such a case, the owner has no incentive to implement the measure either because of the state of emergency or the need to reduce energy costs.

As in the case of single-family houses, the objective of this group is to increase the quality of the renovation works and their complexity, in particular in the case of ownership by associations of owners and individual owners.

In the case of individual owners, it is necessary to find an incentive factor for renovations that would increase interest in carrying out the renovation. In such cases, it will be necessary to consider putting in place appropriate instruments, in particular at the multi-agency level. As in the case of single-family houses, it will be crucial for the period 2020-2030 to carry out a campaign to bring the topic of energy efficiency closer to the general public. Owners will be contacted through topics that encourage them to carry out renovations in order to achieve more implementation.

As in the case of single-family houses, support programmes for the energy renovation of apartment buildings will continue to include special conditions for low-income households, so that no one is excluded from receiving support and improving the energy performance of their housing. The rules and support will also include safeguards to protect tenants against inadequate increases in or loss of housing as a result of renovation.

Public sector

Smaller municipalities are more likely to manage the buildings themselves. They are managed by a director, councillor or councillor, who is often also the initiator of the renovation and, together with an external designer, prepares the form of renovation. Renovations in smaller municipalities often take place more ad-hoc without a long-term renovation plan. Subsidies tend to be the main source of funding. Larger municipalities make greater use of external building management and are also more likely to be involved in building management by those using the building. The management of the municipality has a greater role to play here by asset management, investment activities or other dedicated parts of the Office, which have the capacity to initiate and prepare the renovation. There is a more frequent plan for investment activities and the importance of subsidies for securing financing is slightly diminished. The key to setting additional policies to implement the long-term building renovation strategy is that the incentive for energy-saving projects is to save energy expenditure, increase comfort and improve technology. At the same time, a certain degree of 'subsidisation dependency' is evident for all municipalities. For renovation, more than 3/4 of municipalities benefit from subsidies, and the most frequent reason for delaying the implementation of energy-saving projects is just awaiting the available subsidy. In particular, higher subsidies for larger or better renovations and support for smaller municipalities to prepare project documentation could provide incentives for easier and more frequent renovations. On the contrary, there is rather no interest in interest-free loans.

The objective for this group is to increase the number and complexity of renovations (i.e. a combination of reduced energy consumption and the use of renewable energy sources). Given that this group implements projects in cooperation with experts, there is no need to focus on the quality of project implementation, which in turn is a problem in the residential sector. It is necessary to maintain the current financial scheme for this sector, i.e. the subsidy scheme. However, it is necessary to modify the set-up in order to meet the needs and requirements of the municipalities. There is a need to focus on technical assistance covering both the preparation of projects and the administrative provision of the application for financial support. As cost savings are shown to be an incentive factor, municipalities need to be helped to implement energy management in order to identify the potential for reducing energy consumption or operating costs.

Private sector

The main motivation for implementing energy-saving projects is to reduce operating costs, improve technical conditions and increase comfort. Only a minimum of respondents used the state funding scheme for the implementation of the measure. The main reason for this is the need to adapt the project in order to meet the criteria and administrative requirements for granting the aid. In particular, entrepreneurs would welcome support from the State in the form of tax advantages and technical assistance, including the administration of aid applications.

Similar to the public sector, the aim for this group is to increase the number and complexity of renovations (i.e. a combination of reduced energy consumption and the use of renewable energy sources). The state of energy management in enterprises is key to discussing other instruments to support building renovation in the private sector. Despite the fulfilment of legal obligations in the area of energy audit and/or the introduction of energy management, entrepreneurs do not have an understanding of energy expenditure. At the same time, the saving of operating costs is an incentive for implementation. In the following period, instruments need to be focused on improving energy management in the business sector. As most projects are prepared by external entities, the availability of these services (financial and quality) should provide a higher incentive for building renovation projects.

Economic measures

The high initial investment costs of the energy-saving renovation of buildings are one of the main barriers to the implementation thereof. The Czech Republic has many years of experience in offering support programmes that help different groups of property owners achieve energy savings.

There is a need for a substantial increase in appropriations for building renovation programmes. It complements grants with concessional loans and multi-layered advice that is accessible to all.

The Czech Republic continues the established system of financial support for building renovations through a broad portfolio of investment and non-investment support programmes. In addition to subsidies, the expansion of the portfolio of financial instruments according to the needs of the various actors is being discussed. An analysis of the potential energy savings and investment resources needed shows that, while the overall renovation of a building is a long-term measure (typically around 20 years), it also means that the return on this investment is around 4-6 % per year, or even above. This is an attractive value given the comparable investment options (but not too much for the business community, but for institutions and households, as well as investment funds or banks).

Legislative and administrative measures

In view of the necessary transposition of the revision of Directive (EU) 2023/1791 on energy efficiency and Directive (EU) 2024/1275 on the energy performance of buildings, there will be a comprehensive amendment to Act 406/2000 on energy management.

Measures in the field of training and consultancy

Ignorance of specific appropriate measures to improve the energy performance of a particular building, the investment demands thereof, and potential savings, increases the transaction cost of renovating buildings. This barrier can to some extent be mitigated by strengthening the role of state-guaranteed advice in the so-called Energy Consultation and Information Centres beyond EKIS. Furthermore, it is envisaged to develop model projects for standard building types, quantifying the investment costs and savings achieved.

The above should rather be seen as an overview of the two strands within which the Czech Republic will focus on the setting up of specific measures. These will be complemented by the transposition and implementation of the revision of the Energy Performance of Buildings Directive.

i. Description of policy and measures to promote energy services in the public sector and measures to remove legal and other barriers to the use of energy performance contracting and other energy efficiency service models[60]

For the period 2021-2030, continued support is foreseen for the use of the EPC method, in particular in the public sector, in order to maximise the efficiency of the public funds invested and the energy savings achieved. To this end, it is planned to remove barriers to the use of the EPC method by public bodies, in

60In accordance with Article 18 of Directive 2012/27/EU.

particular through training in the procurement of comprehensive services, support for information centres of energy providers and support for regional offices aimed at promoting the use of energy services.

ii. Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 (e.g. measures to promote the exemplary role of public buildings and energy efficient public procurement, measures to promote energy audits and energy management systems, consumer information and education61measures62 and other measures to promote energy efficiency)63.

All relevant policies, measures and programmes are described under the other parts of this chapter or other parts of this document, as appropriate.

iii. Where applicable, a description of policies and measures to promote the role of local renewable energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv

As set out in the previous sections summarising policies to meet energy efficiency objectives and commitments, the Czech Republic will make efforts to set up local information centres for the general public. In the light of public opinion, it is essential that these services are not unaffordable for the public or are available at a minimum price. We also see the strengthening of self-government capacities in the field of energy and energy efficiency, the training of employees and their empowerment in the implementation of instruments and measures at both national and local level as essential. To implement such a scheme, the Czech Republic is considering using the EU LIFE programme.

iv. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure64

Electro-energy65

Losses in the transmission system are predominantly determined by the size of the transmitted power for transformation with the DSO, by the decoupling of power from power plants connected to the transmission system, and by the size of the overflow over the transmission system determined by commercial exchanges between individual trading zones in the interconnected European system.

In an area that is controlled by the TSO and which does not reduce operational security and reliability of electricity supply, two loss reduction areas can generally be considered. This concerns infrastructure investments and resources for system management.

Infrastructure investment window

Increasing network permeability and thus achieving increased connectivity, which, if specifically applied, results in a reduction of system-wide losses. Increasing system permeability with an impact on loss reduction is mainly driven by the need to increase active power transmission opportunities from sources to consumption and within the interconnected European electricity system, thereby fulfilling the loss reduction requirements in the long term secondarily. An example of implementation is a process assessing the needs in each corridor, where the construction of lines with higher parameters (higher current capacity, duplication of lines) with a lower unit factor of losses, if needed, is taking place.

61In accordance with Article 8 of Directive 2012/27/EU.
62In accordance with Articles 12 and 17 of Directive 2012/27/EU
63In accordance with Article 19 of Directive 2012/27/EU.
64In accordance with Article 15(2) of Directive 2012/27/EU.
There is more detailed material in65 this area, produced with the contribution of ČEPS a.s., ČEZ Distribuce, a.s. and PREdistribuce, a.s., which deals with this issue in more detail. Only a certain summary of this more detailed material is provided in this material.

As part of the standard end-of-life renewal process, a predetermined number of transformers is exchanged between the transmission and distribution systems each year. These transformers are being replaced by completely new machines with higher unit power and the transformation of 220/110 kV will gradually be replaced by 400/110 kV.

In terms of reducing losses on lines, the transmission system uses more cross-section ropes in fully upgraded lines, resulting in a reduction in the loss of this line. For example, a difference in the use of cable 434-AL1/56-ST1A instead of 350AlFe4 means a decrease of about 30 % in unit active power losses with the same active power transmission. Type 490-AL1/64-ST1A ropes are currently being deployed and will continue to contribute to reducing the active losses in the transmission of electricity on key lines that are upgraded or duplicated with an assumed nominal transmission capability of around 2500 A. Significant investments in the transmission system involving the use of lower resistive ropes.

Area of resources for system management

The reduction of losses in the transmission system by changing grid operation is very limited. Deviation from the basic connection generally leads to an increase in losses in the transmission system. The parameter of the location and size of the active power supply/consumption, which significantly affects the size of the losses, is not influenced by the TSO and, if so, at the cost of large costs. From this point of view, only reactive power generation, which partly contributes to losses in the transmission system, can be affected. In this area, it is possible to implement resources and compensation resources in order not only to ensure safety and reliability of operations, but also to reduce losses. In particular, the approaches or tools applied in this area are automatic voltage regulators in cooperation with the optimisation tool.

In general, measures taken to reduce losses should always be applied with regard to the site and with a view to achieving a reduction in overall losses, and not with regard to losses of one type of installation. In the area of system management tools, space is constrained by the possibilities to use available regulatory means, which are already fully used in the transmission system, but there is scope for more integration and coordination in the areas of pilot projects.

Approaches for improving energy performance in the grid

The distributor’s ability to influence the reduction of electricity consumption is severely constrained by legislation and the obligation to deliver contracted quantities of electricity to final customers. It should also be borne in mind that, despite the distributor’s efforts to implement processes and technologies that will help reduce losses, there are many trends linked specifically to the development of renewables, which lead to increased losses. E.g. wider deployment of renewables tends to increase the amount of reactive energy in the grid, which leads to increased losses. Moreover, small intermittent sources are connected to the network in an unsymmetrical way, which may lead to a disproportionate burden on some outlets and thus also increase losses. Moreover, the development of decentralised production and some appliances (e.g. pulses of source management) may also involve the introduction of higher harmonics into the network, which may also result in higher losses.

The potential scope for reducing electricity consumption that the distributor may influence is mainly in the area of technical and non-technical losses. These include, for example, the introduction of new technologies, the unification of voltages, the renewal of existing installations and the replacement of existing distribution system elements with new ones with more efficient and better parameters, as well as control of the demand point to detect unauthorised electricity consumption.

Based on data on electricity consumption and losses per voltage level, it can be concluded that the greatest scope for reducing consumption or technical losses lies at the low voltage voltage level (nn) and partly at the high voltage voltage level (n).

The loss reduction measures can therefore generally be divided into two groups: (I) network renewal through the exchange of key network elements with more efficient and better performance features. The distribution mainly concerns the replacement of transformers and the increase of the cross-sections of conductors. From a cost-effectiveness point of view, this is an option that must always be assessed in the light of the specific conditions of its application, since the financial costs incurred may not always justify the results achieved – especially in terms of local load and topology of the network; (II) the second group of measures is an alternative to a blanket application of more efficient and better performance features. This involves deploying elements such as advanced network management and monitoring methods. In the context of synergistic effects, these elements are deployed both for better burden sharing (and thus reduced losses) but also for the need for better monitoring of the network at lower voltage levels, which is one of the main distribution challenges in the light of changing consumption/production patterns.

Gas

With a gradual shift away from coal sources, it will sufficiently enhance the use of natural gas, biogas and prospectively synthetic methane and hydrogen in the Czech Republic. The gas system has the potential to contribute to the achievement of the energy efficiency objective, e.g. by installing more efficient equipment that improves the energy performance of the system operation. This can be done in the context of continuous maintenance and modernisation of the system. For example, the installation of more efficient compression stations could be carried out with a contribution from EU structural funds.

v. Possible regional cooperation in this area

Act No 406/2000 lays down the obligation for the regions and the city of Prague to draw up a territorial energy concept and to draw up it at regular intervals. In addition to this obligation, regions and municipalities carry out energy audits from a certain size and/or implement an energy management system. The above-mentioned documents make it possible to evaluate energy efficiency by region. These evaluations are important to set up appropriate measures that are acceptable across the public administration.

The Ministry of Industry and Trade is working with the regions to create a platform to address the issues of the implementation of the above-mentioned documents. Intensive discussions are taking place from representatives of these entities in order to raise interest in the topic of improving energy efficiency, to identify the potential in a given territory and to explore ways of realising this potential.The authorities themselves are involved in approving legal acts, as well as in strategic documents. They are therefore indirectly involved in the development of the State’s energy efficiency policy.

vi. Financing measures, including Union support and the use of Union funds, in the area at national level

The financial measures and the sources of financing, respectively, are presented in aggregate in Section 5.3.

vii. Energy efficiency instruments and measures beyond those falling under Article 7 of the Energy Efficiency Directive

The tables below list the instruments and measures beyond those covered by the implementation of Article 7. This point (point/part ix) has been added beyond the structure required by Regulation 2018/1999.

Table 40: *Instruments and measures beyond those falling under Article 8 of the Energy Efficiency Directive 2023/1791*

Measures	Description
Investment support for the deployment of CHP	There is stable investment support in both operational and national programmes for the implementation of CHP. Within the current programming period, support to the business sector is allocated in the Operational Programme for Entrepreneurship and Innovation for Competitiveness. In this case, this concerns in particular the broad-based specific objective 3.2 *Energy savings* and also the narrowly targeted specific objective 3.5 *Energy savings in the GAT*. Furthermore, the investment aid is allocated in the Operational Programme Environment, in particular in Specific Objective 2.2. Reducing emissions from stationary sources and Specific Objective 3.2 Increasing the share of material and energy recovery of waste. In specific objective 5.1. Improve the energy performance of public buildings and increase the use of renewable energy sources, support is granted to the public sector
Operating support for the implementation of CHP	Support for CHP in the Czech Republic also includes operating aid which ensures the development of high-efficiency CHP and the reduction of primary energy consumption. Operating aid for high-efficiency CHP is part of the support system for electricity and heat production from RES. The support is legally enshrined in Act No 165/2015 on supported energy sources.
Investment aid for the modernisation of the transmission and distribution network to increase efficiency and support for the renovation and modernisation of heat distribution facilities	Under the Operational Programme Enterprise and Innovation for Competitiveness, Priority Axis 3 – 'Efficient energy management, development of energy infrastructure and renewable energy sources, support for the deployment of new technologies in the field of energy management and secondary raw materials', are allocated resources to upgrade the transmission and distribution grids in order to increase their efficiency, including the implementation of smart grid elements. It also includes support for the renovation and modernisation of heat distribution facilities under the Energy Savings Scheme for Heat Supply Systems.
Investment support construction charging infrastructure for electric vehicles, hydrogen refuelling stations and other infrastructure for alternatively fuelled vehicles	Under the Operational Programme Transport, under the specific objective – Creating the *conditions for a wider use of alternatively fuelled vehicles on the road network*, investment aid is provided for the construction of a backbone and complementary network of recharging points and other infrastructure for alternatively fuelled vehicles. Investment aid contributes to creating an environment for accelerating the introduction of vehicles on the market of alternative vehicles in the Czech Republic, which contributes positively to increasing the efficiency of passenger transport and thus directly reduces final energy consumption.

Table 41: *Instruments and measures beyond those falling under Article 8 of the Energy Efficiency Directive 2023/1791*

Measures	Description
Obligation to improve the energy performance of buildings	Under Section 7 of Act No 406/2000 on energy management, as amended, in the case of the construction of a new building, the developer is required to comply with the requirements for the energy performance of a building under the implementing legislation and, when applying for a building permit, an application for a joint permit to place and authorise the construction, an application for alteration of a building before its completion with an impact on its energy performance, or a declaration of the construction, the energy performance certificate of the building. In addition, obligations are given following a major change in the completed building, but also for other than major changes to the completed building.
Obligation to draw up an energy performance certificate for a building	Pursuant to Section 7a of Act No 406/2000 on energy management, as amended, entities listed by law are required to draw up a building energy performance certificate under the conditions specified by law.
Energy labelling obligations	Section 8 of Act No 406/2000 on energy management, as amended, lays down the obligations of suppliers of products which are linked to the consumption of energy and which are subject to energy labelling requirements.
Obligation perform energy audit and prepare an energy assessment	Under Sections 9 and 9a of Act No 406/2000 on energy management, as amended, entities listed by law are required, under the conditions specified by law, to carry out an energy audit or an energy assessment for a building or an energy economy, even beyond the EU requirements.
Obligations linked to the award of specific energy efficiency conditions in the case of public contracts	Pursuant to Section 9b of Act No 406/2000 on energy management, as amended, in the case of higher-threshold public supply or service contracts by central institutions, the contracting authority must lay down specific technical conditions in the field of energy efficiency, in particular in relation to the labelling of energy-related products, ecodesign, the energy performance class of the building. In the award of public contracts, the following conditions shall apply: (I) the highest available class for energy-labelled products, (ii) the most efficient product on the market in case it is covered by ecodesign, (iii) the highest fuel class

	efficiency in the case of tyres, (iv) for the acquisition of buildings, the obligation not to purchase less than the energy-efficient classification class – C, (v) the obligation for renting buildings to be better than a less efficient classification class – D
Minimum energy efficiency obligation for energy resources and distribution systems	Pursuant to Section 6 of Act No 406/2000 on energy management, as amended, there is an obligation to ensure minimum efficiency in the use of energy in newly established power-generating or thermal energy plants and in the case of plants for which a change is made to the completed construction. In addition, pursuant to Paragraph 6, the obligation to ensure the efficiency of the energy distribution system is laid down in the case of newly established installations and in the case of plants for which a modification of the completed construction is carried out
Obligation to control combustion sources	In order to ensure the declared efficiency of combustion sources, the applicable legislation (Act No 201/2012 on air protection and Act No 406/2000 on energy management) lays down obligations for regular inspection of combustion sources with a rated output of more than 10 kW and 20 kW respectively and of the relevant thermal energy distribution systems. The existence of mandatory controls ensures the energy-efficient operation of combustion sources and thus eliminates the increase in energy consumption due to suboptimal operation of combustion sources
Regulatory measures for reductions losses in transmission, transport and distribution	In the Czech Republic, the regulatory framework is being implemented pursuant to Act No 458/2000 on business conditions and after State administration in the energy sectors, for reducing losses in the transmission, transport and distribution of energy. For this purpose, a regulatory methodology applicable to regulated entities in transmission, transmission and distribution shall be developed and include an efficiency factor that incentivises entities to reduce regulated costs. The regulatory framework in place stimulates loss reduction in the long term
Obligation to develop territorial energy concepts at the level of the regions and the capital city of Prague	The territorial energy concept sets out objectives and principles for the management of energy in a defined area. The territorial energy concept includes an evaluation of the technical and economic potential of energy savings, the definition of the instruments to achieve them and the design of alternative scenarios for future development. The development of a territorial energy concept creates the conditions for reducing energy consumption at regional government level in line with the Czech Republic's energy and climate objectives.

Table 42: *Instruments and measures beyond those falling under Article 8 of the Energy Efficiency Directive 2023/1791*

Measures	Description
Promoting modal shift in freight transport[66]	On the basis of the Government-agreed Freight Concept 2017-2023, create an environment in which logistics and freight transport can provide the necessary level of services to ensure the competitiveness of the economy, while making economical use of existing resources. The objective of the concept is to maximise the use of efficient forms of freight transport.

66The implementation of the measure presupposes compliance with the requirements/parameters of the proposed revision of the TEN-T Regulation related to the upgrading of the relevant rail infrastructure for freight transport (e.g. ensuring the passage of 740 m long trains and with P400 clearance profile

3.3. Dimension ‘Energy security’ 67

I.Policies and measures related to the elements set out in point 2.368

3.3.1.1 Electricity sector

The main policies and measures to ensure security of energy supply in the electricity sector are the following:

– Development of the transmission system(s) to ensure system and generation adequacy of the system and security of electricity supply ensuring long-term compliance with the N-1 criterion;
– generation adequacy measures;
– the development of an integrated electricity market;
– measures stemming from European legislation;
– diversification of the electricity mix while at the same time sufficient development of manageable emission-free sources (primary nuclear power plants);
– Emergency management of the system and prevention of an emergency.

Development of the transmission system

The development of the electricity stack is key to ensuring security of electricity supply. In the Czech Republic, the main responsibility for ensuring the development of the transmission system lies with the operator of the transmission system. The development of the transmission system is also significantly coordinated at EU level. Detailed information on the state of play and expected development of electricity infrastructure is provided in chapter 4.5.2.

Generation adequacy measures

In the area of generation adequacy, an outlook on the state of generation adequacy shall be developed on an ongoing basis, including the design of measures to address any generation adequacy concerns on an annual basis in accordance with the requirements of Regulation (EU) 2019/943 of the European Parliament and of the Council and relevant methodologies.69 A summary of the outlook on the state of generation adequacy is provided in chapter 4.4.1.5.

In 2021, a reliability standard was also established under that Regulation, together with other auxiliary indicators (VOLL, CONE), in accordance with the Methodology for calculating the value of lost load, the cost of new entry and the reliability standard approved by ACER’s association of energy regulators. VOLL, CONE and reliability standards need to be regularly updated at least every five years according to ENTSO-E methodologies, or earlier in case of significant changes in the energy sector. The values also need to be evaluated in the national context and used to assess the economic merits of remedies in case of source inadequacy with an impact on the reliability of EC operations and on security of supply. These are generally the following measures authorising the Member State to intervene in the event of a market failure:

- operational instruments of a predominantly non-investment nature (tarify, flexibility, including consumption side management, capacity mechanisms)

67Policies and measures shall reflect the energy efficiency first principle.

68Consistency shall be ensured with the preventive action and emergency plans under Regulation [as proposed by COM(2016) 52] concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010, as well as the risk preparedness plans under Regulation [as proposed by COM(2016) 862] on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC.

69 The latest assessment of the generation adequacy of the EC CR was carried out during 2018 and is available here: https://www.mpo.cz/cz/energetika/elektroenergetika/hodnoceni-vyrobni-primerenosti-es-cr-do-roku-2030--233193/

- instruments of an investment nature (construction of a new resource, accumulation)

An in-depth analysis and methodology for determining the reliability standard, using generally used reliability indicators, is also currently being developed, which in turn should allow for a legislative or non-legislative anchoring of the safety standard in the area of production adequacy. A summary of the outlook on the state of generation adequacy is provided in chapter 4.4.1.6. The need to ensure sufficient generation capacities, also in view of the gradual phasing out of conventional fossil fuel sources, is likely to require the creation of a form of so-called strategic reserve, most likely at the 2025-2035 stage, when the Czech energy market may have a first significant electricity and/or power shortage. The set-up of this reserve will be based on the legislative requirements set out in particular by Regulation (EU) 2019/943. Any strategic reserve will be established or defined by law, preceded by an impact assessment of the measure. The settings and parameters of the strategic reserve are already being discussed at the level of a dedicated task force.

Development of an integrated electricity market

One important element in strengthening energy security is the further development of the internal electricity market and its continued integration. The internal energy market is a separate dimension of the Energy Union and is further described in other parts of this document, namely chapters 2.4, 3.4 and 4.5.

Measures stemming from European legislation

Security of electricity supply is already very much covered by specific European legislation in this area. In this regard, Regulation 2019/941 of 5 June 2019 on electricity risk-preparedness and repealing Directive 2005/89/EC, which was published as part of the ‘Clean Energy for All Europeans’ legislative package and entered into force on 4 July 2019, may be specifically mentioned.

Diversification of the electricity mix

The Czech Republic will strive to maximise the diversification of the energy/electricity mix and to minimise the sources for which large quantities of input fuel must be imported from abroad. The strategically optimal composition of the electricity mix for 2040 and 2050 is enshrined in the draft update of the Czech State Energy Concept and is set out in Chapter 1.2.1.1. In this regard, it is important to highlight the role of nuclear energy, which should gradually assume the role of coal energy in the electricity mix (in particular after 2035). In this context, existing coal source sites for the use of Small and Medium Nuclear Reactor (SMR) technology will be explored. To this end, the geotechnical preparation of three potential investors takes place at selected sites that are part of the plan for small and medium reactors in the Czech Republic, approved by the Czech Government in November 2023. On the part of the Czech Republic, the Atomic Act is being amended to include SMR technology and the updating of the spatial development policy with a view to the delimitation of sites. The first SMR is expected to become operational in the mid-30s, with the total installed capacity of SMRs reaching up to 3 GW depending on the construction of large reactors. One of the investors declares the intention to select a supplier by the end of 2024. In addition to electricity generation, the use of SMRs in the heating sector is considered for existing district heating systems serving one third of Czech households. To prepare for the newly established SMR market, the Czech Republic has taken part in international initiatives (IAEA, NEA-OECD, European SMR Industrial Alliance, Phoenix Project, etc.). Increasing the share of nuclear power and renewables at the expense of fossil fuels is also key to achieving long-term greenhouse gas emission reduction commitments as set out in Chapter 3.1.1.5. The Czech Republic no longer has its own resources for uranium ore (or has resources but production has ceased), so fuel is imported from abroad into nuclear power plants. However, compared to natural gas in particular, nuclear fuel can be stored several years ahead. Thus, even if it is not an indigenous source, from the point of view of energy security or import dependency, this energy source is a better alternative than, for example, natural gas. For more detailed information on the diversification of nuclear fuel, see section 4.4.1.8.

Emergency system management and emergency prevention

On the other hand, the issue of emergency situations is covered by Act No 458/2000 on business conditions and the performance of state administration in the energy sectors and amending certain acts (the Energy Act), as amended, which incorporates the relevant provisions of the European Union and governs, following directly applicable European Union legislation, the conditions for doing business and the exercise of State administration in the energy sectors, namely electricity, gas and heating, as well as the rights and obligations of natural and legal persons.

Energy emergency

According to the Energy Act, a state of emergency means a situation which has arisen in the electricity, gas or thermal energy supply system as a result of natural events, measures taken by the State authorities in the event of a state of emergency, a state of threat to the State or a state of war, accidents or accumulation of failures in installations for the production, transmission and distribution of electricity, accidents on gas generation, transmission, distribution and storage facilities, accidents on the installation of the thermal energy supply system, smog situations under specific regulations; an act of terrorism, an imbalance in the electricity system or part thereof, an imbalance in the gas system or part thereof, an imbalance in the heat energy supply system, transmission of a disturbance from a foreign electricity system, a threat to physical safety or security of persons, and a significant and sudden shortage of electricity, gas or thermal energy, or a threat to the integrity, security and reliability of operation of the electricity, gas or heat energy supply system, in the case of an electricity system or a gas system in all or part of the national territory.

The Act further defines the term ‘prevention of an emergency’ as a set of measures and activities carried out in a situation where there is a real risk of an emergency. In the case of a gas system, it then consists of two phases, namely an early warning, where there is such information that an emergency may occur, and a warning where there is a real deterioration in the supply of customers, but there is no need for a general reduction in consumption.

The exact time of the occurrence or termination of an emergency situation for the entire territory of the State shall be announced by the TSO or TSO in the mass media and via dispatching means and immediately notified to the Ministry of Industry and Trade, the Energy Regulatory Office, the Ministry of the Interior, the market operator, the regional authorities and the Prague City Council. Similarly, the prevention of an emergency situation shall be notified by the TSO or TSO within 1 hour of the start of the relevant activities and without delay to the Ministry of Industry and Trade, the Energy Regulatory Office, the Ministry of the Interior, the market operator, the regional authorities and the Prague City Council. For a demarcated area or part thereof, such obligations shall be imposed on distribution system operators. In the area of heating, the Ministry of Industry and Trade declares a state of emergency and its termination for the entire territory of the State, the regional authority or the Prague City Council for part of it, through the media or by any other appropriate means. The authority which declared the emergency must immediately inform the Ministry of the Interior and the competent fire rescue services of the regions of the expected duration of the reduction in the supply of thermal energy.

Pursuant to the enabling provisions of Act No 458/2000 on the conditions of business and the performance of state administration in the energy sectors and amending certain acts (the Energy Act), the Ministry of Industry and Trade lays down by decree measures and procedures to be carried out in the prevention of an emergency, in the event of an emergency and in the recovery of the consequences of an emergency, the method of declaring an emergency and notification of the prevention of an emergency, and the procedures for limiting the production of electricity, the consumption of electricity, gas and heat including the regulatory, break-down and frequency plan, the safety standard for the supply of gas and the content of emergency plans, the method of ensuring gas safety standards, the content of the documents for the preparation of the preventive action plan and the emergency plan in accordance with the directly applicable European Union legislation and the deadlines for their submission to the Ministry. In the field of electricity, this authorisation corresponds to Decree No 80/2010 on the state of emergency in the electricity sector and the content of the emergency plan; in the field of gas, it is Decree No 344/2012, as amended by Decree No 215/2015, and, in the field of the heating sector, Decree No 225/2001 laying down the procedure for the establishment and elimination of a state of emergency in the heating sector.

The issue of crisis management is mainly covered by Act No 240/2000 on crisis management (the Crisis Management Act), as amended, which lays down the powers and powers of state bodies and local self-governing bodies and the rights and obligations of legal and natural persons in preparing for and dealing with crisis situations which are not related to the provision of defence of the Czech Republic against external attacks, and the protection of critical infrastructure and the responsibility for breaches of these obligations.

Protecting critical infrastructure

Critical infrastructure is defined under Act No 240/2000 on crisis management and amending certain acts (the Crisis Act) as an element or system of critical infrastructure elements the disruption of which would have a serious impact on the security of the State, the provision of basic living needs of the population, the health of persons or the economy of the State. The critical infrastructure element is, in particular, the construction, installation, means or public infrastructure identified according to the cross-cutting and sectoral criteria laid down in Government Regulation No 432/2010 on criteria for the identification of the critical infrastructure element, as amended. When determining these elements, their criticality is assessed, i.e. the extent of the impact of the functional failure of the element and its irreplaceability, or the possibility of alternative provision of its function.

Under the Crisis Law, critical infrastructure protection is a measure aimed at reducing the risk of disruption of the critical infrastructure element. Critical infrastructure entity means the operator of a critical infrastructure element and, in the case of an operator of a European Critical Infrastructure element, shall be considered a European Critical Infrastructure entity.

In December 2022, Directive (EU) 2022/2557 of the European Parliament and of the Council on the resilience of critical entities and repealing Council Directive 2008/114/EC (CER Directive), which the Czech Republic is currently transposing as part of the revision of crisis legislation, was adopted. Given the large number of new requirements, critical infrastructure protection will be exempted from the Crisis Act and addressed by a separate Critical Infrastructure Act. The main systemic change brought about by the CER Directive is to shift attention away from individual elements of critical infrastructure and, on the contrary, to focus on the provision of an essential service as a whole. In addition to the implementation of the requirements of the CER Directive, the new Critical Infrastructure Act will take into account experience from the current application practice of the Crisis Act.

Crisis management type plans

Type plans shall set out recommended type practices, principles and measures to address them for a specific type of crisis situation. Pursuant to Government Regulation No 462/2000 Coll., they are part of a crisis plan. Within the remit of the Ministry of Industry and Trade: (I) a type plan to address a crisis situation of large-scale electricity supply disruption; (II) a type plan to address a crisis situation of large-scale gas supply disruption. According to Government Regulation No 462/2000 Coll., the crisis plan also includes the development of type plans into procedures for dealing with specific types of crisis situations identified in the threat analysis.

Emergency plans

Emergency preparedness is a prerequisite for the successful management of emergencies (from catastrophic conditions, floods, systemic failures to the declaration of an emergency, pursuant to Act No 458/2000 Coll.). Emergency preparedness is about being able to react in a timely and correct manner when an emergency or crisis occurs and to eliminate as far as possible the risk of endangering life, health, property or the environment.

Emergency plans are drawn up in accordance with Act No 458/2000 Coll., the Energy Act, which constitute a set of planned measures to prevent and avert emergency situations and to ensure the effective and rapid elimination of such situations.

Procedure for the restoration of electricity supply on the distribution network

The procedure for limiting electricity consumption and restoring electricity supply within the distribution system is laid down mainly on the basis of Decree No 80/2010 on the state of emergency in the electricity sector and on the content of the emergency plan.

In accordance with Paragraph 1 of that decree, the limitation of electricity consumption in areas at risk of an emergency or for which a state of emergency has been declared is determined by the application of the relevant level of the regulatory plan, the break-down plan, the operational shutdown of parts of the installation or the automatic operation of the frequency relays in accordance with the frequency plan, to the extent necessary to balance the power balance of the part of the electricity system concerned.

On the basis of Paragraph 3(2), by 30 September each year, regional distribution system operators shall transmit to the TSO the updated power values for each control stage and step of the switch-off plan and frequency plan.

The application and content of the regulatory plan, the break-down plan, the frequency plan and the emergency plan are laid down in the relevant annexes to the Decree.

3.3.1.2 Gas sector

The main policies and measures to ensure security of energy supply in the gas sector are the following:

- Diversification of gas sources and transport routes (closely linked to the development of the transmission system);
- measures stemming from European legislation;
- development of the transmission system (or distribution systems) to ensure system adequacy and security of gas supply ensuring long-term compliance with the N-1 criterion and the ‘S-1’ criterion;
- development of transmission and distribution networks enabling the integration of the production of gases from renewable energy sources and their transport to the point of consumption;
- the development of an integrated gas market;
- rigorous monitoring of gas traders’ compliance with the security standard of supply for protected customers;
- measures to ensure sufficient storage capacity and efficient use of gas storage facilities;
- emergency management of the gas system and prevention of an emergency;
- adapting to changes in gas flows caused by reduced or zero natural gas supplies from the Russian Federation due to the outbreak of the war in Ukraine in February 2022;
- preparing for the gradual emergence and development of the hydrogen economy in the Czech Republic (relating to the adaptation of the legislation, regulatory and financial framework for all

links in the energy chain, i.e. production, transport, distribution, consumption and storage).

- Ensuring a technical tranche of the consumption side of the natural gas for hydrogen.
- Promote the reinforcement of transport capacities from DE to CZ (i.e. removing bottlenecks in the German transmission system west-> east; in particular, the construction of CS Rehden and CS Wittenburg) is an appropriate solution at a faster pace than planned in the current TYNDP 2022. At the same time, it is important to maintain the type of capacity provided (i.e. uninterruptible) from Germany to VIP Brandov. This can be achieved, for example, by the appropriate location and size of LNG terminals in Germany; the connection to existing OPAL/EUGAL pipeline systems makes the Mukran/Lubmin area the most appropriate. Both national administrations and gas operators can enforce this through their instruments (CZ-DE intergovernmental consultations, working groups, etc.).
- State aid to support the construction of new LNG terminals with sufficient capacity (in particular in the Mukran and Lubmin areas). These pipelines are already directly integrated into the NET4GAS pipelines. Consider a possible investment entry, possibly entrust the selected entity to provide LNG terminal capacity to Czech customers. As part of the National Plan, there should also be a clear commitment for the State to support merchants' capacity efforts in this progressively expanded LNG terminal.
- Seek to maintain sufficient capacities of natural gas transmission routes for Czech customers. Active participation in public consultations (e.g. German TYNDP).
- Resumption of changes in gas flows and quality caused by the integration of biomethane plants into local networks.

Diversification of natural gas and hydrogen sources and transport routes

The Czech Republic is almost exclusively dependent on imports of this commodity for natural gas. Domestic production of natural gas only covers a negligible part of domestic consumption (around 2-3 %). For this reason, ensuring the diversification of natural gas sources and transport routes is very important. The Czech Republic uses very good connections to the gas infrastructure of neighbouring countries, namely Germany and Slovakia, thanks to transit pipelines that cross its territory east-west, west-east and partially north-south. The connection to the Polish gas infrastructure is limited (there is only a connection in the direction from the Czech Republic to Poland) and there is a complete lack of a direct connection between the Czech Republic and Austria. In this respect, it is worth mentioning the possibility of reverse flows, following the gas supply constraints in 2009, when historically the flow from east to west was previously dominated. In recent years, thanks to the implementation of the Nord Stream I pipeline, the flow of the Czech Republic from west to east has prevailed. For more information see chapter 4.5.2.2.

Until February 2022, the vast majority of imported natural gas originated from the Russian Federation. However, as a result of the war in Ukraine, gas supplies to the Czech Republic from Russia are currently zero (reg. 2023). It is now important to have access to other sources of natural gas (Norway and LNG) to ensure the supply of natural gas to Czech customers. Without direct access to the sea and therefore without the possibility to build its own LNG terminals, the Czech Republic is now primarily dependent on gas supply through cross-border pipelines from Germany. Therefore, German LNG development projects clearly have the potential to increase the security of gas supply not only for Germany but also for the Czech Republic (and other central and eastern European markets). However, in order to increase the availability of gas supplies to the Czech Republic, it is necessary to develop not only the LNG terminal infrastructure itself, but also the national German gas infrastructure. Currently, the existing transmission capacities between the new LNG terminals on the German North Sea coast and the interconnection points between Germany and the Czech Republic are very limited. Such restrictions seriously threaten the security of gas supply for the Czech Republic (and other central and eastern

European markets). The lack of firm capacities on the German side has already led to a shortening of nominations from Germany to the Czech Republic at the end of October 2022, confirming that firm capacities on these routes are limited. For this reason, there is a need to speed up the implementation of certain German gas infrastructure development projects aimed at increasing technical capacity towards the Czech Republic. For example, a project to build a new Wittenburg compression station, which will increase the capacity of the NEL pipeline. This project can be considered the most beneficial for increasing capacity in the West-East direction. Other projects are the extension of the Rehden compression station or the construction of the Achim/Embsen compression station.

In the context of ensuring the diversification of sources and the expansion of transport routes, the Czech-Polish bi-directional interconnection (the Bezměrov-Hať gas pipeline) is an important project. This is a project of strategic and security importance for the Czech Republic, which aims to connect Poland's and the Czech Republic's gas networks in two directions. The implementation of the project will expand transport routes and allow diversification of natural gas sources for the Czech Republic through connections to a potential source of gas other than from the Russian Federation, namely LNG from Poland and natural gas from Norway. The project is prepared as 100 % H2 ready for future hydrogen transport. The implementation of the project depends on the decision of the state authorities on its importance and funding.

The development of new types of gas (biomethane, synthetic gas, hydrogen) will also increase safety in the future. The European Hydrogen Backbone initiative of a group of 31 European gas infrastructure operators offers transport routes that can be used for hydrogen imports in the future. The study resulting from this initiative is not binding, but mutual cooperation, discussion and knowledge sharing within the involved European gas system operators is an invaluable source of information for the future gradual transformation of the current gas transmission infrastructure into hydrogen. For the Czech Republic, there is a potential for hydrogen import utilisation through three transport corridors out of a total of five, namely: corridor A: North Africa & Southern Europe, Corridor D: Nordic-Baltic Corridor, Corridor E: Eastern and South-Eastern Europe. This means that hydrogen transport to the Czech Republic will be made possible in the future from the eastern direction (e.g. from Ukraine via Slovakia), from the southern direction (e.g. from North Africa via Italy and Austria, and from Türkiye and Greece via Romania, Hungary and Slovakia), as well as from the northwest (e.g.: Baltic and Northern Germany) to industrial clusters in southern Germany and then to the west.

Security of supply with regard to the diversification of natural gas sources and transport routes or the robustness of the transmission system is expressed in the N-1 criterion, in line with the requirements of the EU Regulation 2017/1938 methodology. The N-1 criterion is quantified by the transmission system operator as part of the Ten-Year Ten-Year Development Plan. The recommended value of this criterion under Regulation (EU) 2017/1938 corresponds to 100 %. Table 43 quantifies the security of gas supply for the Czech Republic in 2023-2032 according to criterion N-1, based on the data used in the Czech Republic's Ten-Year Transmission System Development Plan 2019-2028[70]. Figure 18 then shows a comparison of the minimum value required by the Regulation and the expected evolution of the N-1 criterion for 2023-2032.

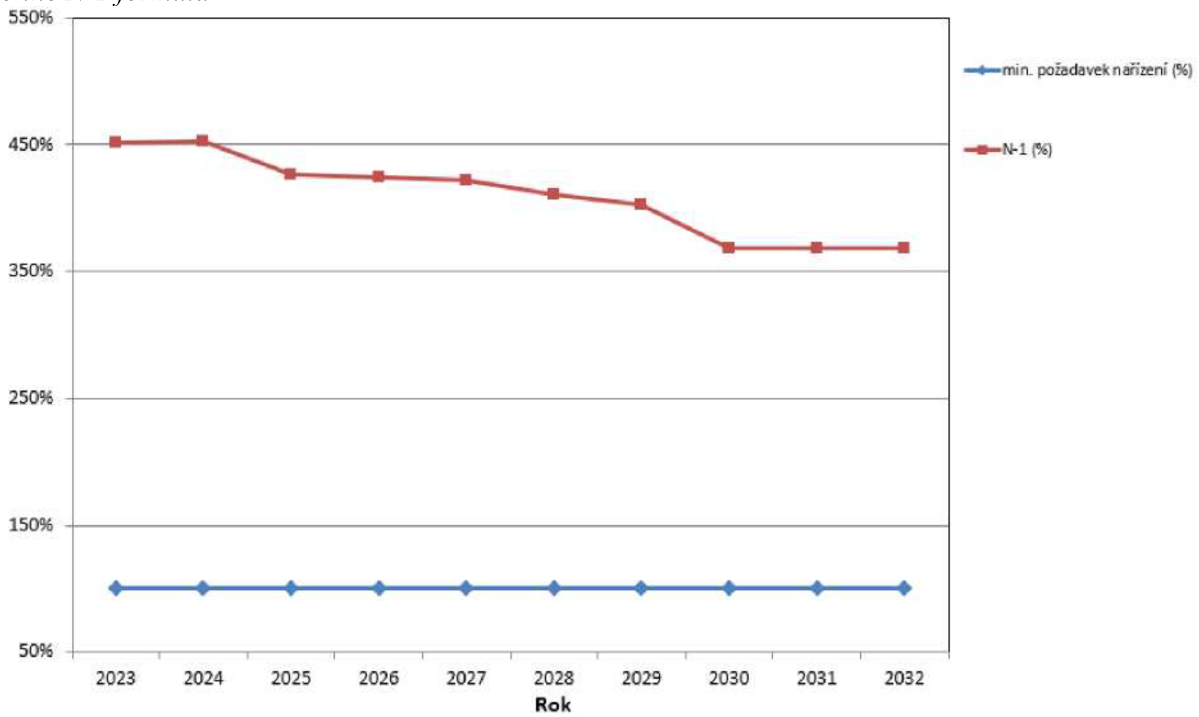
70At the time of the preparation of the National Transmission Network Development Plan in the Czech Republic for the period 2024-2033, work had not yet been prepared, although work on its preparation had already started.

Table 43: *Quantification of the security of gas supply for the Czech Republic in 2023-2032 according to the N-1 formula*

(GWh/d)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
P_m	5,1	5,8	5,6	5,9	5,7	5,4	4,3	4,4	3,8	3,2
S_m	618,0	618,0	712,3	712,3	712,3	712,3	712,3	712,3	712,3	712,3
EP_m	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7	4 306,7
I_m	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4	1 640,4
D_{max}	727,4	727,4	792,6	797,7	802,8	824,4	840,3	918,4	918,4	918,4
Min.	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
N-1	452,2	452,3	427,0	424,3	421,6	410,5	402,6	368,4	368,3	368,2

Source: Ten-Year Transmission System Development Plan in the Czech Republic – 2023-2032

Graph 18: *Quantification of the security of gas supply for the Czech Republic in 2023-2032 according to the N-1 formula*



Source: Ten-Year Transmission System Development Plan in the Czech Republic – 2023-2032

Measures stemming from European legislation

Security of gas supply is already very much covered by specific European legislation in this area.

In October 2017, Regulation 2017/1938 of the European Parliament and of the Council of the EU concerning measures to safeguard the security of gas supply entered into force and replaces (or repeals) the former Regulation 994/2010. As part of the coordination of emergency planning at national, regional and Union level, the obligation to prepare risk clearance, preventive action plans and emergency plans shall be maintained. At the same time, other specific measures, such as the principle of solidarity, are being introduced. The Regulation also implies an obligation to comply with an infrastructure standard at the level of compliance with the N-1 criterion or an obligation to establish and maintain a security standard for the supply of natural gas. These obligations are subsequently specified in national legislation, in particular Act No 458/2000 and Decree No 344/2012, as amended.

Development of the transmission system ensuring system adequacy and security of gas supply

The development of the transmission system shall aim at ensuring system adequacy and security of gas supply, including at the level of: (I) maintaining the transit role of the Czech Republic on a European scale; (II) increased interconnectivity between the transmission systems of individual EU Member States; (III) removing national bottlenecks and (iv) enabling the transport of low-carbon gases.

The expected development of the transmission system is the subject of the so-called Ten-Year Transmission System Development Plan, which is drawn up annually by the transmission stack operator. Measures shall be taken under this plan to ensure system adequacy and security of gas supply. Ten-year transmission network development plan: (I) indicates which parts of the transmission system need to be built or extended over the next 10 years, (ii) defines all transmission system investments decided by the transmission system operator and new investments to be made in the following three years.

When drawing up the 10-year development plan, the transmission system operator shall base itself on the existing and foreseeable future gas supply and demand. To this end, the transmission system operator shall carry out an analysis of the evolution of gas generation, supply, import and export, taking into account the planned development of distribution systems connected to the transmission system, the planned development of gas storage facilities and the European Union-wide transmission network development plan prepared pursuant to Regulation (EC) No 715/2009.

The purpose of the Ten-Year Development Plan for Transmission Sites is to establish an overview of the expected investments representing an increase in the capacity of the Czech transmission system and to assess the ability of the transmission system to meet the requirements: (I) the Czech Republic's State Energy Concept (possibly other relevant strategic documents); (II) ensuring the security standard of supply by ensuring compliance with the N-1 criterion.

Development of an integrated gas market

One important element in strengthening energy security is the further development of the internal market in natural gas and its continued integration. As already mentioned in the introduction to the chapter, it is now important to have access to gas sources in Norway and LNG terminals that are supplied via pipelines from Germany to ensure the security of gas supply. Therefore, in order to increase the availability of gas supplies, efforts will also need to be made to develop national German gas infrastructure in order to remove capacity constraints that limit the security of gas supply to the Czech Republic. The internal energy market is a separate dimension of the Energy Union and is further described in other parts of this document, namely chapters 2.4, 3.4 and 4.5.

Achieving an environmentally and economically sustainable and socially acceptable energy transition that guarantees security of energy supply requires a balanced approach. In this context, reference should be made to the proposal for a gas and hydrogen package, which aims to create the right regulatory environment for the decarbonisation of the EU gas sector. The proposal is a revision of the existing European gas legislation, which will be recast (so-called "recast"). The proposal for the gas and hydrogen package is partly based on existing principles applicable to the natural gas market. The creation of a hydrogen market is based on the rules of a well-functioning European internal market in natural gas, which, over its lifetime, has proven to be built on well-choice and effective principles.

Security of supply standard

A key policy to ensure security of gas supply is to ensure the so-called security of supply standard. The obligation to ensure a security standard of supply arises directly from Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010. The security standard of supply is further regulated by the Energy Act No 458/2000, as amended. The method of ensuring the safety standard, its determination and other relevant requirements are laid down in Decree No 344/2012 on the situation of the gas emergency and on the method of ensuring the safety standard of gas supply, as amended (as amended by Decree No 37/2023).

The Market Operator shall be responsible for monitoring and evaluating the fulfilment of the security standard of supply within the remit of its competences. In addition, as part of the monitoring of gas statistics, the Energy Regulatory Office regularly publishes a monthly report on the evaluation of the safety standard of gas supply in the Czech Republic during the heating season. That report shall include aggregated information on the fulfilment of the safety standard, in particular with regard to the obligation to store at least 30 % in gas storage facilities, the structure of the collateral and how it is demonstrated by the proportions of protected customers and other relevant indicators.

Measures to ensure sufficient storage capacity and efficient use of gas storage facilities

In 2022, as a result of Russia's military aggression in Ukraine, there were fundamental changes in the energy field. These changes have significantly affected the territory of the Union as a whole, pointing to the fact that the current rules on security of supply at the time were not sufficiently adapted to sudden significant changes in the geopolitical situation. Based on the European Commission's analysis of risk preparedness and security of gas supply within the Union, a new Regulation (EU) 2022/1032 of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage was adopted. In accordance with this Regulation, each Member State is to ensure, in principle, that the capacity of underground gas storage facilities located on its territory and directly connected to a market area of that Member State is filled by at least 90 % of its capacity at Member State level on 1 November of each year. The obligations arising from this Regulation have also been reflected in national legislation.

On the basis of the measure enshrined in the Czech Republic's State Energy Concept (2015), the total capacity of gas storage facilities should be maintained at 35 % to 40 % of annual gas consumption. In 2016, in which the consumption of natural gas corresponded to 88.2 TWh, the value of this criterion corresponded to 37 %. Taking into account the expected consumption of natural gas and the evolution of storage capacity, this criterion should be met by 2030 (or 2028[71]). In the Czech Republic, natural gas storage facilities are operated on a commercial basis and investments in other storage capacities may be affected, inter alia, by the following factors: (I) the difference between summer and winter gas prices; (II) increased market integration and interconnection of gas networks (i.e. increased market flexibility) leading to greater competition for services offered from gas storage operators, (iii) decisions to build storage facilities are often made conditional on a binding interest from a particular trader; (IV) nor does the security standard of supply (BSD) directly affect the expansion of storage capacities connected to the Czech system; it is possible to use foreign gas storage facilities provided that there is sufficient agreed transport capacity to the Czech Republic, which can be provided by the storage operator and offered to the market as part of the standard product; (v) the gas market design, including the level of transmission tariffs to and from the gas storage facility, creates key storage conditions and should be set in such a way as to ensure efficient use of gas storage facilities and maintain an optimal level of storage capacity as required by the Czech State Energy Policy (2015).

Extraction capacity from reservoirs for 2 months should also be guaranteed at 70 % of peak daily consumption in winter. The highest daily consumption was reached on 23 January 2006, at 68 million$^{m^3}$; this would correspond to the required production capacity of 47.6 million$^{m^3}$. The maximum extractive power of all storage facilities connected to the Czech system is 69.7 million$^{m^3}$ – but this value is usually reached at maximum filling and it can therefore be reasonably assumed that the required production capacity may no longer be guaranteed at the end of the winter season. However, it should be pointed out that the criterion is only aggregate and, as such, does not fully affect the specific features of Czech storage

71Based on the Ten-Year Transmission System Development Plan in the Czech Republic 2019-2028 facilities, in particular the geographical distribution, which cannot be described as perfectly optimal, since almost all of them are located in the territory of Moravia; in Bohemia there is only the Háje reservoir, which is due to the appropriate conditions for their location.

More detailed information on the existing capacity and the distribution of gas storage facilities, but also on the expected development of capacity and production capacity, is provided in Chapters 4.5.2.2 and 4.5.2.4 respectively.

Emergency management of the gas system and prevention of an emergency

Emergency system management

System operation is overseen by the gas dispatcher of the shipper, through measuring apparatus and dispatching of other operators (distributors and storages) is informed about the state of the network, while traffic simulations can obtain expected operational values for that status. A significant difference between expected and actual values may indicate an accident on an installation. Reliable and safe operation requires that shippers, storage operators and distributors are able to cooperate even in the event of an accident on the system. The main emergency response document is the NET4GAS Transmission System Option Plan. In cases of prevention of an emergency and in the event of an emergency, the National Gas Network of the Czech Republic is also drawn up. The contingency plan shall be revised and refined on an annual basis. In addition, Decree 344/2012 deals with the procedure for declaring an emergency. Article 13 of Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 establishes a solidarity process during which a Member State is obliged to offer natural gas to the requesting Member State for its solidarity protected by customers. The Czech Government and the Ministry of Industry and Trade, as the competent authority on the basis of the recommendations of the transmission system operator or the Central Gas Crisis Staff, are responsible for providing and seeking solidarity under the forthcoming amendment of the national legislation for the Czech Republic. The priority of the established procedures is to make the most of the application of solidarity to the market and non-market principle, which consists of channelling gas off-take to those final customers who are not protected under solidarity.

Prevention of an emergency

In preventing an emergency in the early warning phase (1st level), the accumulation capacity of both transmission and distribution systems is used, storage operators to investigate the possibility of maximum pumping from storage facilities, as well as miners to verify production possibilities and merchants to verify the possibility of increasing gas imports into the Republic. All of them shall inform transporters without delay of the supply possibilities. A situation of emergency at the early warning stage is notified without delay by the transporter or distribution company to storage operators, gas producers, traders and customers in the area concerned and within one hour from the date of the declaration of the situation to the Ministry of Industry and Trade, the Ministry of the Interior of the Czech Republic and the regional authorities. Emergency commissions and crisis staff are activated. The market operator shall notify all market operators that imbalance settlement will take place in the emergency prevention mode.

In addition, the transporter may declare a state of prevention of an emergency in a state of alert (2nd level) for the entire national territory. The agreed transmission, distribution, delivery of gas to all demand points of Group A customers (customers with gas offtakes above 630 MWh per year) are limited to the extent of their ability to switch to substitute fuel. If the measure is not effective, gas delivery to defined customer demand points may be interrupted. The operator shall notify the transporter or distribution companies and the traders to which those demand points belong of the identification of the sites concerned. The declaration of an alert emergency shall be extended to Český rozhlas in addition to the entities previously mentioned. Nor is it possible to claim compensation for loss of profit in the event of a settlement.

3.3.1.3 Field of crude oil and petroleum products

The main policies and measures to ensure the security of energy supply of crude oil and petroleum products are the following:

- diversifying oil transport sources and routes;
- securing emergency oil stocks.

Of course, the safety of crude oil and petroleum products is broader than the above. An in-depth analysis in this document is not useful and is dealt with in more detail in other materials. For example, some more detailed information on the state of play is available in the Report on the Development of the Energy Sector in Oil and Petroleum Products72.

Securing emergency oil stocks can be considered one of the main energy security measures. In Czech law, the obligation to create and maintain emergency stocks of crude oil and petroleum products is laid down in Act No 189/1999 on emergency oil stocks, on dealing with oil emergencies and amending certain related acts (the Emergency Oil Stocks Act), of 29 July 1999, as amended. Section 2, which deals with the building up and maintenance of emergency stocks, provides in paragraph 2 as follows: 'Emergency stocks are created and maintained by the Administration of State Material Reserves from crude oil and selected petroleum products at least equivalent to 90 days of average daily net imports of the reference year.' In this respect, Decree No 165/2013 on the types of oil and the composition of petroleum products for storage in emergency oil stocks, on the calculation of the level of emergency oil stocks, on storage facilities and on reporting emergency oil stocks is an important implementing regulation.

3.3.1.4 Heat sector

To date, the transformation plan for the sector was largely based on the replacement of coal with natural gas and, to some extent, on the use of energy from waste and biomass. Thereafter, natural gas will be gradually replaced by low-carbon heat sources with the objective of achieving carbon neutrality by 2050. At the same time, the share of district heating in the Czech Republic (in the housing sector) is among the highest in the EU. This represents a very good starting point and an opportunity to effectively and systemically address the overall decarbonisation of heating. Thus, existing systems can enable the efficient integration of decentralised sources (e.g. heat pumps, solar panels), provide flexibility in heat production (and electricity) and provide overall energy services to existing and new customers. This opportunity needs to be used in cooperation with all stakeholders (cities/municipalities, customers, heating companies) to make the necessary adjustments.

First and foremost, strategic planning of consumption and heating at city level is a key element of the heat transition. This is an essential condition for the efficient decarbonisation and transformation (not only) of the heat sector. In the next step, the transophmation of the heat sector must be based on the principle of energy efficiency first, i.e. based on a gradual reduction in final consumption, inter alia in relation to the Long-Term Building Renovation Strategy, but also on savings in industry and heat distribution. Subsequently, the heat transition (in the wider corner of heating) is based on a diversified use of energy sources, first of all using all waste heat options, followed by local renewable energy sources (solar energy, sustainable biomass) and, as a next step, other energy sources (natural gas and others).

72 This document is available in electronic form at: https://www.mpo.cz/cz/energetika/statni-energeticka-policy/message-o-development-energy-sector-v-region-ropy-a-ropny-product-za-year-2016--235988/

The 3 rd (and 4th) generation SZTEs are complex systems that are also interconnected to the electricity system and involve a large number of actors. A coordinated and participatory approach by these actors (cities, heating plants, industry, customers) will thus be crucial for a successful heat transition.

The area of energy security can be seen from several perspectives. The primary objective of users (customers) of the heating sector is primarily to ensure a stable supply of thermal energy. From the point of view of operators of heating resources and heat supply systems, ensuring entry conditions are such that their business in the sector is predictable and ultimately carried out at a profit.

The following areas have been identified as primary objectives (or trends) in the field of heating, in line with the National Strategy Papers:

– diversification of energy sources and decentralisation of inefficient systems;
– flexibility in the supply of electricity and other products or services.

Diversification and decentralisation of resources

Based on the NSPs, a higher degree of diversification of heat sources is expected in the future due to the gradual replacement of coal (as one of the primary fuels in the heating sector for larger sources) with so-called alternative fuels. Namely, an increase in the utilisation ratio:

– waste for energy purposes;
– biomass;
– natural gas.

In individual strategic documents (for example, the Biomass Action Plan 20122020 in the Czech Republic), the heating sector is mentioned as one of the sectors with high biomass utilisation potential, which should help to replace coal at least partially. Priority should be given to the use of local biomass resources, in particular:

– residual biomass types;
– targeted biomass;
– biodegradable municipal waste.

Biomass potential can be seen both in individual heat production and in the case of central heat sources in the high-efficiency CHP area.

In case of inefficient systems, they can be expected to be degraded into smaller units, in particular by using cogeneration units.

At the same time, the Strategy Papers refer to efforts to switch most of the sourcing resources to high-efficiency cogeneration where technically possible and economically advantageous.

The diversification of supply chains and the elimination of dependence on Russian supplies also play an important role.

Flexibility of supply of electricity and other products and services

In the context of the ongoing decentralisation of electricity sources, the overall flexibility of the energy system will need to be ensured. From this perspective, heat sources should be more involved in the provision of ancillary services at both distribution and transmission system level.

At the same time, thanks to the possibility of using CHP, generation sources contribute to flexible electricity supply, while technologies such as electrocotters and heat pumps have the potential to increase the controllability of the power generation/consumption side.

Last but not least, the development of the market should also be mentioned not only for heat and electricity but also, for example, for cold.

3.3.1.5 Area of long-term supply of nuclear materials and fuel

In the context of the Czech Republic's State Energy Policy, the following instrument is defined in the section on instruments in the area of State administration: "Setting mandatory security standards for the supply of gas and nuclear fuel stocks in accordance with the legislation in force, proportionate to the expected security of supply situation and the international situation".

In accordance with the requirements of the Czech Republic's current State Energy Concept and subsequent strategies and priorities (including the National Action Plan for the Development of Nuclear Energy in the Czech Republic), the target safety standard is defined as: 'The need to secure the supply of nuclear fuel or to create such conditions (technical, commercial, licensing) for the supply of nuclear fuel, guaranteeing the nominal operation of all units at all sites of nuclear power stations over a period of four years.' The 2040 Strategy further states in the energy security priority for this objective: "To achieve this objective in time to increase the share of nuclear energy to the target level of 50-60 % of final consumption".

In 2018, the 'Nuclear Fuel Security of Supply Standards' was prepared, containing a description of the state of play and expected development of nuclear fuel reserves for individual plants, which was discussed in part by the technical and investment working group of the Standing Committee on Nuclear Energy and the Standing Committee on the Construction of New Nuclear Resources in the Czech Republic73. This material will be dealt with on request by the Standing Committee on Nuclear Energy and the Standing Committee on the Construction of New Nuclear Resources in the Czech Republic. For more information on the current state and outlook for ensuring long-term supply of nuclear fuel, see section 4.4.1.8.

3.3.1.6 Cybersecurity in the field of energy

The energy sector is the intermediary of an essential function of the State. It is therefore a high-priority sector from the point of view of security and the requirements to maintain the functioning of the sector are therefore crucial. In this regard, both the energy sector and individual sub-sectors have been classified under the regulation of Act No 181/2014 on cybersecurity from the very beginning of its effectiveness. The National Cyber and Information Security Office (NÚKIB) is the governor of this Act and its implementation. The implementation of Act No 181/2014 on cybersecurity and Decree No 82/2018 on cybersecurity, which specify the specific obligations to be fulfilled by the relevant entities, can therefore be identified as the main measures in the field of cybersecurity. The cybersecurity of their organisations is thus ensured by entities by fulfilling the obligations imposed on them by the Cybersecurity Act and Decree No 82/2018 on cybersecurity, depending on the nature of the entity.

When assessing whether a system is critical and therefore its administrator should be classified as obliged entities under that law, the implementing legislation lays down criteria. These constitute, in particular, certain limits to the impact of breaches of information security in those systems, which need to be taken into account.

Act No 181/2014 on cybersecurity came into force in 2015 and its main objective is to improve the cybersecurity of the Czech Republic, especially in the most critical areas. In the energy sector, these are mainly essential pipelines or power plants. The objectives of a critical so-called critical information infrastructure are to capture information and communication systems that build on these physical elements (critical infrastructure). Indeed, a breach of the information security of those information or communication systems could have significant negative effects on the functioning of critical

73On 18 February, Government Resolution No 132 amended the Statute, including a change of name.

infrastructure elements.

In 2016, the European Commission adopted Directive 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union (the so-called NIS Directive). In relation to energy, the NIS Directive redefines the concept of an operator of an essential service. Following the transposition of the NIS Directive into national law, this becomes another obliged entity within the meaning of Act No 181/2014. The introduction of the basic service operator in the Czech legal environment has led to an extension of the scope of obliged entities in the energy sector. The impact values required for the inclusion of the management of the information system under the regulation of Act No 181/2014 are lower in relation to that institute than in the case of critical information infrastructure.

The NIS Directive obliges Member States to regulate within the energy sector three sub-sectors of electricity, oil and gas. The Czech Republic has included the heating sector in addition to the mandatory sub-sectors. The actual criteria for determining the operator of the basic service and the basic service information system are then laid down in Implementing Decree No 437/2017 on criteria for the designation of the operator of a basic service, as amended. A different formal process of identifying these systems by the NÚKIB would also be adopted compared to the critical information infrastructure. It does so, unlike critical information infrastructure, by issuing, ex officio, a decision in an administrative procedure initiated by the NÚKIB itself.

ii. Regional cooperation in this area

In the field of gas, regional cooperation in this area takes place, inter alia, on the Platform for the preparation of the Gas Regional Investment Plan for Central and Eastern Europe (CEE GRIP). Furthermore, meetings at the level of the Gas Coordination Group can be mentioned. Furthermore, regional cooperation follows from the Gas Security of Supply Regulation, which enshrines the principle of solidarity and the development of regional risk analysis chapters, preventive action plans and emergency plans. In the field of electrical energy, the issue is addressed in a number of existing structures, such as cooperation at ENTSO-E level. Regional cooperation on energy security is likely to be further strengthened on the basis of the Regulation on security of electricity supply, which was part of the ‘Clean Energy for All Europeans’ legislative package. Other forms of cooperation may be mentioned in the context of regional cooperation in the gas sector, such as: Gas Regional Initiative of the SSE and various pan-European working groups at ACER, CEER or ENTSO-G.

iii. Where applicable, financial measures at national level in the area concerned, including Union support and use of Union funds

Financial measures in the field of energy security at national level, including EU support and the use of EU funds, are mainly linked to financial measures related to the development of electricity and gas infrastructure. This information is more declassified in Chapter 3.4.

Dimension ‘Internal energy market’ 74 75

3.4.1 Electricity infrastructure

i. Policies and measures to achieve the targeted level of interconnectivity as set out in point (d) of Article 4

74Policies and measures shall reflect the energy efficiency first principle.
75The permanent shutdown of V280 management is carried out in 2023.

The overarching objective of interconnection of the transmission system of the Czech Republic corresponds to maintaining the import or export capacity of the transmission system in relation to maximum load at a level of at least 30 % and 35 % respectively. This is in line with the 15 % interconnectivity target by 2030 (linked to installed capacity). The Czech Republic currently meets this objective with a relatively significant margin and it can be expected that this will continue in the future (see Chapter 2.4.1 and Chapter 4.5.1). Therefore, the Czech Republic does not consider it necessary to have specific policies and measures to achieve this objective.

The assessment of the anticipated export and import capacity of the Czech Republic's transmission system and its sufficiency for commercial exchanges and, in particular, for the safe operation of the transmission sculpture is carried out periodically, both in the context of the preparation of the 10-year plan for the development of the Czech Republic's transmission system and in cooperation with the 10-year development plan at ENSTO-E level. In the above-mentioned development plans, ČEPS is preparing system measures in the medium and long term that will ensure the required sufficient transmission capacity and help maintain the reliable, safe and efficient operation of not only the PC of the Czech Republic but also the entire European interconnected system. In particular, in the context of strengthening profiles, for example:

- strengthening the international profile with Slovakia in order to lighten the overloaded Nošovice (CZ) – Varín (SK) profile while increasing the cross-border transmission capacities with Slovakia. The reinforcement is part of the conceptual solution for the planned shutdown of the existing intermediate lines V280 [75] (Sokolnice (CZ) – Senice (SK)) and V270 (Lískovec (CZ) – P. Bystrica (SK)) from operation.
- strengthening international profiles with Poland, Austria and Germany, which is the subject of further studies and is the subject of further development of the PSC and cooperation with the surrounding TSOs.

Another aspect affecting the development of transmission system capacities on border profiles, which it is worth mentioning in this context, is ČEPS's strategy of replacing the 220 kV system with the 400 kV system. For more information see also chapter 4.5.2.

ii. Regional cooperation in this area76

In line with Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, the development plan is also reflected in the content of the regional investment plan of the CEE region at a two-year interval. Therefore, many of the upcoming ČEPS development investment actions are part of the CEE Regional Investment Plan 2022 and are included in the European Transmission System Development Plan 2022, which is subject to an assessment according to the criteria set out in its preparation.

One of the cooperation initiatives is the Electricity neighbours initiative. Electricity neighbours is an initiative created in 2015 on the basis of a joint statement prepared by the German Federal Ministry of Economic Affairs and Energy in cooperation with the European Commission and the countries of the Pentalateral Energy Forum. The group consists of Germany, France, the Benelux countries, Denmark, Italy, Norkso, Sweden, Poland and the Czech Republic. The Declaration underlines the importance of the internal market as the most economic means of ensuring security of supply.

The real evolution of operational security in the regions and the response to blackouts in Western Europe in 2006 led to the creation of ad-hoc coordination platforms (Coreso, TSC, SSC) aimed at ensuring operational coordination between the dispatch offices of the participating TSOs.

Over the years and with the increasing need for coordination, inter alia due to the growing share of

76Non-European regional groups dealing with PCIs established under Regulation (EU) No 347/2013 (replaced by new Regulation 2022/869 of 30 May 2022).

intermittent electricity sources in the interconnected European system, cooperation between TSOs has become much more coherent and detailed.

In June 2017, TSCNet and Coreso, as the two future RSC (RSC) entities in accordance with the SO GL (System Operation Guideline), signed a framework cooperation agreement.77 This means sharing means, methodologies and tools, joint or alternating service provision and the development or development of new services and assets. The adopted SO GL Regulation, together with the CACM (Capacity Alocation and Congestion Management Guideline) and the NC ER (Emergency Restoration Network Code) Regulation, sufficiently define the mandatory cooperation of TSOs with regional security coordinators.

On 23 January 2019, in accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure, the Czech Republic's ACONproject of common interest was approved. Under the CEF financial instrument, E.ON Distribuce, a.s. and Zapadoslovenská Distribučná, a.s. received EUR 91.2 million from the European Commission for an international smart energy system project ACON Smart Grids. This is the first-ever distribution company project in the Central and Eastern Europe region that succeeded in the EU's projects of common interest (PCI projects). In addition to distribution companies, ACON is supported by transmission system operators in the Czech and Slovak Republic – ČEPS, a.s., and by Slovak elektrizačná prenosová sústava, a.s. and other partners. Work on the modernisation of distribution networks will start already this year in both countries and will continue until 2024. This project, implemented in the Czech Republic by E.ON Distribuce, a.s., aims at modernising and increasing the efficiency of the distribution system and enhancing cross-border cooperation between Slovakia and the Czech Republic. Thanks to the project, smart technologies will be introduced into the distribution grid to help regulate energy exactly according to consumption and will allow for a greater involvement of renewables in the future. Investing in smart grids will increase stability and security of supply as well as economic efficiency of networks, while improving the remote management of networks. All this to prepare the distribution grid for the next decade to enable the connection of electric cars, batteries and other devices that will become part of everyday life.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Investments in the electricity stack can be considered very important, including in relation to the use of EU funds. The reason for these investments is, in particular, that a significant part of the generation resources and the electricity system is 35 years old or more and requires adequate investments in maintenance, renewal and modernisation. There is also a need to adapt to new technologies and further technological developments, both on the resource and consumption side. Electricity grids should be continuously upgraded to allow for the further development of new electricity generation sources (increase of free connection capacity). In addition to the EU funds, the Czech Republic also benefited from CEF funding. Absorption from the CEF programme is possible in a point for the Czech Republic in accordance with the inclusion of Czech projects in future new lists of PCIs.

The actual use of Structural Funds can be summarised as follows. To date, eight projects with a total value of CZK 1 609 million have been approved in favour of increasing the modernisation and capacity of the transmission system; the EU contribution amounts to CZK 643 million, as at 21. 3. CZK 23 million was paid for three projects. In the area of modernisation and capacity of distribution systems, seven projects are currently being administered with a total project expenditure of CZK 289 million, of which the EU contribution is CZK 116 million. The sub-area of transmission, distribution and storage of

77In this regard, it is relevant to mention Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal market for electricity, which, in the context of Article 35, legislates the so-called regional coordination centres, which should replace RSC entities.

electricity and modernisation of energy infrastructure is supported in the 2014-2020 period under the OP PIK, namely under Priority Axis 3, Investment Priority 3, Development and deployment of smart distribution systems operating at low and high voltage levels, SC 3.3 'Increasing the application of smart grid elements in distribution systems'.

According to the OP PIK programming document, the total allocation to investment grants for this investment priority amounted to EUR 37 million K 21. 3. In 2018, a total of three applications were approved with a total investment grant of CZK 152.641 million. There was also less interest in subsidies for the construction of smart electricity networks, which should cover the expected significantly higher integration of decentralised resources into the system and the introduction of new demand management services. However, the interest of regulated entities is closely linked to the set V regulatory period.

In 2017, the European Commission approved a request to amend or remove the share for large enterprises in SO 3.2, 3.3 and 3.5. This should ensure a higher absorption capacity. The OP PIK supports increasing the application of smart grid elements (Smart Grids I – distribution networks) and strengthening the energy security of the transmission system (Smart Grids II – transmission grids).

3.4.2 Natural gas and hydrogen transmission infrastructure

i. Policies and measures related to the elements set out in point 2.4.2, including, where appropriate, specific

measures to ensure the implementation of Projects of Common Interest (PCI) and other major infrastructure projects

Since 2017, when Commission Regulation (EU) 2017/459 of 16 March 2017 establishing a Network Code on Capacity Allocation Mechanisms in Gas came into force, transmission system operators on each side of the entry-exit system border under that Regulation have cooperated in the process of assessing the market demand for incremental capacity and in carrying out technical studies on incremental capacity projects for their joint interconnection points.

The last assessment of market demand on the basis of the above mentioned Regulation took place in 2021 and resulted in the start of the preparation of an incremental capacity project on the Czech-Polish border (TRA-N-140) on which NET4GAS, s.r.o. cooperated with the Polish transmission system operator GAZ-SYSTEM, S.A.

During the preparation of the project, the General Court of the Court of Justice of the European Union issued its judgment of 16 March 2022, in joined cases T-684/19 and T-704/19, which declared Chapter V of Commission Regulation (EU) 2017/459 setting out the parameters of the incremental capacity process unappliable. This has led to legal uncertainty throughout the process, leading to the absence of a coordinated decision by the NRAs on the forthcoming Czech-Polish gas interconnection project (TRA-N-140), bringing the incremental capacity process on the Czech-Polish border to an end.

TSOs are now discussing the way forward at both European and national level and with the involvement of national regulatory authorities. In any event, according to the legislation in force, market participants may at any time initiate the implementation of an incremental capacity project at a given border to the transmission system operators and the relevant TSOs will address this initiative.

Furthermore, it is possible to implement non-commercial infrastructure projects that meet the criteria for inclusion in the so-called list of projects of common interest (PCI) under Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022[78]laying down new guidelines for trans-

78Projects of common interest are continuously updated and the indication of these specific projects in the

European energy infrastructure and repealing, inter alia, Regulation (EU) No 347/2013. These projects can then benefit from certain benefits resulting from this Regulation and from obtaining PCI status. The last type of projects are national projects governed by Act No 458/2000 on business conditions and the performance of state administration in the energy sectors and amending certain acts (the Energy Act).

ii. Regional cooperation in this area[79]

Context of regional cooperation

The Czech Republic produces only 2 % of its natural gas consumption and is therefore dependent on imports from third countries. Sufficient diversification of transmission routes (Gazelle pipeline and reverse gas flows at border transfer points), together with the liberalisation of the market, has led to the currently very well-guaranteed security of gas supply for domestic customers. At the same time, the transmission system operator in the Czech Republic is an important gas transit agent for markets in Western, Central and Southern Europe. It is currently not possible to determine precisely the impact of decarbonisation in the European and Czech context on the Czech gas network and the concrete information on how this network will be used with a view to minimising the sunk costs of the transmission system operator. Technological solutions for the decarbonisation of the gas sector on a large scale are not currently being developed in both the EU and the Czech Republic, and it is therefore appropriate to keep this infrastructure for future use for both natural gas and new types of gases. A combination of natural gas with CCS or CCU technology for the storage or utilisation of carbon generated by the fission of natural gas may be considered. Another trend is the decarbonisation of the gas sector. The expected impact of decarbonisation in the European and Czech context on the gas network will consist of the storage of different renewable gases and low-emission gas types. Deployment is likely to evolve at different paces across the EU, but the application of technologies to new gases is expected already in the 2030 horizon. The revision of the Gas Regulation and Directive, as part of the Gas Package, aims to facilitate the increased uptake of renewable and low-emission gases through the development of hydrogen infrastructure to complement the natural gas network. At the same time, natural gas will be partially replaced in the gas system by other gases (e.g. hydrogen, biomethane, synthetic methane). Keeping existing gas infrastructure for future use for both natural gas and new types of gases, including hydrogen, will be the most cost-effective option. At the same time, a combination of natural gas with CCS or CCU technology for the storage or utilisation of carbon generated by the fission of natural gas may be considered. For this reason, it is likely that in the longer term there may be a need to ensure the use of gas infrastructure also for the transport of CO_2 to sites where carbon will be stored or used, including outside the Czech Republic. The use of synthetic methane, biomethane and hydrogen as a partial substitute for natural gas is another European trend, building on the European Hydrogen Strategy, the FIT for 55 package, the Gas and Decarbonisation Package as well as the REPowerEU Plan. Concrete decisions on the application of technologies to new types of gases can be expected in the 2020-2030 horizon and will depend very much on the research and development of these technologies and the economies of scale in their deployment.

Regional cooperation in the field of natural gas

In the field of natural gas, there is micro- and macro-regional cooperation at several levels. Within the Gas Coordination Group, which meets regularly around a year, EU Member States discuss security, legislative and economic issues related to the gas sector in the EU.

Regional infrastructure cooperation is strengthened at operational level through the implementation of PCI projects, which are regularly discussed in smaller geographical groups.

National Plan does not mean that these projects can be considered binding.

79Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

The revised Security of Gas Supply Regulation (2017/1938) created Risk groups to implement regional risk management. Countries discuss factors that could threaten the stability of gas supply in the future and are looking for ways to mitigate risks. The Czech Republic is an active member of three regional groups, namely Ukrainian, Baltic and Belarus. Furthermore, a so-called "Solidarity" mechanism has been created, which obliges states to cooperate more closely with their neighbours in the management of crisis situations and to codify the mechanism to provide cross-border assistance in the event of gas disruptions to protected customers.

The V4 Gas Forum is regularly organised by the V4 Presidency countries (in the Czech Republic under the responsibility of the Ministry of Industry and Trade). The content of the meeting is always fully within the competence of the Presidency, but the central motive is to discuss the possibilities for regional cooperation in the field of gas infrastructure development and to find a common position on the legislative proposals currently being discussed by the Council of the EU. The new V4 Gas Forum discusses the legal and operational aspects of the implementation of Solidarity.

It is also the so-called "Budapest Process", a V4+B4+ meeting platform. This platform is still a relative novelty and it is currently difficult to estimate how the initiative will develop and/or have a specific focus.

Preparedness and regional cooperation in hydrogen transport

In the future, according to the Czech Republic's Hydrogen Strategy ('the Strategy'), the Czech Republic is expected to have to import hydrogen from countries where the conditions for the production of renewable hydrogen are more favourable. Infrastructure will need to be developed for hydrogen imports and hydrogen could replace current imports of natural gas and oil. The strategy further states that the Czech Republic can be a major player in the field of hydrogen transport from south to north and east to west. However, this requires timely preparedness of our gas transmission system for the transport of hydrogen. Due to its favourable geographical location, the Czech Republic can play an important role in the future transit of renewable and low-carbon gases.

The transmission system operator NET4GAS shall examine and explore the possibilities of its infrastructure in order to define its readiness to transport mixtures of gas with different concentrations of hydrogen and transport of clean hydrogen. Internal technical hydrogen readiness activities fall under the long-term H2 Readiness (H2R) programme, which aims to capture the technical, strategic, commercial, legislative, regulatory, financial and organisational areas needed to prepare the transmission system for the hydrogen future. This will very likely include, in the medium term, both the transport of a blend of hydrogen and natural gas and the transport of pure hydrogen in separate pipelines. The basis for exploring technical readiness is the categorisation of more than 90 thematic areas relevant for technical hydrogen readiness, ranging from components of the type of regulatory armament to activities such as leakage detection, to the methodology for calculating wall thickness of new hydrogen-compatible pipelines. The proposal for a revision of Regulation (EC) No 715/2009, currently under the legislative process in the so-called trilogue between the European Commission, the European Parliament and the Council of the EU, obliges transmission system operators to accept up to five percentages by volume of hydrogen at cross-border interconnection points from October 2025. Whether this obligation will be part of future legislation in force depends on the outcome of the trilogue negotiations, which is likely to be concluded by the end of 2023.

Experience across European Transmission System Operators (TSOs) has shown that blending hydrogen with natural gas in the volume of lower percentage units does not require major infrastructure adaptations. However, this hypothesis needed to be verified in detail in order to take into account the technical specificities of the Czech transmission system. Under the H2R programme, for example, for the 5 % threshold, the vast majority of all relevant topics have already been analysed with the following result: More material adjustments will only be needed in the area of commercial measurement, where part of the measuring instruments will have to be replaced – either because of the inability to identify or continue to process hydrogen (e.g. certain process gas chromatographs and converters) or because hydrogen compatibility has not been confirmed by the manufacturer (e.g. some older rotary and turbine meters). Minor modifications will apply to compression machines (e.g. reset of combustion control software or replacement of o-rings for blowers), lubricants and sealants, or sleeves on purging pistons.

In addition to internal and national activities, the TSO also addresses this topic at international level. For example, the TSO is involved in the initiative of a group of 31 European gas infrastructure operators from 28 European countries with a vision for the creation of hydrogen transport infrastructure, the so-called European Hydrogen Backbone. The study resulting from this initiative is not binding, but mutual cooperation, discussion and knowledge sharing within the involved European gas system operators is an invaluable source of information for the future gradual transformation of the current gas transmission infrastructure into hydrogen.

At the same time, the TSO was involved in the Central European Hydrogen Corridor (CEHC), the SunsHyne Corridor (SunyHyne Corridor) and the Czech-German Hydrogen Interconnector CGHI initiatives. The aim of the Central European Hydrogen Corridor and SunsHyne Corridor projects is to implement the "Reurposing" part of the infrastructure between the Lanžhot and Waidhaus border points (DN 1000+, ca 400 km) in the southern part of the Czech transmission system so that it is able to transport clean hydrogen. For the Czech-German Hydrogen Interconnection, Repurposing aims to implement the part of the infrastructure between the border points Brandov and Waidhaus (DN 1400, ca. 170 km) in the western part of the Czech transmission system.

These projects were nominated as candidate projects for the emerging list of Projects of Common Interest (PCI) and Projects of Common Interest (PMI) in accordance with the revised Regulation 2022/869 (TEN-E).

The aim of these initiatives, in cooperation with Central European gas companies, is to build a hydrogen "motorway" across Central Europe, which should serve to transport hydrogen from future production areas in Ukraine, North Africa, Baltic and Northern Germany, which, according to the initiatives, offer excellent conditions for its massive organic production. Hydrogen corridors shall enable the transport of hydrogen between its production facilities and its consumers in the Czech Republic and in other States along the corridors.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

For infrastructure projects with PCI/PMI status it is possible to receive financial support from the Connecting Europe Facility (CEF) under the revised Regulation 2022/869 (TEN-E) in the current programming period 2021-2027. In this respect, e.g. natural gas infrastructure Repurposing/retrofit projects can be supported. The transmission system operator NET4GAS has nominated two projects for the emerging list of Projects of Common Interest (PCI) and Projects of Common Interest (PMI). These are the Czech-German Hydrogen Interconnector (CGHI) projects and the Central European Hydrogen Corridor (CEHC). The area of natural gas infrastructure repurposing/retrofit will also be financially supported in the period up to 2030, e.g. through the Modernisation Fund.

Following the publication of the REPowerEU plan, it is currently possible to receive support from the Recovery and Resilience Facility (RRF) for infrastructure projects that are in line with the REPowerEU objectives set out in Article 21c) of Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility, as amended. These objectives include, for example, supporting infrastructure projects to ensure security of supply, diversifying sources and transport routes.

3.4.3 Market integration

1 . Policies and measures related to the elements set out in point 2.4.3

2 .4.3.1. electro-energy

The Czech Republic's policies and measures in this area primarily pursue the international dimension of EU legislation, namely Regulation 2015/1222 (CACM), Regulation 2016/1719 (FCA), Regulation 2016/2195 (EBGL), 2017/1458 (SOGL) and the resulting conditions and methodologies. In particular, the MCO plan, see chapter 2.4.3, which is binding on all NEMOs within the EU.

As part of the cooperation of all NEMOs in the EU, a plan for the joint deployment and performance of the MCO functions for day-ahead and intraday electricity market coupling – the MCO plan – was first developed in June 2017. It laid down governance and cooperation rules between NEMOs, defines the relationship with third parties, and further describes the transition of existing day-ahead and intraday interconnected market initiatives to the single connected day-ahead and intraday interconnected market.

In addition, following the CACM, the following methodologies have been developed by NEMO: (I) the product methodology that NEMOs may include in single day-ahead and intraday coupling; (II) a substitution methodology; (III) the methodology for harmonised maximum and minimum clearing prices and the methodology for the matching algorithm for day-ahead linked markets and continuous trading matching. These methodologies shall be kept up to date with the requirements of electricity market participants or the Agency for the Cooperation of Energy Regulators (ACER).

Market for long-term transferor rights

The Czech Republic, through the transmission system operator ČEPS, a.s., has been using the single EU platform for allocating long-term financial transmission rights under harmonised rules for several years. 80At the same time, it is already possible to obtain financial transmission rights of the type of option at all borders of the bidding zone. Financial transmission rights shall be offered in the form of annual and monthly products.

Thus, for the coming period, the main objective of the Czech Republic and ČEPS, a.s. is to establish a coordinated calculation of cross-border transmission capacities for the long-term timeframe in the Core region in Q4/2024.

Day-ahead electricity market integration

The MCO Plan identified the Price Coupling of Regions (PCR) project based on the cooperation of power exchanges as a technical solution to enable day-ahead market integration. OTE, a.s., has been a full member of the project since 2013 and is therefore involved in developing this solution.

The PCR project provides a unified algorithm known as EUPHEMIA and unified operating procedures for the efficient pricing of electricity and the use of cross-border transmission capacity. In particular, the main aspects of the evolution of the algorithm in recent years and as a follow-up were:

- Geographical distribution and natural market growth;
- Switching from the NTC to the Flow-Based Capacity Calculation Method;
- The possibility of having multiple NEMOs in one bidding zone;
- The requirements of the CACM for the algorithm;
- New requirements from stakeholders;
- Changes to the topology of the network.

80 For more information see https://www.jao.eu/

In the coming years, further intensive research on this algorithm is planned to ensure sufficient quality, robustness and stability of the algorithm for the single day-ahead market in Europe, in line with the set of requirements for the matched day-ahead market matching algorithm.

Figure 2: *State of play of interconnected day-ahead electricity markets in Europe*

Source: OTE, a.s.

Until June 2021, there were two parallel projects and equivalent projects in the framework of the implementation of the CACM: Multi Regional Coupling ('MRC') and 4M Market Coupling ('4M MC'). The full market connection of these projects on 17 June 2021 concluded the so-called DE-AT- PL-4M MC project, otherwise Interim Coupling.

Project ('ICP'). The ICP introduced implicit capacity allocation based on the NTC method at 6 borders (PL-DE, PL-CZ, PL-SK, CZ-DE, CZ-AT and HU-AT border). This completes the integration of the Single Day-Ahead Coupling (SDAC).

The completion of the ICP in 2022 was followed by the implementation of market coupling under the Core FB MC project based on flow-based capacity calculation.

Flow-based MC is a method in which physical grid limits are based on available capacities on critical network elements and power transmission distribution factors defined for each critical element and each bidding zone within the Core CCR.

These factors describe how the change in balance (import/export difference) of each bidding zone changes the energy flow through each single critical element. The computational market coupling algorithm then seeks optimal energy flows between bidding zones. Compared to the NTC method used in the past to calculate cross-border capacity, the FB method increases the overall societal benefit. The FB method is more sophisticated, takes into account multiple parameters and optimisation conditions and therefore better reflects the real-world conditions of the network.

The flow-based capacity calculation method is required under Article 20 of Commission Regulation 2015/1222 laying down guidelines on capacity allocation and congestion management (CACM

Regulation) and constitutes an important part of the European target model achieved precisely by bringing the Flow-Based method into operation on 8 June 2022.

Intraday electricity market integration

With the increasing amount of ad hoc renewable generation such as solar and wind power, market participants are increasingly interested in trading in intraday markets. The main reason for this is the increasingly difficult balance to be maintained after the closure of the day-ahead market. Achieving a balanced position as close as possible to an hour of supply benefits both market participants and energy systems. This also contributes to reducing the need for reserves and related costs to maintain the stability of the energy system.

SIDC (Single Intraday Coupling) is Europe-wide cross-border intraday coupling, responding to market needs by creating a transparent and more efficient continuous trading environment that allows market participants to easily trade their intraday positions across EU markets without the need for explicit allocation of transmission capacity. An integrated intraday market increases the overall efficiency of intraday trading by:

- the promotion of effective competition;
- increasing liquidity (i.e. increasing the ease with which energy can be bought and sold quickly without affecting its price);
- enabling easier sharing of production resources across Europe; and
- possibilities for market participants to react more easily to unexpected changes in consumption and to shortfalls.

SIDC is a joint initiative of nominated electricity market operators (NEMOS) and transmission system operators (TSOs), enabling continuous cross-border trade across Europe. This is a continuation of the XBID (cross Border Intraday) project, which presented in June 2018 a technical solution for the creation of a single intraday market through the intraday continuous trading platform. SIDC enables the integration and expansion of energy networks across Europe.

This technical solution was launched on 12 and 13 June 2 018 in 14 European countries, and one year later, the project parties announced a successful first year of operation.

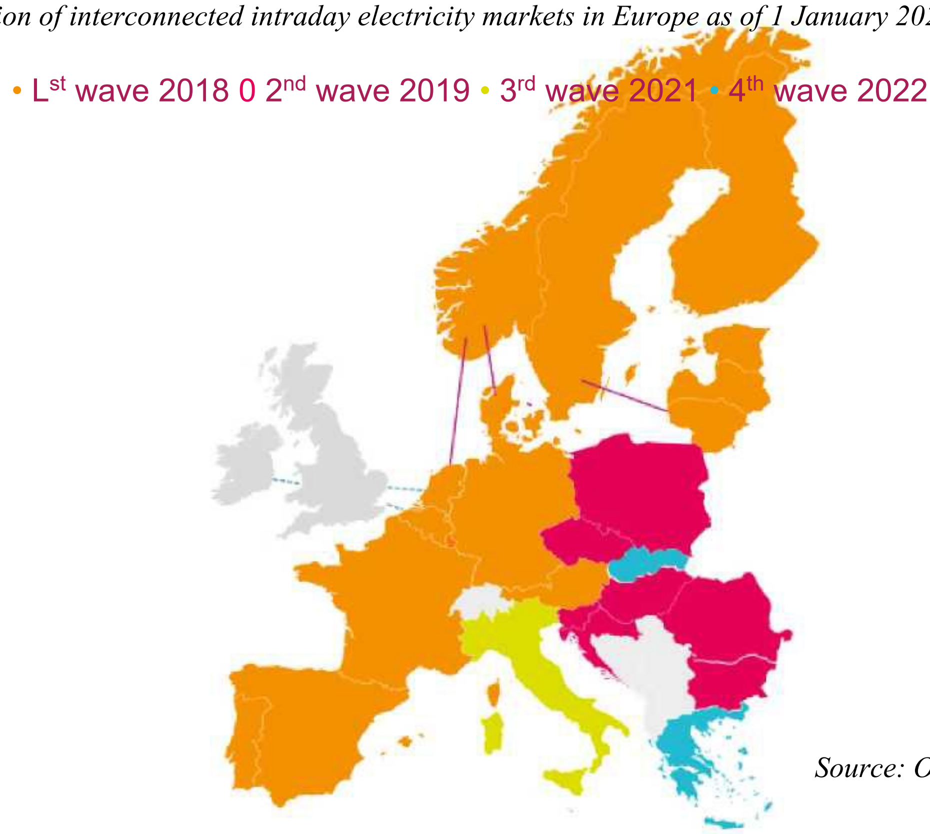
On 19 and 20 November 2019, OTE, a.s., as NEMO in the Czech Republic and ČEPS, a.s., as the transmission system operator of the Czech Republic, together with similar entities in six other countries of Europe, joined the SIDC as part of the second launch wave. This has resulted in an overall interconnection of 21 countries and is a very important milestone in the operation of the intraday market in the Czech Republic.

Following the Czech Republic's successful involvement in the European interconnection of electricity intraday markets (SIDC), a further significant change occurred in the intraday market in June 2020, extending trading in the intraday electricity market up to 5 minutes before the start of the hour of delivery. Italy's connection to SIDC was also successful in mid-2021. Transmission system operators of the United Kingdom of Great Britain and Northern Ireland k31. 12. 2020 have ceased their activities in the SIDC project due to the consequence of the so-called Brexit.

Due to Slovakia's involvement in SIDC, a so-called local implementation project under the SIDC by nominated electricity market operators and transmission system operators from Slovakia, the Czech Republic, Poland and Hungary was launched in 2020 to include the borders between Slovakia and the Czech Republic, Slovakia and Hungary and Slovakia and Poland in the interconnected intraday market at the end of 2022. This link was successfully completed on 29 November 2022.

In the area of the calculation of intraday cross-border transmission capacities, a coordinated calculation shall be progressively implemented as possible taking into account the agreement of all States, TSOs, NEMOs, NRAs and ACER respectively.

Figure 3: *Situation of interconnected intraday electricity markets in Europe as of 1 January 2023*



Source: OTE, a.s.

Balancing services market

Over the past period, the Czech market for balancing energy and balancing reserves has gradually been integrated with the market in the European Union:

- The introduction of European, harmonised price caps for balancing energy.
- Introduction of a European, standard balancing energy product (RR) from replacement reserves in 2020.
- Launch of the European platform for the exchange of balancing energy TERRE[81] in 2020. The Czech Republic was the first country to use the platform.
- Introduction of European, standard balancing energy products from frequency restoration reserves with manual (mFRR) and automatic activation (aFRR) in 2022.
- Launch of the use of the European platforms for the exchange of balancing energy PICASSO[82] and MARI[83]. The Czech Republic was the first country to use the platforms in 2022.
- Introduction of marginal pricing of standard balancing energy products in 2022.
- Implementation of the imbalance settlement system in accordance with Commission Regulation (EU) 2017/2195.
- Interconnection of the national market for reserves for automatic frequency control (FCR) with 11 additional TSOs in Q1/2023. The Czech TSO purchases all its necessary volumes on this day-ahead market.
- A simplified certification process for the provision of balancing services for serially produced power equipment is in place from Q3/2023.
- Baseline introduced to evaluate the flexibility provided on installations up to 30 MW installed capacity at all voltage levels from Q3/2023.

The Czech Republic will follow up on the changes already made in the coming periods by further amendments to provide it with extended balancing services compared to the current situation. The objective is to enable the integration of the decentralised energy through an implicit and in particular an explicit aggregator and to prepare for the risk of shutdown of fossil fuel fired plants, which now provide a large part of balancing services, without sufficient flexibility from non-fossil installations in the electricity system of the Czech Republic:

- Joint procurement of FRR with automatic activation of the balancing service (aFRR) with Austria and Germany in 2025.
- Central Management of Cross-border Transmission Capacity Management Function for the European Regulatory Energy Market in Q4/2023.
- Rules for the legislative anchoring of an independent aggregator in 2024.
- The calculation of cross-border transmission capacities for the balancing energy market timeframe shall be coordinated with the other TSOs of the Core capacity calculation region.

3.4.3.2. Gas

The Czech Republic intends to help complete the internal energy market, namely the internal gas market by removing narrow infrastructure throats between the Czech Republic and its neighbours. The implementation of the Czech-Polish bi-directional interconnection (Bezměrov-Hať pipeline) will help to resolve the infrastructure bottleneck between the Czech Republic and Poland. This is a project that is primarily of strategic and security importance for the Czech Republic, where its implementation will lead to a two-way interconnection of the transmission networks of Poland and the Czech Republic. The

81Trans-European Replacement Reserves Exchange

82Platform for the International Coordination of the Automatic frequency restoration process and Stable System Operation

83Manual Activated Reserves Initiative

implementation of the project will expand transport routes and diversify natural gas sources for the Czech Republic by connecting to a potential source of gas other than from the Russian Federation, namely LNG from Poland and natural gas from Norway. Therefore, the Czech Republic finds this project important for national interests and will provide all possible synergies, including funding for the implementation of this project.

The development and subsequent integration of a market for gases, namely hydrogen, will be further supported by supporting the implementation of projects with the status of PCI (projects of common interest) enabling direct interconnections with the gas networks of neighbouring countries. These projects contribute to the integration of national markets in the region and to the creation of a central European regional gas market, namely mainly hydrogen.

See also the information provided in chapter 2.4.3.2.

ii. Measures to increase the flexibility of the energy system with regard to renewable energy generation, such as smart grids, aggregation, demand response, storage, distributed generation, dispatching mechanisms, redispatching, hydrogen electricity storage and curtailment of renewable energy and real-time price signals, including the deployment of intraday market coupling and cross-border balancing markets

National Smart Networks Action Plan

The key strategic and planning document containing measures to increase the flexibility of the energy system is the National Action Plan for Smart Networks, which the Ministry of Industry and Trade started to draw up on the basis of a task formulated in the Czech Republic's 2015 State Energy Concept. The National Action Plan for Smart Networks (NAP SG) was subsequently approved by Government Resolution No 149 of 4 March 2015.

The period up to 2019 was characterised as preparatory in the SG's NAP, during which the aim was to prepare the necessary analyses, design and agree on a target model for implementing smart grids in the Czech Republic, completing and evaluating pilot projects and drawing up the procedure for implementing smart metering (AMM).

On 16 September 2019, the Czech Government approved the update of the NAP SG and the National Action Plan for Smart Networks 2019-2030 (NAP SG 2019-2030) respectively[84]. At the same time, an evaluation report of the SG's NAP of 31.12.2018 was drawn up in order to obtain detailed information on the performance of individual cards and policies and measures under the SG's NAP. The draft update of the SEC of the Czech Republic then defines the instrument containing the terms of reference for the further update of the SG's NAP.

The following areas have been identified as relevant areas falling within the scope of the applicable NAP SG 2019-2030:

- Legislation (EU legislation – network regulations, winter legislative package, new technologies);
- Use of aggregation, flexibility for electricity systems (decentralised energy sources, consumption);
- Electro-mobility (integration and use for grid operation);
- Digitalisation and its use (automation, communication);
- Decentralised energy sources (integration and use for grid operation);
- Dispatch control (including operational measurement);
- Accumulation (integration and use for electricity system operation);

84 The National Action Plan for Smart Networks 2019-2030 is complete by following link.

– Smart metering (AMM).

Table 44 gives an overview of a total of 20 projects (measures/tasks) that were burned under NAP SG 2019-2030, broken down into three main areas. The projects are further divided into three main groups: supporting, implementing and piloting. The NAP SG 2019-2030 then contains detailed tender sheets for each project, indicating the timeline of the solution, the responsibility for implementation, the expected benefits and other information.

Table 44: *Overview of NAP SG 2019-2030 measures by area*

Areas/programmes	Projects (measures/tasks)
I – Legislation, tariff system, regulation	Legislative support (supported project)
	Monitoring and implementation of the EC Regulation (network codes) (implementation project)
	Booting 15 minutes interval evaluation of deviations (implementation project)
II – Use of new technologies in the operation of the EC Czech Republic	Installation of electricity quality measurements (implementation project)
	Frequency demand disconnection (implementation project)
	Battery system flexibility (0.5 MW and above) for provision balance sheet a other support services (pilot project)
	Deposition flexibility (0.5 MW and above) for the provision of balance sheet and other support services (pilot project)
	Flexibility for large consumers (involved under 110 KV) for the provision of balance sheet and other support services (pilot project)
	Aggregation of consumption side flexibility providers (including prosumers) involved in and nn for the provision of balance sheet and other support services (pilot project)
	Accumulation, use of accumulation as part of the installation of FVEs in networks nn (support project)
	Technical DataHub – Digitalisation of EC Czech Republic operations in future conditions (implementation project)
	Management Q (implementation project)
III – Integration of new technologies into the EC	Smart metering implementation (implementation project)
	Implementation of smart stations at the outside level (remote control, monitoring, signalling) (implementation project)

	Implementation of remote control switchgear (DOP) on outdoor lines (implementation project)
	Network automation nn (ASDR) (supported project)
	Integration of electromobility into DS (pilot and support project)
	Development and construction of optical telecommunications infrastructure (implementation project)
	Energy DataHub – part of trade (implementation project)
	Use of Power to X technology for accumulation of surplus electricity from RES (support project)

Source: Self-processing of the Ministry of Industry and Trade on the basis of the National Smart Network Action Plan 2019-2030

Measures stemming from European legislation

The redesign of the market to increase its flexibility is implemented in the context of the implementation of the European Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation (the FCA Regulation), the European Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (the so-called CACM Regulation) and, in the morning, the European Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (the so-called EB Regulation).

The FCA lays down detailed rules for the allocation of cross-zonal capacity in the forward market, the development of a common methodology for determining long-term cross-zonal capacity, the creation of a single allocation platform at European level offering long-term transmission rights and the possibility to return long-term transmission rights to subsequent forward capacity allocation or to transfer them between market participants.

The CACM Regulation sets out a detailed guideline on cross-zonal capacity allocation and congestion management in day-ahead and intraday markets, including requirements for the development of common methodologies for determining the volume of capacity that is simultaneously available between bidding zones, criteria for assessing efficiency and a review process to define bidding zones.

The EB Regulation sets out a detailed guideline on electricity balancing, including the establishment of common principles for the procurement and settlement of FRR, FRR and Replacement Reserves, including a common methodology for activating FRR and Replacement Reserves.

iii. Where applicable, measures to ensure the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets

According to Act No 165/2012 on supported energy sources, a transmission system operator or a distribution system operator is obliged, on its licence of a defined area, to connect as a priority to the transmission system or to the distribution system a power-generating facility from an supported source for the purpose of transmission or distribution of electricity, if the producer so requests and meets the connection conditions, with the exception of a demonstrable lack of capacity of transmission and distribution facilities or where the safe and reliable operation of the electricity system is compromised. At the same time, the operator of a transmission system or distribution system must, at the request of a producer whose electricity generating facility using a subsidised source is to be connected to the distribution or transmission system, provide information necessary for the connection, an estimate of the costs associated with the connection, deadlines for the receipt and processing of the connection application, and an estimate of the time required to complete the connection.

Itegration of renewable energy sources and response to demand and overall flexibility is dealt with in detail in the National Action Plan for Smart Grids and its updates, i.e. the National Smart Network Action Plan 2019-2030. These measures are set out in more detail in part (ii) and are summarised in Table 44.

Sub-measures with regard to demand-side flexibility are also included in commended European legislation, in particular Directive (EU) 2019/944 of the European Parliament and of the Council on common rules for the internal market for electricity. The measures required by this Directive will be gradually transposed into national legislation.

iv. Policies and measures to protect consumers, especially vulnerable and, where applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market

Policies and measures to protect the legitimate interests of customers and consumers in the energy sectors, with a view to meeting all reasonable energy supply requirements:

- security of supply of energy resources to consumers at the most competitive prices;
- ensuring adequate measures to promote a more efficient use of energy by consumers;
- an increased level of consumer protection as a consumer, in particular household customers;
- ensuring that consumers are informed of their energy consumption and energy costs at sufficient intervals; non-discriminatory payment systems;
- ensuring that consumers are informed about their rights in the energy sector;
- ensuring the enforcement of consumer rights – putting in place fast and efficient complaint procedures and out-of-court dispute settlement tools;
- ensuring that effective means of dispute settlement are available to all customers;
- issuing binding decisions on the protection of consumer rights in disputes with energy companies;
- issuing binding decisions on energy companies; the imposition of effective, proportionate and dissuasive penalties on energy undertakings;
- promoting fair competition to enable consumers to take full advantage of the opportunities on energy markets.

Energy poverty can be characterised, as a multidimensional phenomenon, from many different perspectives. Nevertheless, the basic model criteria may be the situation where households suffer from insufficient levels of basic energy service due to a combination of high energy expenditure, low household income, energy inefficient buildings and equipment, possibly in combination with the specific energy needs of such households. Therefore, energy poverty itself can be seen as an issue at the interface between social, economic and environmental agendas. For this reason, an integrated approach to the solution is primarily offered, which can include both social policy measures and measures to improve energy efficiency in households, as well as measures to ensure that consumers are better informed of the possibilities to save energy (improving the position of consumers, especially vulnerable consumers).

Rather than focusing on the definition of vulnerable customers, the EU's main focus is on the existence of support schemes and the definition of which categories of customers are covered by this support. In relation to vulnerable customers, however defined in each Member State, taking into account national circumstances, Member States are to ensure the application of rights and obligations aimed at protecting and supporting this category of customers.

Therefore, criteria must first be established at Czech level to define the situation referred to as energy poverty, thus enabling the monitoring (regular monitoring) of the state of energy poverty in the Czech Republic. It is only if, on the basis of research and market analysis, priorities are established, on the basis of which interventions are developed and implemented, and that make it possible to evaluate their effectiveness, that the concept of ‘vulnerable customer’ can be understood and defined in the Czech environment.

Notwithstanding the fact that energy poverty and vulnerable customers are currently not defined in the Czech Republic, customer support systems are already in place and partly meet the requirements of the directives by allowing economic support and protection against disconnection of weak customers. Combining economic support within social systems, together with tools to protect the supply of customers in emergency situations (supplier of last resort, obligation beyond the licence). However, the Czech Republic does not have an economic support system specific to energy, which, however, is not in direct conflict with EU requirements, as this requires a high degree of caution when considering intervention in the internal market for electricity or gas, even in the case of a plan to protect vulnerable customers.

Existing support systems:

- energy sector specific economic support system (Czech Republic does not have an enabling economic system specific to energy. In most countries that have an energy support system in the energy sector, the system covers customers with income below a defined level.);
- a system of economic support outside the energy sector (a characteristic factor is that customers may, if necessary, receive some financial support (in the Czech Republic’s social system environment).
- a non-economic support system specific to the energy sector (a system of non-financial support, such as, in particular, disconnection protection, can act as a complement to the system of economic support. In the Czech Republic, these measures include the institutes of supplier of last resort and the obligations in addition to the licence provided for in the Energy Act.).

A vulnerable customer, whose position may be derived from the situation of energy poverty, must be appropriately characterised in legislation in order to be adequately protected. In particular, the default theoretical parameters of a vulnerable customer may be a situation in which the customer:

- is significantly less able than a typical consumer to protect or represent his interests on the energy market (e.g. because of age or state of health);
- in the event of a negative energy supply situation, due to his personal status, the event will be more damaged than another customer in the same situation.

In particular, in the Czech Republic, there is no systematic collection of information on the number of households in energy poverty specifically in the energy sector, so there can also be no binding parameters characterising a vulnerable customer. Ultimately, there can therefore also be no system of economic support for vulnerable customers tailored to the energy sector.

In this regard, the following principles should be used to underpin new policies and measures to protect vulnerable and energy poor consumers:

- in order to identify energy poverty among household customers in the Czech Republic, it will be necessary to publish the parameters and criteria used to identify, measure and monitor it – among others, low income, high energy expenditure and low energy efficiency of homes are important factors in designing indicators for measuring energy poverty;
- the development of a national action plan or other appropriate framework to combat this problem, aimed at reducing the number of people facing this problem and ensuring the necessary energy supply to vulnerable and energy poor customers;

- the application of an integrated approach, for example in the context of energy and social policy – measures must be adapted to the specific situation identified and may include social or energy policy measures relating to the payment of electricity bills, to investments in the energy efficiency of residential buildings or to consumer protection, such as protection against disconnection;
- in the fight against energy poverty, the principle of community energy can be an appropriate tool, which can also bring about progress in energy efficiency at household level and reduce consumption and obtain lower supply tariffs – community energy can enable certain groups of household consumers to participate in the energy market, who would otherwise not be able to do so;
- ensuring the protection of energy poor or vulnerable customers should be implemented by means other than public interventions in price-setting for the supply of electricity or gas – an exception to this rule is an intervention in the form of a so-called public service, but it must also comply with transparently defined conditions and only in well-defined cases.

For information on energy poverty, see Chapter 2.4.4 and 3.4.4.

v. Description of measures to enable and develop demand response, including those addressing tariffs to support dynamic pricing[85]

Measures developing demand-side flexibility are mainly included in the National Smart Networks Action Plan or its update, the National Smart Networks Action Plan 2019-2030. These measures are set out in more detail in part (ii) and are summarised in Table 44.

Sub-measures with regard to demand-side flexibility are also included in commended European legislation, in particular Directive (EU) 2019/944 of the European Parliament and of the Council on common rules for the internal market for electricity. The measures required by this Directive will be gradually transposed into national legislation.

3.4.4 Energy poverty

1. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4

The Czech Republic currently does not have policies or measures specifically aimed at reducing energy poverty. This issue is mainly addressed by social policies, possibly in a partial way by consumer protection policies and financial support, but this is not yet targeted only at this group of people. However, the Czech Republic is also actively dealing with this issue in the light of the approved European legislation.

In 2023, the definition of vulnerable customer and the tools to address this issue were enshrined in Czech legislation), paving the way for progress in addressing energy poverty as a complex problem.

The expert group on energy poverty, set up under the Ministry of Industry and Trade (more information in Chapter 2.4.4), is currently in progress. The aim of this group is to propose a definition of energy poverty resulting from the Energy Efficiency Directive, which will, however, be adapted to the Czech Republic’s circumstances. Only following the preparation of this definition and the related activities of the Expert Group will it be possible to propose specific measures and policies in this area.

Financial support

New Green Savings Light Programme[86]

The new Green Savings Light is a programme for the elderly and low-income households. It was prepared

85In accordance with Article 15(8) of Directive 2012/27/EU.
86More information is available on the New Green Savings website (link)

to limit as much as possible the need for own funds to implement austerity measures to help vulnerable households reduce housing costs. Under the programme, aid may be paid to applicants in advance and therefore no initial investment is required for beneficiaries. The amount of the subsidy can reach up to 100 % of direct implementation expenditure, helping households in energy poverty who lack their own funding for renovation.

The New Green Savings Light programme currently provides for public funding for:

- insulation facades
- insulation roofs
- insulation ceiling
- insulation flooring
- exchange of windows
- replacement of doorways

Solar water heating

Consulting

An advisory network has also been set up in the Czech Republic, including hundreds of trained advisers and certified specialists. Advice is provided at several levels – Energy Consultation Centres (EKIS), Mobile EKIS, Energy Coordinators of Local Action Groups, as well as Online Advice. These advisory services are provided free of charge and are therefore also available to energy poor and vulnerable households.

For example, advisors can handle everything applicants need to apply and receive the subsidy. Assistance shall include the identification of appropriate measures, the production of photographic documentation and expert opinion, assistance with the establishment of an electronic identity, assistance in requesting documents confirming that the candidate is a legitimate applicant, the submission of an application, assistance with communication with the implementing firm, the acquisition of photographic documentation of the measures implemented, the drawing up of a report on the implementation of the measures supported and the proof of implementation. Even if candidates deal with the request themselves, they need an expert opinion and a report on the measures implemented from the consultants of the NZÚ Light. Advice also focuses on community-based energy, which plays an important role in the fight against energy poverty.

As part of the obligation under Article 22 of the Energy Efficiency Directive and Article 18 of the EPBD, work is currently underway to set up pilot one-stop shops that will provide, inter alia, specialised services for energy poor and vulnerable households. These one-stop shops will provide complex services, from technical assistance to administrative and financial advice. Three to five pilot one-stop shops are foreseen by the end of 2024.

Social Climate Fund87

Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 established the Social Climate Fund. This should provide funding in the period 2026-2032 to support policies aimed at addressing the social impacts on vulnerable households, vulnerable micro-enterprises and vulnerable transport users, including through measures and investments to reduce reliance on fossil fuels.

Boiler subsidies for low-income households88

Boiler subsidies are subsidies intended for the replacement of old boilers, and from 1 September 2024

87 https://www.mzp.cz/cz/news_20220104-Ceske-predsednictvi-splnilo-sve-priority-v-oblasti-zivotniho-prostredi

88 https://www.mzp.cz/cz/news_20230405-MZP-spousti-dalsi-vlnu-popularnich-kotlikovych-dotaci-pro-nickprijmove-domacities

only boilers of 3 and higher emission classes will be permitted under the Air Protection Act. In early April 2023, a call was launched with an allocation of CZK 1.7 billion to replace heating systems in low-income households. This call is intended in particular for elderly people and citizens in receipt of housing assistance. This challenge will cover about 15 thousand exchanges for the most vulnerable households. The programme is therefore aimed at supporting the replacement of substandard heat generators in a residential building by socially weak households and can therefore be considered to some extent as addressing energy poverty, which is at the same time specific to energy. The Czech Republic will report on developments in this regard as part of the periodic reports on the procedure in accordance with Regulation 2018/1999.

Renovation of buildings

In its measures, the Czech Republic plans to focus on building renovation as one of the ways to combat energy poverty, also given that the high energy performance of housing is in many cases one of the factors contributing to energy poverty. In line with Article 3 of the EPBD, the share of vulnerable households and a plan to reduce the number of people in energy poverty and vulnerable households will be included in the National Renovation Plan, aiming to achieve through deep renovations and energy performance of residential buildings.

3.4.5 Regulatory area

<u>Concept of linking the new design of the electricity market with the requirements for a change in regulated prices and tariffs – innovation in the electricity tariff structure</u>

Major changes affecting the energy sector, such as the increase in the number of decentralised resources, the expected development of accumulation, flexibility, an increase in the number of electric vehicles and associated charging stations, or the deployment of AMM, will have a significant impact on all electricity market participants. These changes need to be addressed not only by primary legislation but also by secondary legislation on tariff structure (regulated pricing principles). These energy changes will, in addition to clear benefits, have the effect of increasing the investment needed and the costs of system operation. The change in the tariff structure must therefore be comprehensive, allowing not only the operation of new technologies, but also, in order to maintain stability in the price of electricity transmission and distribution, a greater emphasis on efficient use of the systems. Therefore, the Energy Regulatory Authority has *prepared a concept for linking the new design of the electricity market with the requirements for a change in regulated prices and tariffs*, with the following objectives:

- a price to customers corresponding to the costs and benefits it generates in the system and brings to the system;
- long-term predictability of the tariff system and its orientation towards new energy;
- increased use and efficiency of the operation and development of the electricity system.

These objectives will be reflected in the phasing-in measures under the responsibility of the Energy Regulatory Authority, which include:

- enabling electricity sharing within apartment buildings – implemented since early 2 023 in the Electricity Market Rules Decree;
- streamlining the use of the transmission system and distribution systems at the very high-voltage and high-voltage levels of the power component of electricity – planned from April 2024 onwards;
- streamlining the use of the transmission system and distribution systems at very high and high voltage levels in the area of unsolicited reactive energy – planned from the beginning of 2025;
- verification of new low-voltage distribution tariffs – gradual changes planned from 2026

onwards.

Figure 4: *Timetable for regulatory changes*

Source: Energy Regulatory Office

Meeting the objectives set by the Energy Regulatory Authority in the *concept of linking the new design of the electricity market with the requirements for a change in regulated prices and tariffs* will enable a switch to new energy.

<u>Methodology for price regulation for the next regulatory period</u>

In June 2020, the Energy Regulatory Authority*published the Price Regulation Code for the regulatory period 2021-2025 (V. Regulatory Period) for the electricity, gas, electricity and gas market operator and mandatory buyers*. The next regulatory period therefore starts in 2026 and, under current legislation, the Energy Regulatory Authority will publish a draft methodology for price regulation 16 months before the start of that period, while the final version of the methodology for price regulation must be published 10 months before the start of the regulatory period.

In the methodology for price regulation, the Energy Regulatory Authority shall set out price control methods, conditions and procedures for the entire regulatory period in such a way as to create the conditions for a transparent, predictable and long-term stable investment environment in the electricity and gas sectors, while ensuring the stability and acceptability of regulated prices. The methodology for price regulation will thus have to reflect both the EU's increasing climate and energy targets, striking a balance between a predictable environment and the need to provide possibilities to respond more quickly to similar changes that have occurred in the recent past, while also dealing with the effects of the energy crisis, which can be expected to materialise over the next regulatory period.

3.5. Dimension 'Research, innovation and competitiveness'

I. Policies and measures related to the elements set out in point 2.5

3.5.1.1 National R & D & I policy of the Czech Republic 2021+[89]

The Czech Republic's national R & D & I policy 2021+ (NP R & D & I 2021+) is an overarching strategic document at national level for R & D & I. It provides a strategic framework for the development of all components of research, development and innovation (R & D & I) in the Czech Republic (basic research, oriented and applied research, experimental development and innovation) and uses their joint action to develop a knowledge-based society and support the economic, environmental, cultural and social development of the Czech Republic. The R & D & I strategy paper contributes to the fulfilment of certain criteria as enabling conditions for the absorption of EU funds in the 2021-2027 programming period.

3.5.1.2 National priorities for oriented research, experimental development and innovation[90]

The national priorities for oriented research, experimental development and innovation were approved by the Government of the Czech Republic on 19 July 2012. National priorities for oriented research, experimental development and innovation are valid for the period up to 2030 with gradual implementation. Within the 6 priority areas defined, there are 24 sub-areas with a total of 170 specific objectives. The material contains a description of the different priority areas and sub-areas, indicates the links between the different areas and defines several systemic measures. The material also contains comments on the assumption that R & D & I expenditure is allocated from the State budget to different areas.

Table 45: *Energy-related priority areas under NPOV*

Area	Sub-area
Renewable sources of energy	Development of economically efficient solar energy
	Developing an economically efficient use of geothermal energy
	Development of economically efficient use of biomass
Nuclear resources	Efficient long-term use of current nuclear power plants
	Promoting the safety of nuclear installations
	Research to support the construction and operation of new economically efficient and safe units
	Fuel cycle research and development
	Disposal of radioactive waste and used fuel
	R & D on Generation IV reactors, in particular efficient and safe rapid reactors

[89]https://www.vyzkum.cz/FrontClanek.aspx?idsekce=913172

[90] The material can be accessed via the following link: https://www.vyzkum.cz/FrontClanek.aspx?idsekce=653383

Fossil Fuels	Economically efficient and environmentally friendly fossil energy and heating
Mains including energy storage	Capacity, reliability and security of electricity backbone transmission networks
	Modification of demand-side management networks
	Electric energy storage, including hydropower use
	Security and resilience of distribution networks
Production and distribution of heat/cool, including cogeneration and tri-generation	Heat extraction from base load power plants
	High-efficiency cogeneration (trigeneration) in SCZT sources in subloaded operations (system services)
	Distributed cogeneration of electricity, heat and cold from all types of sources
	Heat transfer and storage
	Effective management of indoor environmental adjustment
	Alternative sources – recovery of waste
Energy in transport	Increase the share of liquid and gaseous biofuels as a substitute for fossil resources
	Increase the use of electricity for propulsion as a substitute for fossil resources
	Prospectively deploy the use of hydrogen as an energy source for propulsion in transport
The systemic development of the Czech Republic's energy sector in the context of the development of EU energy	System analyses to support a balanced State Energy Concept, other related State Strategy Papers and Regional Development Concepts with regard to the EU Framework
	Integrated concept for the development of municipalities and regions with demonstration projects (link to the SET Plan – Smart Cities and Smart Regions)

Source: National priorities for oriented research, experimental development and innovation

The update of this strategy paper is currently under discussion. The concept of new National Priorities for Oriented Research, Experimental Development and Innovation is as follows:

Oriented research – research consciously and in the long term aimed at supporting solutions to strategic challenges of a societal and economic nature' (Section 2(1)(e) of the draft Act on research, development, innovation and knowledge transfer)

National oriented research priorities – a document based on strategic challenges of a societal and economic nature and defining a limited number of long-term strategic research areas to address current or expected societal needs or to exploit current or expected opportunities.' (Section 3(4) of the draft Act on research, development, innovation and knowledge transfer)

The RVVI (391st meeting) identified 5 areas of strategic challenges of a societal and economic nature:

- **Energy transition and a sustainable future**
- Adaptation to climate change
- Trust in democracy, societal resilience, security and defence
- Preparedness for demographic change and population ageing
- Technological and digital transformation of society

These strategic challenges provide an initial framework for identifying a limited number of long-term strategic R & D & I objectives (5-6 per area), which will be proposed through expert panels.

Science, research and innovation (R & D & I) in the energy sector are the subject of expert discussion in the panel “**Energy transition and sustainable future”.**

3.5.1.3 National Research and Innovation Strategy for Smart Specialisation of the Czech Republic – RIS 3 Strategy

EU Member States were required to prepare their National Research and Innovation Strategies for Smart Specialisation (National RIS3 strategies) to identify suitable forward-looking areas of the economy, which should then be supported by the European Structural and Investment Funds (ESIF). To this end, the Czech Republic has prepared its national RIS3 strategy which reflects the priorities of our economy, which should be the focus of ESIF programmes as well as selected national R & D support programmes. Table 46 lists the priority areas for research in the field of energy on the basis of the National Research and Innovation Strategy for Smart Specialisation of the Czech Republic. The approval of the National RIS3 strategy by the Czech Government and the European Commission was a necessary condition for drawing on the relevant ESIF (under the so-called ex ante conditionalities).

It is a strategic document ensuring effective targeting of European, national and territorial budgets and related private resources to support oriented and applied research and innovation in priority forward-looking areas. This document is an update of the original National RIS3 strategy for the 2014-2020 programming period, the latest revision of which was approved by the Czech Government in 2018. The new National RIS3 strategy for the 2021-2027 programming period reflects, inter alia, up-to-date analyses carried out for R & D & I support in the Czech Republic, the conclusions of the mid-term evaluation and the new strategic documents drawn up after 2018 both in the Czech Republic and at EU level. The shift towards finding new innovative solutions in view of long-term sustainability and the Covid-19 crisis also has a significant influence on the direction of the strategy. The aim of the update is also to hear the call for a more concise and clearer understanding of the priorities of the National RIS3 strategy and the document as a whole. At the same time, the existence and implementation of a smart specialisation strategy is an essential condition for the implementation of European Union89 (EU) cohesion policy interventions in the field of research, development and innovation (R & D & I) under the so-called general regulation for EU funds (in particular Annex IV). The Ministry of Industry and Trade is the guardian of meeting this basic condition; the co-gestors are the Office of the Government of the Czech Republic (RVVI) and the Ministry of Education, Youth and Sports. The EU sets seven criteria for fulfilling this enabling condition on the basis of which continuous fulfilment of the enabling condition is assessed.

89Regulation (EU) 2021/1060 of the European Parliament and of the Council of 24 June 2021 laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and the European Maritime, Fisheries and Aquaculture Fund and financial rules for those and for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument for Financial Support for Border Management and Visa Policy.

Table 46: *Priority research areas based on RIS 3 Strategy*

Key application sectors/thematic areas	Application Sector
Advanced machinery and technology[1']	**• Engineering, mechatronics • Industrial chemistry • Metallurgy • Energy**
Digital technologies and electrical engineering	**• Electronics and electrical engineering * Digital economy and content**
Transport for the 21st century	**П Automotive • Railway and rolling stock * Aerospace industry**
Health care	**• Pharmaceuticals, biotechnology, medical devices and Life Sciences**
Cultural and creative industries	*** Both new and traditional cultural and creative sectors**
Sustainable agriculture and the environmental sector	**• Sustainable management of natural resources • Sustainable agriculture and forestry • Sustainable food production • Ensuring a healthy and high-quality environment, biodiversity and the ecology of natural resources • Sustainable construction, human settlements and technical protection of the environment**

Source: National RIS3 Strategy

3.5.1.4 Innovation Strategy 2019-2030

The Czech Republic's Innovation Strategy 2019-2030 was approved by Resolution No 104 of the Government of the Czech Republic of 4 February 2019. This is a strategic framework plan that sets out the government's R & D & I policy to help the Czech Republic move towards Europe's most innovative countries in twelve years.

The innovation strategy is composed of nine interlinked pillars, which include the baselines, the underlying strategic objectives and the tools to achieve them. These are: R & D funding and evaluation, innovation and research centres, national start-ups and spin-offs, polytechnological education, digitalisation, mobility and building environment, intellectual property protection, smart investment and smart marketing.

The Innovation Strategy has been developed by the Government's R & D & I Council in close collaboration with a team of more than 30 members of business, scientists, academics and government representatives.

THÉTA programme

One of the main instruments for supporting applied research specifically in the energy sector is the THÉTA programme managed by the Czech Technology Agency. The programme was drawn up on the basis of measures in the Czech Republic's 2015 State Energy Concept.

The focus of the THÉTA programme was therefore based on the Czech State Energy Concept, which was approved by the Czech Government in May 2015. The programme was aimed at supporting projects whose results have a high potential for application in a number of areas of society-wide life in the Czech Republic. Horizon progam was by 2025 and between 2018 and 2025 (i.e. 8 years in total). The first call for tenders was launched in 2017, a second one was launched in 2018 and a third one was launched in October 2019. The fourth tender was launched in 2021 and the fifth in 2022. The maximum duration of project solutions was set at 8 years, but varied from sub-programme to sub-programme.

The objective of the programme was to contribute, through the outputs, results and impacts of the supported projects, to the medium and long-term vision of energy sector transformation and modernisation in line with approved strategic materials. This objective was achieved through support for energy R & D and innovation, focusing on: (I) support for projects of public interest; (II) new technologies and system elements with a high potential for rapid implementation on the ground, (iii) support for long-term technological perspectives, which corresponds to the split into individual sub-programmes.

By the end of the fifth tender, 563 projects had been submitted for all sub-programmes, of which 296 projects were supported.

The first tender submitted 102 projects and supported 56 projects. This represents a success rate of 54.9 %. 108 projects were submitted in the second tender, of which 58 projects were supported. The success rate was 53.70 %, 141 applicants applied for the third competition and 45 projects were supported – 31.91 %. 212 projects were launched in the fourth tender and 71 were supported. The success rate was 33.49 %. 124 projects (only sub-programmes 1 and 2 projects) were submitted to the fifth call for tenders.

Table 47: *Success of projects under THÉTA tenders*

Contest	Submitted projects	Projects supported	Success
1 VS	102	56	54.9 %
2 VS	108	58	53.70 %

3 VS	141	45	31.91 %
4 VS	212	71	33.49 %
5 VS	124	66	53.22 %

The financial cost of the 1st tender was CZK 1 047 million, out of which CZK 783 million is expenditure from the State budget in the form of dedicated subsidies with an aid intensity of 75 %. The remaining part of the budget consisted of non-public resources (CZK 264 million).

The financial cost of the 2nd tender was CZK 1 300 million, of which CZK 984 million is expenditure from the State budget in the form of dedicated support with an aid intensity of 76 %. The remaining part of the budget was non-public resources (CZK 316 million). In the 2nd tender, the aid intensity target was 82.9 % in sub-programme 1, 59.1 % in sub-programme 2 and 85.4 % in sub-programme 3.

The total cost of the 3 rd tender was CZK 1 025 million, of which CZK 717 million is expenditure from the State budget in the form of dedicated support, with an average aid intensity of 70 %, 44 % for the programme. The remaining part of the budget was non-public resources (CZK 308 million). In the 3 rd tender, the average aid intensity in sub-programme 1 is 82 % for sub-programmes 2 % and 3 88 % for sub-programmes.

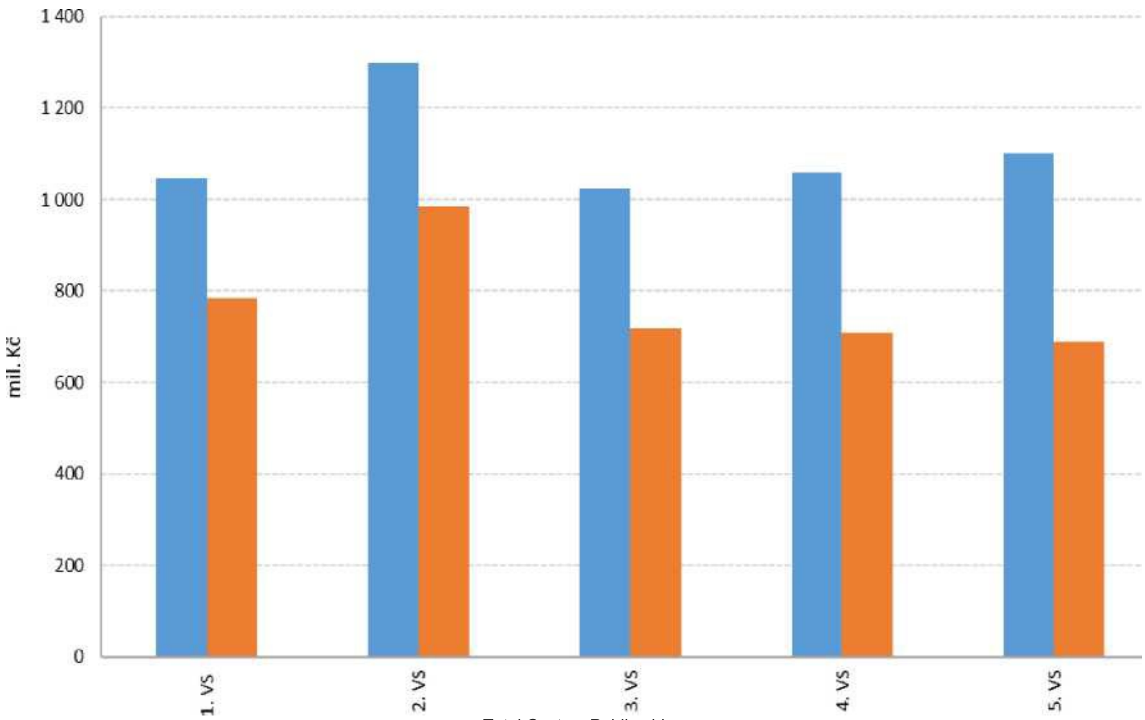
The total cost of the 4th tender was 1.06 billion. CZK. CZK 709.03 million is expenditure from the State budget in the form of dedicated support with an average aid intensity of 67.13 % for the programme. The remaining part of the budget consisted of non-public resources (CZK 350.97 million). In the 4th tender, the average aid intensity in sub-programmes 1 is 84.93 % in sub-programme 2 of 58.47 % and in sub-programme 3 at 86.05 %.

The total cost of the 5th tender was EUR 1.10 billion. CZK. CZK 687.66 million is expenditure from the State budget in the form of dedicated support with an average aid intensity of 62.58 % for the programme. The remaining part of the budget consisted of non-public resources (CZK 412.34 million). In the 5th tender, the average aid intensity is 83.87 % for sub-programmes and 59.33 % for sub-programme 2 and 86.05 % for sub-programmes. Sub-programme 3 was not published in the 5th tender.

Table 48: *Information on individual THÉTA tenders*

Contest	Total cost	State budget	Private resources	Aid intensity
1 VS	CZK 1 047 million	CZK 783 million	CZK 264 million	75 %
2 VS	CZK 1 300 million	CZK 984 million	CZK 316 million	82.9 %
3 VS	CZK 1 025 million	CZK 717 million	CZK 308 million	70 %
4 VS	CZK 1 060 million	CZK 709.03 million	CZK 350.97 million	67.13 %
5 VS	CZK 1 100 million	CZK 687.66 million	CZK 412.34 million	62.58 %

Graph 19: *Public support and private resources (THÉTA programme)*



3.5.1.5 THÉTA II programme

The THÉTA 2 programme is the successor programme of the THÉTA programme. It serves as one of the main tools for delivering on the fifth pillar of the Energy Union, focused on energy science, research and innovation, as well as an ambitious 2050 decarbonisation target. With the end of the THÉTA programme, there was a need for a follow-up programme that also reflects the future needs of the energy sector in the fields of science, research and innovation related to the global transition. The THÉTA 2 programme builds on the activities and priorities of the European Strategic Energy Technology Plan (SET Plan), in particular in terms of priorities and relevance of technology for the Czech Republic.

The total expenditure for the implementation of the programme is foreseen at CZK 10 621.7 million, of which CZK 7 410 million will be financed from the State budget for R & D and innovation and CZK 3 211.7 million from other sources. The funding of the Programme will be implemented according to the possibilities of the State budget.

The support will be around EUR 1 billion in the "most busy" years of the programme. CZK. This corresponds to about 85 % increase in public allocation compared to THÉTA, but it is necessary to take into account in particular the expected increase in the importance of THÉTA 2 in the context of current energy trends.

Projects in science, research and innovation aimed at exporting investments, technologies or the involvement of companies in transnational supply chains to transform global energy in line with the requirements of the Paris Agreement are to be supported in the Programme. From this perspective, it is in the interest of the Czech Republic to respond to this opportunity. The proposed budget for the THÉTA 2 programme should therefore be regarded as minimal and already reflecting the strain on the State budget.

For the purpose of achieving the objective, the Programme shall be divided into three sub-programmes, which shall be mutually supportive and complementary according to their focus and scope:

- Sub-programme 1: Research in the public interest

- Sub-programme 2: Energy technologies for competitiveness
- Sub-programme 3: Technologies to ensure the long-term sustainability of energy

The Czech Republic announced the results of the first THÉTA 2 tender, launched on 13 September 2023. The bidders submitted 132 project proposals to the tender, of which 129 project proposals were submitted for evaluation (1 project proposal withdrew from the tender during the evaluation).

Of these, TA ČR supported 82 project proposals (14 in sub-programme 1.37 in sub-programme 2 and 31 in sub-programme 3), which means a 62.1 % success rate (the success rate is calculated on the basis of the number of project proposals submitted to the tender).

Other relevant TA CR programmes

Environment for Life Programme

Programme of applied research, experimental development and innovation in the field of the environment – The environment for life was approved by Government Resolution No 204 of 25 March 2019. The provider of the aid is the Technical Agency of the Czech Republic, and the content gestor is the Ministry of the Environment.

The focus of the Environment for Life Programme is determined by the updated State Environment Policy of the Czech Republic 2012-2020 (hereinafter referred to as the Environment Programme), which was approved by the Government in November 2016. In order to improve environmental protection in the Czech Republic and to fulfil its commitments in this area within the framework of the European Union and international conventions, applied research, experimental development and innovation will focus on the priority thematic areas of the Environment Programme, i.e. protection and sustainable use of natural resources, climate protection and improvement of air quality, improvement of waste management and use, protection of nature and landscape and safe and resilient environment, including prevention and reduction of the consequences of natural and anthropogenic hazards.

The objective of the Programme is to bring new environmental solutions, stabilise and broaden the knowledge base that will significantly contribute to ensuring a healthy and high-quality environment in the Czech Republic and the sustainable use of its resources, minimises negative impacts of human activities on the environment, including transboundary impacts, and thus contributes to improving the quality of life in Europe and in the global context.

These solutions will contribute to reducing the impacts of climate change on nature and society, in particular mitigating the impacts of droughts and preventing droughts, reducing the impacts of other meteorological extremes (wind, floods, extreme temperatures), increasing air and water quality, developing the waste economy of the circular economy and efficient use of raw materials, protecting natural resources, water, soil and rock environment, preserving biodiversity and improving nature and landscape protection, developing environmentally friendly and environmentally friendly societies and climate change.

The specific objectives of the Programme shall be the following:

1. Contribute to climate change adaptation and the implementation of economically efficient mitigation measures 2. Contribute to the improvement of environmental components and support the implementation of circular economy principles (circular economy)
3. Foster resilient and secure societies and nature

The priority areas of the programme are as follows:

– climate – climate action, mitigation and adaptation to increased extremity of rainfall and

temperatures, both in settlements and in the open countryside;
– air protection;
– waste and circular economy;
– protection of water, soil, rock environment and other natural resources;
– biodiversity, nature and landscape conservation;
– an environmentally friendly society, a safe and resilient environment, specific instruments for environmental protection and sustainable development.

In 2023, the government approved a successor programme to support applied research and innovation in the fields of environment, climate protection and sustainable development. The environment for life 2.The programme has four horizontal specific objectives:

– contribute to a high-quality and safe environment
– contribute to the EU's climate neutrality, the development of the circular economy, the promotion of sustainable development and the knowledge-based (technological and environmentally friendly) competitiveness of the Czech Republic. contribute to biodiversity protection, ecological stability of nature and landscape, restoration
natural ecosystems and the conservation and conservation of nature and landscape
– contribute to the development of policies and instruments, in particular in the field of environment and climate protection, on the basis of expertise, in such a way that they benefit all sections of the population;

At the same time, promoting R & D in the field of circular economy is one of the priorities of the Ministry of the Environment and the Circular Czechia 2040 Strategic Framework.

A long-term research project is currently underway: *Waste and Circular Economy and Environmental Safety Centre (CEVOOH)*. The Centre is composed of a consortium of eight research organisations and universities and focuses on carrying out research in thematic areas related to the transition of the Czech Republic from a linear to a circular economic model.

Under the Operational Programme "Just Transition" (OPST) aimed at addressing the negative impacts of the shift away from coal in coal regions (Karlovarský, Ústecký, Moravskoslezský Region), innovative circular economy projects are promoted in the thematic area Transition to Circular Economy.

SIGMA

SIGMA is a new comprehensive instrument of its kind, aimed at achieving and addressing a number of objectives and measures set by the key strategic and policy documents for R & D & I in the Czech Republic, and will allow for a flexible response to the needs of society and the economy that may arise from unexpected situations. The main vision of the newly envisaged broad support instrument is the consolidation of several current TA CR programmes into one programme, allowing support to regions according to their innovation potential, supporting cross-cutting and systemic measures, including leaving room for support in areas/topics at the time of preparation of the programme unidentified. SIGMA will gradually implement activities from the current ZÉTA, ÉTA, GAMA 2, DELTA 2 programmes and EU instruments (in which the provider will be involved).

DELTA

DELTA 2 aims at supporting the acquisition of knowledge and skills leading to or substantially improving new products, processes and services. It therefore supports projects focusing on specific outputs in applied research, which will be put into practice once completed. Companies and research organisations may participate in the project on the Czech side, with their foreign partners submitting complementary project proposals to the relevant foreign organisation. In order to receive aid, projects must be supported both by the Czech Republic (TA CR) and by a foreign party (foreign organisation in the locality). The list of foreign organisations for a given tender is usually published 2-3 months before its launch.

Research infrastructures of the Czech Republic

In 2009, as part of Act No 130/2002 on support for research, experimental development and innovation from public funds and amending certain related acts (the Act on Support for Research, Experimental Development and Innovation), as amended, a specific legislative instrument for supporting research infrastructures in the Czech Republic was newly established. The Ministry of Education, Youth and Sports has become the central body of the state administration of the Czech Republic responsible for the financing of so-called 'large research infrastructures' from public funds of the Czech Republic*, and large research infrastructure is defined as 'research infrastructure which is a research facility necessary for a comprehensive, financially and technologically intensive research and development activity, approved by the government and set up for use by other research organisations'.' (Research infrastructure means, in accordance with Article 2(91) of Commission Regulation (EU) No 651/2014, 'facilities': resources and related services used by the scientific community to conduct research in relevant disciplines, including scientific equipment and research material, knowledge-based resources such as collections, archives and structured scientific information, information and communication technology infrastructures such as GRID networks, computer and software equipment, means of communication, as well as any other elements of a unique nature necessary to carry out the research.")*

In 2010, the Czech Republic's Road Map of Large Infrastructures for Research, Experimental Development and Innovation was drawn up for the first timeand is in line with the ESFRI Roadmap and updated in 2011,2015 and 2019. A completely new Roadmap for large research infrastructures of the Czech Republic for the years 2023 to 2026 will also be drawn up in 2023[92]. Thus, since 2010, the roadmap for large research infrastructures in the Czech Republic has been a strategic document of the Czech Republic which sets out the concept of support and further investment development of large research infrastructures and represents the Czech Republic's contribution to European efforts to develop a strategic approach to research infrastructures at both national and macro-regional level of the EU.

In the field of energy, the following large research infrastructures shall be supported: (I) *the Czech International Centre of Research Reactors (CICRR)*; (II) *COMPASS – Tokamak for fusion fusion research*; (III) *Energy recovery and gas cleaning (ENREGAT)*; (IV) *VR-1 Nuclear Experimental Hub (WCZV)* The *Surface Physics Lab – Hydrogen Technology Centre (SPL* – HTC) also operates in the field of fuel cells and hydrogen technologies.

Competence Centres/National Competence Centres

Competence centres

The Competence Centre programme was approved by Government Resolution No 55 of 19 January 2011. The draft amendments to the Competence Centre's programme were approved by Government Resolution No 146 of 27 February 2013. The programme was aimed at supporting the creation and operation of R & D & I centres in forward-looking disciplines with high application and innovative potential and perspective for a significant contribution to the growth of the Czech Republic's competitiveness.

Within the framework of the Czech Republic's Competence Centre's Technology Agency programme, the following centres have been created in the field of energy: Competence Centre for Energy Recovery

92 The document can be accessed via the following link: http://www.msmt.cz/vyzkum-a-vyvoj-2/cestovni-mapa-cr- Grand-infrastructure-pro-survey

of Waste, Centre for Advanced Nuclear Technologies (Canut), Advanced Technologies for Heat and Power Production, Centre for Research and Experimental Development of Reliable Energy and Technology Development Centre for Nuclear and Radiation Safety: RANUS – TD.

National competence centres

The programme for the promotion of applied research, experimental development and innovation of the National Competence Centre (NCK) was approved by Government Resolution No 291 of 29. 4. 2019. The programme aims to synergise existing successful centres created with the support of the TA ČR (Centre of Competence Centre), GA CR (Centre of Excellence) and operational programmes (in particular the so-called R & VpI Centre) with other research centres and units in one integrated system. The programme will help significantly strengthen the segment of research organisations focused on applied research and incentivise relevant existing research workplaces to concentrate their research and technology capacities in NCK centres where high-quality applied research will be carried out according to the needs of the application sphere. As part of the National Competence Centre's programme, the National Centre for Energy is set up.

The Programme can be used for synergies and complementarities with the Union's Horizon Europe programme and other international programmes consistent with the programme's focus.

The supported National Energy Competence Centres include the National Energy Centre, the National Energy Centre II and the Centre for Advanced Nuclear Technologies II and the National Competence Centre for Hydrogen Mobility. Taking into account the potential and commitments of the Czech Republic at international level, in particular the Green Deal, the main mandatory output of the above-mentioned National Competence Centres is the formulation of a strategic agenda as a background material and recommendations for government and policy-making in the field of research. The Knowledge Domain of National Competence Centres, made up of top experts at national and international level using unique scientific backgrounds, is ready to support national administrations responsible for sub-strategies in order to help formulate relevant strategies in the sense of "research for policy".

Set Plan

In the field of science and research, the Czech Republic is relatively significantly involved in cooperation with other Member States, both at the level of the European Strategic Energy Technology Plan (SET-Plan) structures and its other pillars (e.g. the European Energy Research Alliance93). Furthermore, there is a relatively significant involvement of the Czech Republic under the EU Framework Programme for Research and Innovation (Horizon Europe). The Czech Republic is also also involved in European but also international research in the context of major scientific sites.

The priorities of the European Strategic Energy Technology Plan (see Table 49) are already largely taken into account in the Czech Republic's State Energy Concept in areas defining the main priorities for

93European Energy Research Alliance (EERA) research and development. The SET-Plan priorities have also been taken into account in detail in the preparation of the THÉTA II programme, which is specifically focused on energy. The specific reflection, relative use and modification of the SET-Plan priorities in the Czech Republic is specifically set out in the text approved and already ongoing in the THÉTA II programme or in the underlying analyses of that programme.

Table 49: *Priorities according to the Integrated Roadmap, Energy Union priorities, 10 SET Plan actions*

SET Plan Integrated Roadmap (13 themes)	**ENERGY UNION R&I & Competitiveness priorities**	**SET Plan (10 key actions)**
T10: Development of renewables T8: System flexibility	**N°1 in Renewables**	**1. Performant renewable technologies integrated in the system** **2. Reduce costs of technologies**
T1: Engaging consumers T2: Smart technologies for consumers T6: Modernising the electricity grid T7: Energy storage T8: System flexibility T9: Smart cities & communities	**Smart EU Energy System with consumers at the centre**	**3. New technologies & services for consumers** **4. Resilience & security of energy system**
T3: Energy efficiency in buildings T4: Energy efficiency in heating & cooling T5: Energy efficiency in industry & services	**Efficient Energy Systems**	**5. New materials & technologies for buildings** **6. Energy efficiency for industry**
T7: Energy storage T13: Biofuels, fuel cells & hydrogen, alternative fuels	**Sustainable Transport**	**7. Competitive in global battery sector (e-mobility)** **8. Renewable fuels**
T11: Carbon capture storage/use		**9.**
T12: Nuclear energy		**10. Nuclear Safety**

Source: SETIS Information System

The Czech Republic has been pro-actively involved in the development of SET-Plan policies in the long term, as a member of the steering body of the SET Plan Steering group. It actively participated in discussions on the revision of the concept and its future functioning. The Communication on the revision of the Strategic Energy Technology Plan, adopted on 20 October 2023, will help align the initial strategic objectives of the SET Plan with the European Green Deal Plan, REPowerEU and the Green Deal Industrial Plan, in particular the Net Zero Industry Act. It will ensure a coherent approach to achieving Europe's decarbonisation objectives, supporting Europe's strategic clean zero energy technologies and building a sustainable and resilient energy future.

In particular, the reasons why the Czech Republic sees the revision of the SET Plan as an important and important milestone on the road to clean energy innovation are:

– it will help align the initial strategic objectives with the Green Deal and the REPowerEU Plan;
– ensure a coordinated approach to achieving the European decarbonisation objectives, supporting strategic technologies and building sustainable; secure and resilient energy and industrial competitiveness;
– while the updated SET-Plan will continue to be essential to deliver on the fifth dimension of the

Energy Union – research, innovation and competitiveness – it will also be firmly anchored within the European Research Area (ERA). According to the Czech Republic, institutional anchoring is important;

- define new priorities on key cross-cutting issues in the field of energy and decarbonisation;
- the debate on current exploitable technologies will be extended to all strategic renewable energy technologies;
- the inclusion in the ERA opens the door for further more advanced discussions on the use of hydrogen;
- build on cooperation between the European Technology and Innovation Platforms and European industrial alliances, including the Battery Alliance, Clean Hydrogen Alliance, Hydrogen Europe and Solar Photovoltaic Industry Alliance, etc. This cooperation will boost investment and boost the manufacturing capacity of clean energy technologies;
- it will also be able to better address market, regulatory and infrastructure issues that currently hinder the widespread application of clean technologies.

As part of the revision of the SET Plan, the Czech Republic aims to contribute to specific objectives such as intensifying links with EU financial instruments, policies and initiatives; enhancing synergies within the SET-Plan community and improving the general development of research and innovation in energy. For this reason, the Czech Republic is represented in some of the implementation groups of the SET Plan, including the 'Nuclear safety' group, the existence of which the Czech Republic considers to be important for the co-design of the platform's policies, also in view of the Czech Republic's position towards nuclear energy.

Horizon Europe

Horizon Europe is the EU's framework programme for research and innovation for 2021-2027. The programme builds on the achievements of Horizon 2020, which ended in December 2020 and is often referred to as the EU's 'success story'.

The programme's budget is EUR 95.517 billion (current prices), 30 % more than Horizon 2020. The budget increase reflects the fact that research and innovation remain one of the EU's top political priorities. The budget is divided between the three main pillars and one cross-cutting area of the programme. The largest part of the budget is dedicated to addressing global challenges. Horizon Europe is not only the largest but also the most ambitious research and innovation programme ever to date, with the potential to generate significant scientific, societal and economic impact, to contribute to climate objectives and to create new high-skilled jobs.

A novelty of the programme is the missions that are linked to the thematic clusters in the second pillar. Missions are defined as project portfolios with bold and measurable objectives. The concept of missions was inspired by Apollo 11, which had a huge impact on humanity as a whole. And it is the word 'impact' (on science, society and citizens) that is very often diluted in the context of missions. The impact of missions is expected to be many times larger than would be the case for individual projects. The hallmark of missions is the bottom-up approach, allowing the involvement of a wide range of actors in their design.

In addition to missions, clusters are also associated with European Partnerships, initiatives implemented by the European Commission in cooperation with public or private partners. The European Innovation Council, whose projects have already been piloted in Horizon 2020 and is now becoming an integral part of the third pillar, is also gaining an important role in the programme, with a strong emphasis on openness in science. Open access to publications and research data is becoming a standard requirement and modem operandi of the programme. There are also new opportunities for involving countries with good scientific, innovation and technological capacity.

The two key legislative acts are the Rules for Participation and Dissemination and the Strategic Plan.

Figure 5: *Horizon Europe and Euratom schema*

Source:See link

European Partnership

The Ministry of Industry and Trade, together with the Technology Agency of the Czech Republic (TA CR), are involved in two European Partnerships, which have energy as a topic under the new EU Horizon Europe programme. European Partnerships are an instrument that will replace the instruments used so far, such as ERA-NET Cofund, Joint Programming Initiatives (JPIs), Joint Technology Initiatives (JTIs) and others. European Partnerships are part of Pillar 2, Cluster 5 – Climate, Energy and Transport of Horizon Europe.

There are three types of EU partnership, of which TA ČR is involved in one type of cofund (co-funded). Like ERA-NET Cofund, the EU provides an opportunity for providers from individual Member States (such as TA CR), associated countries and most of the non-European countries to launch joint international calls on the agreed topic. The European Commission contributes 30 % of the total amount to the project support budget for national providers.

'Energy' partnerships are: Clean Energy Transition (CET) and Driving Urban Transition (DUT). In addition to TA ČR, MITs and, in the CET partnership, the Ministry of the Environment are also members of the consortium.

ERA-NET Cofund

The Czech Republic participates in the last ERA-NET Cofund – ERA-NET EnerDigit in the energy sector. These are international smart energy challenges launched by ERA-Net Smart Energy Systems in cooperation with Mission Innovation. The main theme of this ERA-NET is "digital transformation for green energy transition" and aims to financially support international research projects that focus on digital solutions for energy systems and networks.

Involvement in research within the International Energy Agency

The Czech Republic is also involved in research cooperation programmes at the level of the International Energy Agency.

IEA questionnaire

Membership of the International Energy Agency (IEA) obliges the Czech Republic to report selected statistical data in the form of questionnaires. One of them is a questionnaire focusing on research and development in the energy sector. In order to prepare the statistical data for the purpose of this questionnaire, a detailed analysis of expenditure on science and research projects since 1996 has been carried out.

Participation of the Czech Republic in the IEA Technology Collaboration Programmes (TCPs)

The Czech Republic is present in the following IEA Technology Collaboration Programmes (TCPs):

1) ECB: Energy in buildings and municipalities

The participating countries in the EBC are: Australia, Austria, Belgium, Canada, PR China, Czech Republic, Denmark, Finland, France, Germany, Italy, Ireland, Japan, the Republic of Korea, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States of America.

The Czech Republic is present in "anex" 72: Life-cycle related environmental impacts of buildings, in "annex 75: Cost-effective renovation of buildings at district level The Energy Efficiency and Renewable Energy Efficiency and Annex 83: Positive Energy Areas (PED).

Annex 72: Positive energy circuits – The work phase of the Annex for the Czech Republic started in 2016 and ended in 2021.

Annex 75: Positive energy circuits – the work phase of the Annex for the Czech Republic started on 1 November 2017 and was completed in 2021.

Annex 83: Positive energy districts – The work phase of the Annex for the Czech Republic starts on 1 November 2020 and will be completed in 2024.

2) 'Fluidised bed conversion'

The International Energy Agency (IEA) Technology Cooperation Programme (TCP) on Fluidised bed conversion (FBC) of clean energy fuels provides a framework for international cooperation on the development and deployment of energy technologies. Currently, 18 countries are active parties: Austria, Canada, China, Czech Republic, France, Finland, Greece, Hungary, Italy, Japan, Korea, Portugal, Poland, Russia, Spain, Sweden, United Kingdom and USA.

In this TCP, VŠB-TU Ostrava operates in cooperation with the ČVUT in Prague.

3) "Gender" in energy

In 2018, the Czech Republic participated in the Clean Energy Technology Cooperation Programme (C3E TCP) to strengthen cooperation with international partners and develop and improve data collection on gender diversity. The Government of the Czech Republic has designated the Technical University of Ostrava as the C3E TCP.

4) TCP Heat pumps

Barriers to participation in TCP: there are several barriers to participation in the TPC:

- Lack of information: private entities do not have sufficient information on TCP. It is also not very useful that there is a relatively large diversity between TCPs in terms of cost sharing x task sharing, structure, etc.
- Transaction costs: potential participants stressed that migration costs (such as travel costs) are an obstacle to participation in the TCP.
- Participation costs: Some entry fees are relatively high and it is difficult to assess whether the added value of the results is justified by the fees.Lack of visible results: some potential participants reported a lack of visible results (this may be partly explained by lack of information). Knowledge sharing

may not be a sufficient incentive for a private company.

The Czech Republic sees participation in certain TCP groups as effective. In cooperation with the IEA, TCP Days are ongoing in various countries. This event is planned in the Czech Republic in autumn 2024.

Section B: Analytical basis[94]

4 State of play and estimates based on existing policies and measures[95.96]

4.1 Projected evolution of main exogenous factors influencing energy system and GHG emission developments

i. I. Macroeconomic forecasts (GDP and population growth)

4.1.1.1 Expected population development (demographic projections)

The Czech Statistical Office prepares population projections in roughly five-year cycles – the latest one was prepared in 2018, an update is expected by the end of 2023. The aim of the projection is to outline the direction of future population trends in the long term and to show possible changes in population numbers and age composition, meeting the underlying assumptions of future natural currency developments (or fertility and mortality) and migration. However, the projection, whose objective feature is vague, cannot foresee sudden effects of external influences, such as a deep economic crisis, significant changes in the system of social measures, disease outbreaks or major discoveries of medical science that may affect mortality or fertility levels in the short and longer term, nor changes to legislative measures that affect the volume and structure of migratory flows. Therefore, the projection results must always be understood conditionally and interpreted in relation to the input parameters. The ČSÚ projection is determinisical, processed in three variants: medium, low and high. The middle option represents, from the authors' point of

94See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan.

view, the most likely scenario for the future development of the population (in terminological terms, so-called forecast). For this reason, the main focus in the text is on the assumptions and results of the intermediate option.

Expected evolution of population and age composition (middle)

The Czech population will continue to grow in the near future and in the first eleven forecast years if the assumptions of the future development of fertility, mortality and migration embedded in the middle variant are met. By the end of the 2020s it will reach 10.784 million compared to 10.610 million at the projection threshold. Then, from the 1930s onwards, the abundance of the population should follow a slightly decreasing trend, interrupted in the second half of the 1940s. The population should remain above 10.7 million until 2058.

The size of our population is expected to decrease further over the 1960s and 1970s. It is expected to fall to 10.4 million by the early 1980s. However, in the last two decades of this century, the population of the Czech Republic is again projected to grow to 10.527 million at the beginning of 2101.

[95] Current situation shall reflect the date of submission of the national plan (or latest available date). Existing policies and measures encompass implemented and adopted policies and measures. The policies and measures adopted are those for which a formal government decision has been taken before the date of submission of the national plan and where there is a clear commitment to proceed with their implementation. Implemented policies and measures are those for which one or more of the following applies at the date of submission of the national plan: national legislation is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised.

[96] The selection of exogenous factors may be based on the assumptions made in the EU Reference Scenario 2016 or other subsequent policy scenarios for the same variables. Besides, Member States specific results of the EU Reference Scenario 2016 as well as results of subsequent policy scenarios may also be a useful source of information when developing national projections with existing policies and measures and impact assessments.

Thus, while the expected trend is not stable, changes should not be dramatic. At maximum (1. 1. 2029) the population should be 1.6 % higher than the projection threshold at the minimum (1. 1. 2081) and 1.9 % lower.

From the perspective of the whole forecast period, the future evolution of the total population can therefore be generalised to, in principle, maintaining the current size or slight fluctuation around this figure.

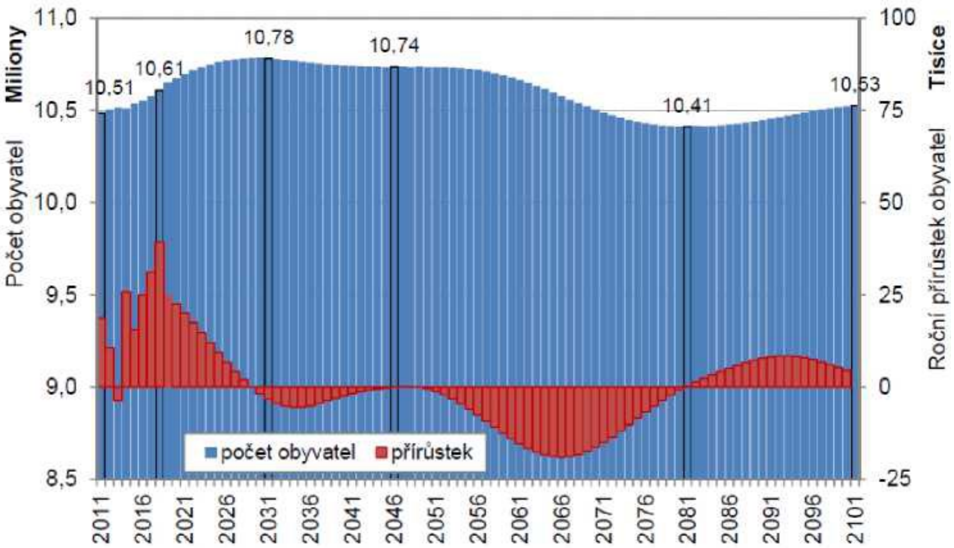
With the distribution of projected population growth into natural currency and migration components, it is clear that, with the exception of 2018, population growth will only provide a positive external migration balance, which can offset (and exceed) the expected negative natural currency balance. At the same time, the losses in the natural currency will not be small. From 2025 to the end of the century, the number of deaths should outweigh the number of live births by more than 15 thousand each year. The decline in natural currency should peak in the mid-1960s, when almost 45 thousand people are expected to lose annually.

Table 50: *Expected demographic developments*

Pointer	2017*	2018	2020	2030	2040	2050	2060	2070	2080	2090	2100
Population k 31. 12. (thousands)	10 610	10 649	10 697	10 782	10 740	10 736	10 665	10 488	10 411	10 456	10 527
Total increment	31 235	39 369	22 589	—1 810	—2 263	—448	—14 000	—16 364	—880	7 865	4 554

Natural increment	2 962	1 369	—3 411	— 810	—28 263	—26 448	—40 000	—42 364	—26 880	—18 135	—21 446
Increment by moving	28 273	38 000	26 000	26 000	26 000	26 000	26 000	26 000	26 000	26 000	26 000

Graph 20: *Real and expected population (on 1. (1) and annual increments, 2011-2100, middle option*



Although the expected change in the total population of the Czech Republic is not significant, the age composition of the population will make a significant difference. Over the years, there will be significant changes in the abundance of the different age groups (and their proportions), both from the perspective of the three basic age groups and from a more detailed perspective – in terms of five-year age groups.

4.1.1.2 Expected economic growth

The expected economic growth is projected according to the MF Macroeconomic prediction of August 2023,97 is the outlook until 2026, and in the case of the long-term impact assessment (up to 2050), the E3ME growth benchmark is used as a model trajectory to compare the impact of policies between the WEM+ scenario (i.e. the evolution of macroeconomic aggregates without the impact of Fit for 55 policies) and WAM3 (i.e. the development of macro-economic aggregates with the impact of Fit for 55 policies, in particular the revision of the EU ETS and other regulatory measures from the EU level, the modelling of the use of emissions trading revenues is taken into account – see chapter 5 for more).

Table 51: *Expected evolution of key macroeconomic indicators*

GDP – use at constant prices – annual

chain-linked volumes, reference year 2015

Source: CZECH STATISTICAL OFFICE. Calculations and predictions of the Ministry of Finance of the Czech Republic.

		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
								Prediction	*Prediction*	*View*	*View*
Gross domestic product	*billion CZK 2015*	**4 988**	**5 148**	**5 304**	**5 013**	**5 191**	**5 313**	**5 305**	**5 428**	**5 560**	**5 688**

	% growth	5,2	3,2	3,0	—	3,6	2,	—	2,3	2,4	2,3
	growth in % (1)	5,3	3,2	3,0	—	3,5	2,	0,0	2,2	2,5	2,4
Household consumption	billion CZK 2015	**2 355**	**2 438**	**2 504**	**2 322**	**2 418**	**2 401**	**2 318**	**2 409**	**2 497**	**2 565**
	% growth	4,0	3,5	2,7	—	4,1	—0,7	—	3,9	3,7	2,7
Government consumption	billion CZK 2015	**913**	**949**	**973**	**1 014**	**1 027**	**1 033**	**1 058**	**1 076**	**1 098**	**1 120**
	% growth	1,8	3,9	2,5	4,2	1,4	0,	2,4	1,8	2,0	2,0
Gross capital formation	billion CZK 2015	**1 323**	**1 425**	**1 489**	**1 351**	**1 609**	**1 699**	**1 621**	**1 560**	**1 532**	**1 542**
	% growth	6,5	7,7	4,5	—	19,1	5,	—	—3,8	—1,8	0,7
Fixed capital	billion CZK 2015	1 248	1 374	1 455	1 368	1 379	1 420	1 432	1 443	1 470	1 501
	% growth	4,9	10,0	5,9	—	0,8	3,	0,8	0,7	1,9	2,1
Change in inventories and	billion CZK 2015	75	51	34	—	230	279	189	117	62	41
Exports of goods and services	billion CZK 2015	**4 168**	**4 322**	**4 386**	**4 034**	**4 312**	**4 623**	**4 823**	**5 045**	**5 250**	**5 414**
	% growth	7,2	3,7	1,5	—	6,9	7,	4,3	4,6	4,1	3,1
Imports of goods and services	billion CZK 2015	**3 771**	**3 989**	**4 051**	**3 719**	**4 214**	**4 479**	**4 531**	**4 664**	**4 811**	**4 943**
	% growth	6,3	5,8	1,5	—	13,3	6,	1,2	2,9	3,2	2,7
Gross domestic expenditure	billion CZK 2015	**4 592**	**4 811**	**4 964**	**4 693**	**5 053**	**5 131**	**4 997**	**5 049**	**5 134**	**5 235**
	% growth	4,3	4,8	3,2	—	7,7	1,	—	1,0	1,7	2,0
Methodological Discretion	billion CZK 2015	—1	3	3	10	38	36	15	2	—5	—9

97 https://www.mfcr.cz/cs/rozpoctova-politika/makroekonomika/makroekonomicka-prediction/2023/Macroeconomics- prediction-August-2023-52667

Real gross domestic income	billion CZK 2015	**4 988**	**5 149**	**5 324**	**5 083**	**5 259**	**5 232**	**5 297**	**5 426**	**5 559**	**5 688**
	% growth	4,3	3,2	3,4	—	3,4	—	1,2	2,4	2,4	2,3
Contributions to GDP growth											
Gross domestic expenditure	p.b	**3,9**	**4,4**	**3,0**	—	**7,2**	**1,5**	**—2,6**	**1,0**	**1,6**	**1,8**
Final consumption	p.b	**2,3**	**2,4**	**1,8**	—	**2,2**	—	**—1,1**	**2,1**	**2,1**	**1,7**
Expenditure of households	p.b	1,9	1,7	1,3	—	1,9	—	—1,6	1,8	1,7	1,3
Government expenditure	p.b	0,3	0,7	0,5	0,8	0,3	0,1	0,5	0,4	0,4	0,4
Gross capital formation	p.b	**1,7**	**2,0**	**1,2**	—	**5,0**	**1,7**	**—1,5**	**—1,1**	**—0,5**	**0,2**
Fixed capital formation	p.b	1,2	2,5	1,6	—	0,2	0,8	0,2	0,2	0,5	0,5
Change in inventories	p.b	0,5	—	—0.3	—	4,8	0,9	—1,7	—1,3	—1,0	—0,4
External trade balance	p.b	**1,2**	—	**0,0**	—	**—3,6**	**0,9**	**2,4**	**1,3**	**0,8**	**0,5**
Goods balance	p.b	0,9	—	0,4	—	—3,6	1,4	2,4	1,2	0,8	0,4
Service balance	p.b	0,3	—	—0,4	—	0,0	—	0,0	0,2	0,1	0,1
Gross added-value	billion CZK 2015	**4 491**	**4 644**	**4 784**	**4 532**	**4 687**	**4 797**	.	.	.	.
	% growth	5,2	3,4	3,0	—	3,4	2,3	.	.	.	.
Balance of taxes and subsidies on products	billion CZK 2015	**497**	**504**	**521**	**480**	**504**	**516**	.	.	.	.

(1) From data adjusted for the impact of seasonality and uneven number of working days

ii. Sectoral changes expected to impact the energy system and GHG emissions

Changes in sectors that could have an impact on the energy sector and greenhouse gas emissions are detailed in the relevant chapters of this document and in the analytical annexes.

iii. Global energy trends, international fossil fuel prices, EU ETS carbon price

4.1.1.3 Global energy trends

Recent trends in the world energy sector

This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

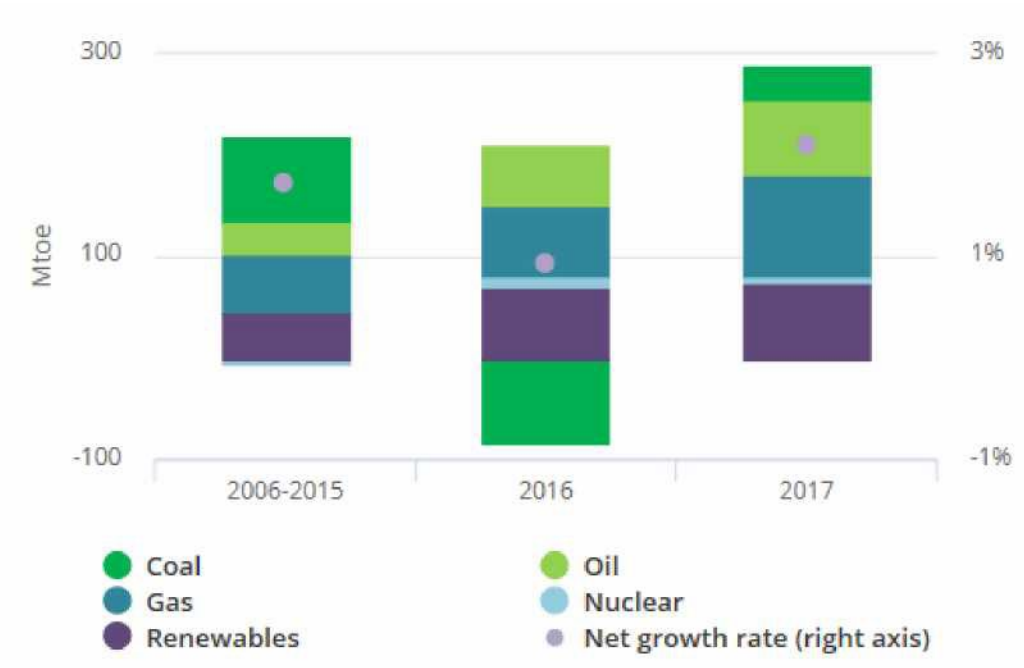
Global energy demand grew by 2.1 % in 2017, according to IEA preliminary estimates95, more than double the growth in 2016. Global energy demand in 2017 was estimated at 14 050 million tonnes of oil equivalent (Mtoe), compared to 10035 Mtoe in 2000.

Fossil fuels covered more than 70 % of the growth in energy demand worldwide. Natural gas demand grew the most, reaching a record share of 22 % of total energy demand. Renewable energy sources also recorded relatively strong growth, accounting for around a quarter of global growth in energy demand, while nuclear energy accounted for the rest of that growth. The global share of fossil fuels in global energy demand remained at 81 % in 2017, a level that has remained stable for over three decades despite strong growth in renewables.

The increase in energy efficiency in the world's energy sector has slowed down. The rate of decline in global energy intensity, defined as energy consumption per unit of economic production, decreased to only 1.7 % in 2017, much lower than the annual increase of 2.0 % achieved in 2016.

Growth in global energy demand was concentrated mainly in Asia, with China and India accounting together for more than 40 % of the overall increase in demand. Energy demand in all advanced economies has contributed more than 20 % to global growth in energy demand, although the share of these countries in total energy consumption has continued to decline. Southeast Asian countries (8 % of world energy demand growth) and Africa (6 %) also recorded remarkable growth, although per capita energy consumption in these regions remains below the world average.

Graph 21: *Average annual growth in world energy demand broken down by fuel*



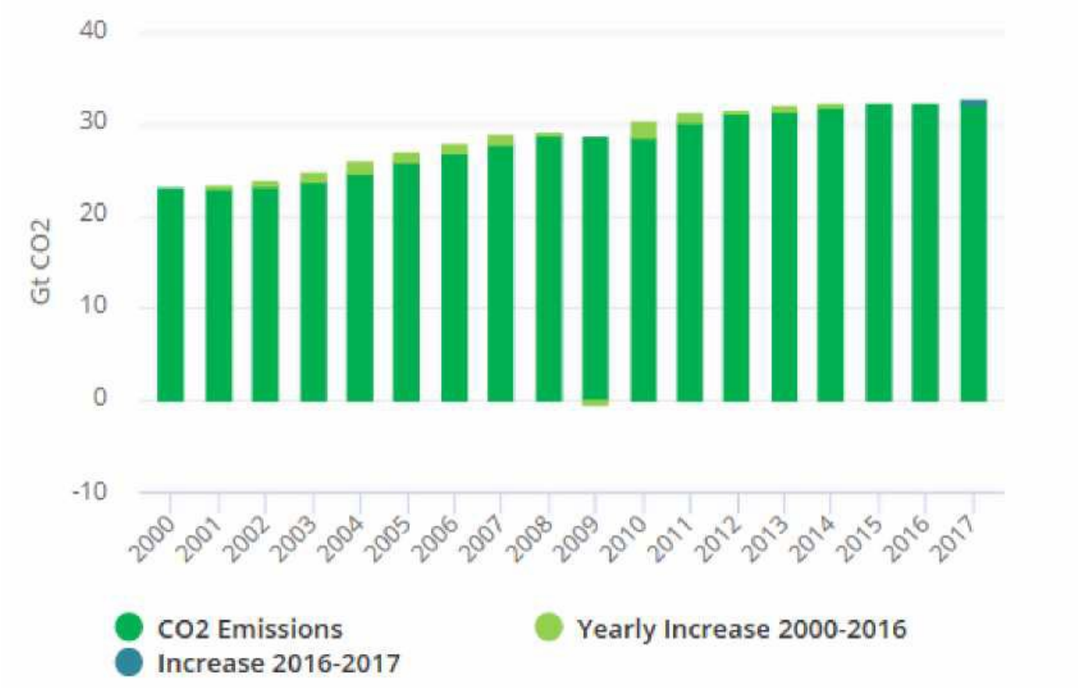
Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Global CO2 emissionsrelated to energy conversion grew by 1.4 % in 2017, reaching a historical peak of 32.5 billion tonnes, a resumption of growth after three years of relative stagnation. However, the increase

95 Recent trends in the world energy sector have been drawn from information from the International Energy Agency (IEA), namely the publication 'Global Energy & CO2 Status Report', availableonline at https://www.iea.org/geco/.

in CO_2 emissions was not universal. While most major economies have seen an increase, some others have seen declines, including the United States, the United Kingdom, Mexico and Japan. The United States recorded the largest decrease mainly due to higher use of renewables.

Graph 22: *Global energy conversion CO2 emissions*

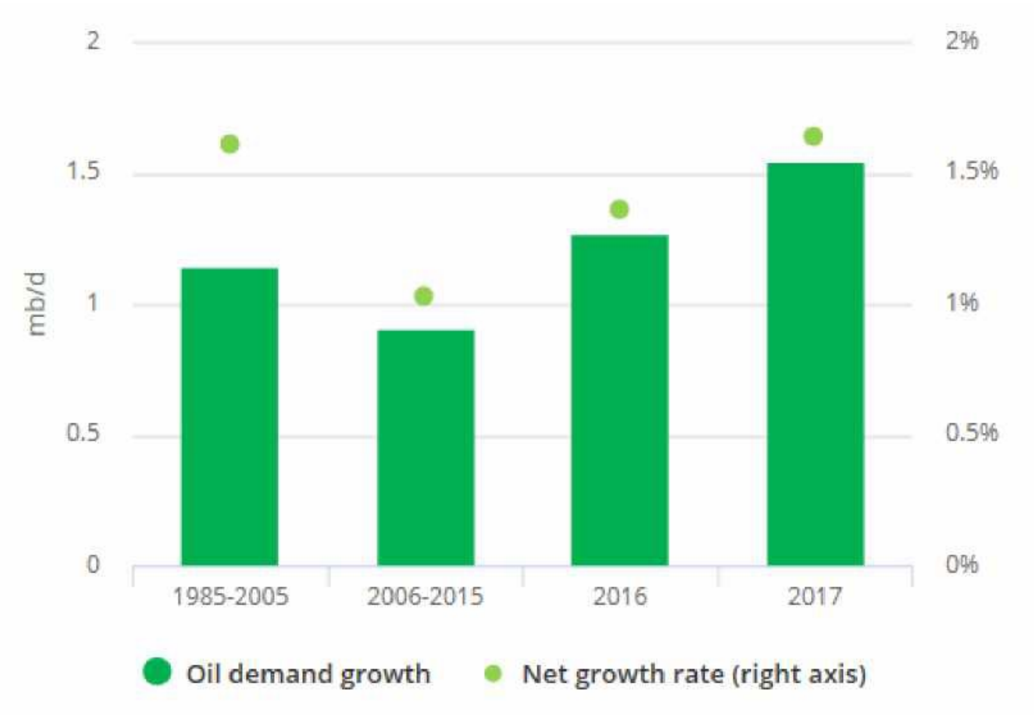


Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Global oil demand grew by 1.6 % (or 1.5 million barrels per day) in 2017, a much higher year-on-year growth than average growth of 1 % over the last decade. The increasing share of sport commercial vehicles (SUVs) and light trucks in major economies and demand in the petrochemical sector were the main drivers of this growth.96

96In this regard, it is worth mentioning the phenomenon of a shift away from plastics, linked to the deepening of knowledge of global negative environmental impacts, which may potentially have an impact on oil consumption in the petrochemicals sector.

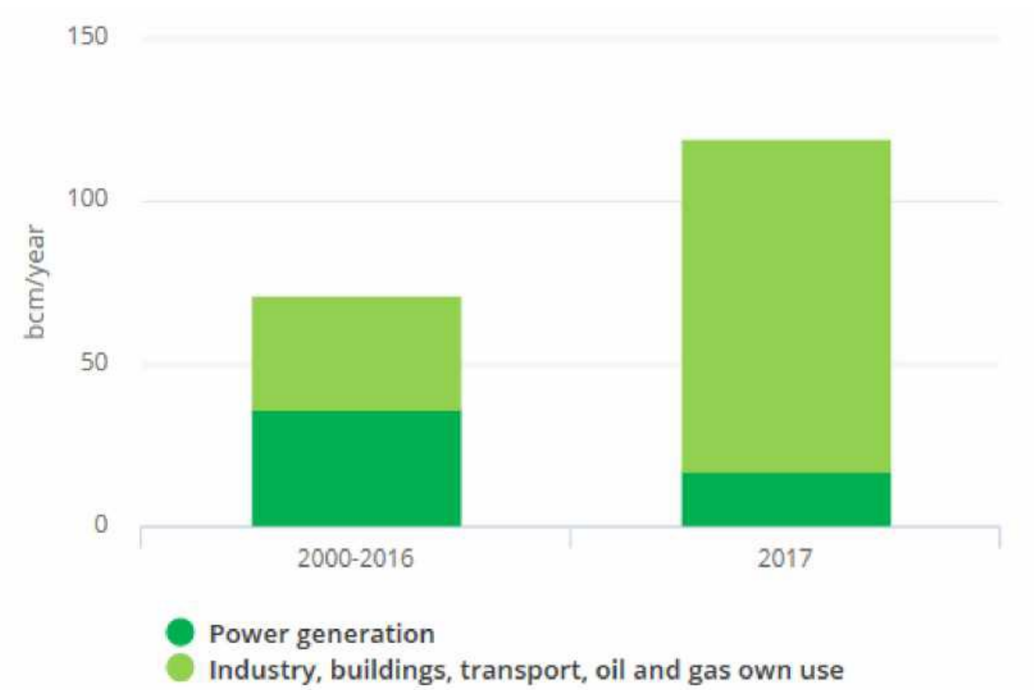
Graph 23: *Average year-on-year growth in oil demand*



Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Global gas demand grew by 3 %, largely due to relatively large supply and relatively low costs. China alone was responsible for almost 30 % of global growth. In the past decade, half of the world's growth in gas demand came from the energy sector; however, last year more than 80 % of the increase came from the industrial and building sectors.

Graph 24: *Average annual growth of natural gas demand*



Source: International Energy Agency; Global Energy & CO2 Status Report (online)

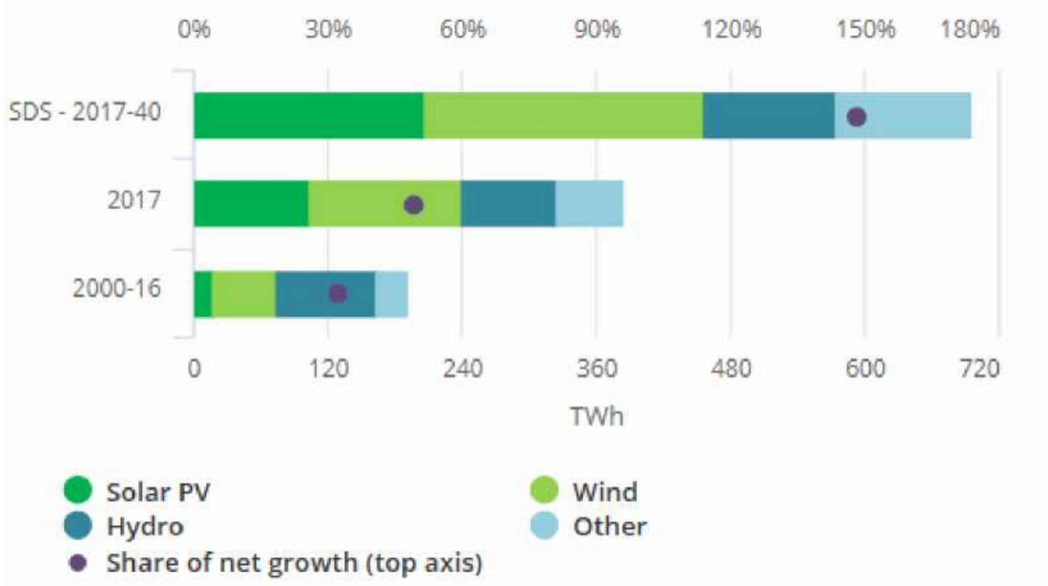
Global coal demand increased by 1 % in 2017, reversing the downward trend observed over the last two years. This growth was mainly driven by demand in Asia, which was almost entirely due to the increase in coal-fired electricity generation.

Graph 25: *Average year-on-year growth in coal demand*

Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Renewable energy sources recorded the highest growth rate from all energy sources in 2017, covering a quarter of the world's growth in energy demand. China and the United States have led this unprecedented growth, contributing to around 50 % of the increase in renewable electricity generation, followed by the European Union, India and Japan. Wind energy accounted for 36 % of renewable power growth.

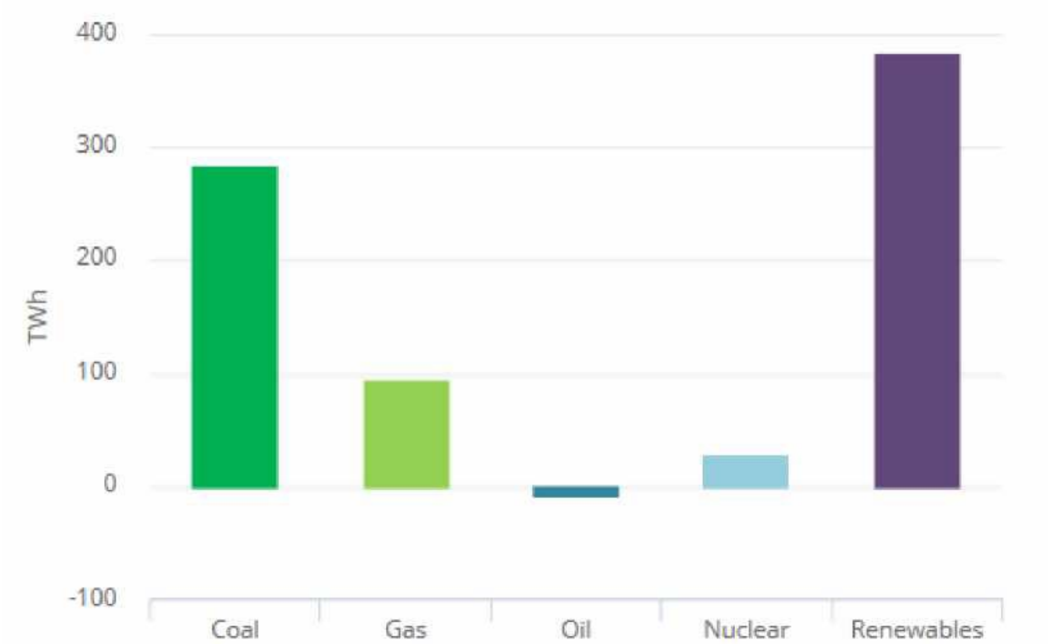
Graph 26: *Average annual growth in world RES production (including comparison with the SDS scenario)*



Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Global electricity demand grew by 3.1 % in 2017, well above the overall increase in energy demand. China and India together accounted for around 70 % of this growth. Electricity production from nuclear power plants increased by 26 TWh in 2017 as a relatively large number of new nuclear capacities were launched.

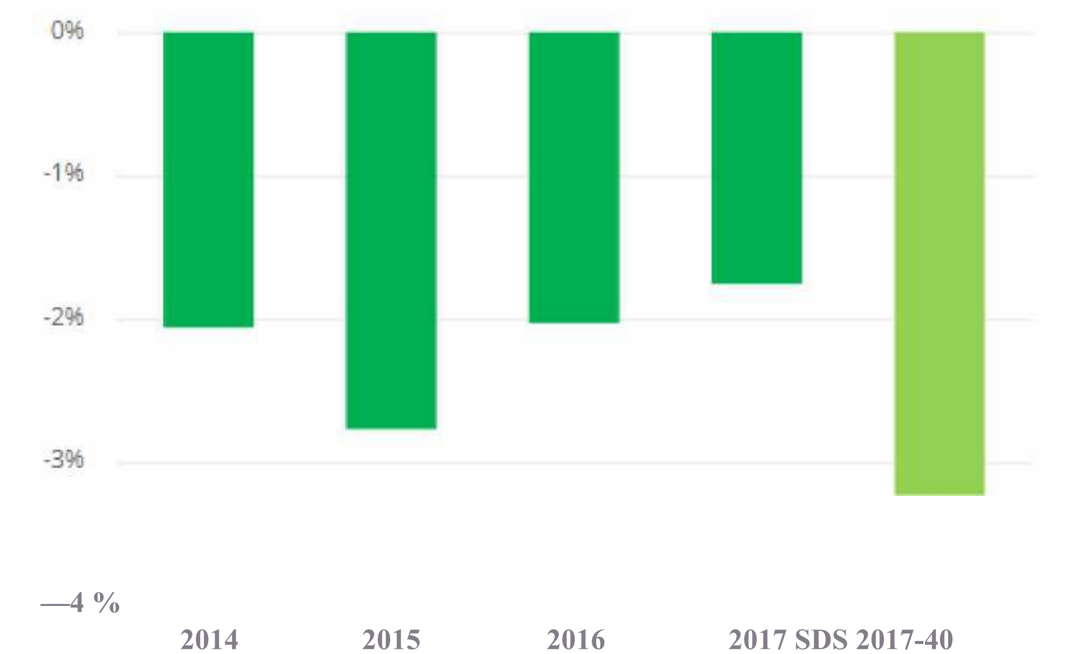
Graph 27: *Change in the fuel electricity production mix between 2016/2017*



Source: International Energy Agency; Global Energy & CO2 Status Report (online)

Global energy efficiency gains slowed dramatically in 2017, mainly due to insufficient policies as well as relatively low prices for basic energy commodities. Global energy intensity improved by only 1.7 % in 2017 and 2.3 % on average over the last three years.

Graf č. 28: *Průměrná meziroční změny energetické intenzity ((včetně srovnání se scénářem SDS)*

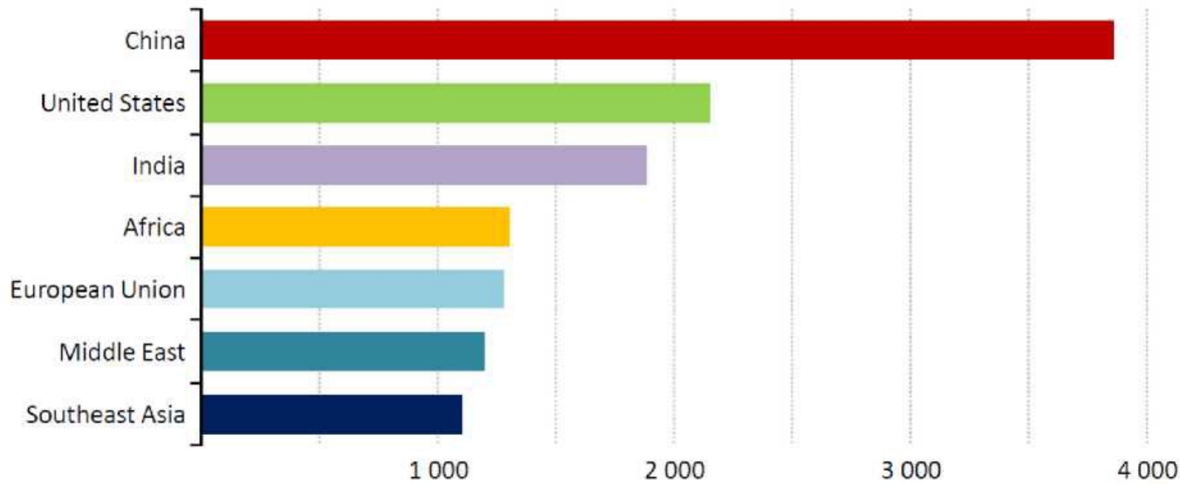


Source: International Energy Agency; Global Energy & CO2 Status Report (online)

World Energy Outlook

In the IEA baseline scenario,97 rising incomes and population growth of around 1.7 billion people, mostly in urban areas in emerging economies, will cause an increase in global energy demand by more than a quarter by 2040. The increase in global demand would then be approximately twice as high if there were no gradual improvements in energy efficiency, which is a strong policy tool to address energy security and sustainability concerns. Almost all of the additional demand growth comes from emerging economies led by India. In 2000, Europe and North America accounted for more than 40 % of world energy demand and emerging economies in Asia around 20 %. By 2040, it is foreseeable that there will be a reversal of these shares.

Figure 29: *World energy demand by country according to WEO 2018 (IEA) in Mtoe*



97The world energy outlook was drawn from information provided by the International Energy Agency (IEA), namely the World Energy Outlook 2018. The baseline scenario refers to the ‘New Policy Scenario’ scenario.

Source: International Energy Outlook (WEO 2018)

A significant shift of energy consumption to Asia is reflected in all fuels and technologies, as well as in energy investment. Asia is expected to account for up to half of global growth in natural gas, a 60 % increase in wind and solar panels, more than 80 % of oil consumption growth and more than 100 % growth in coal consumption and the use of nuclear energy (taking into account the decline in other regions).

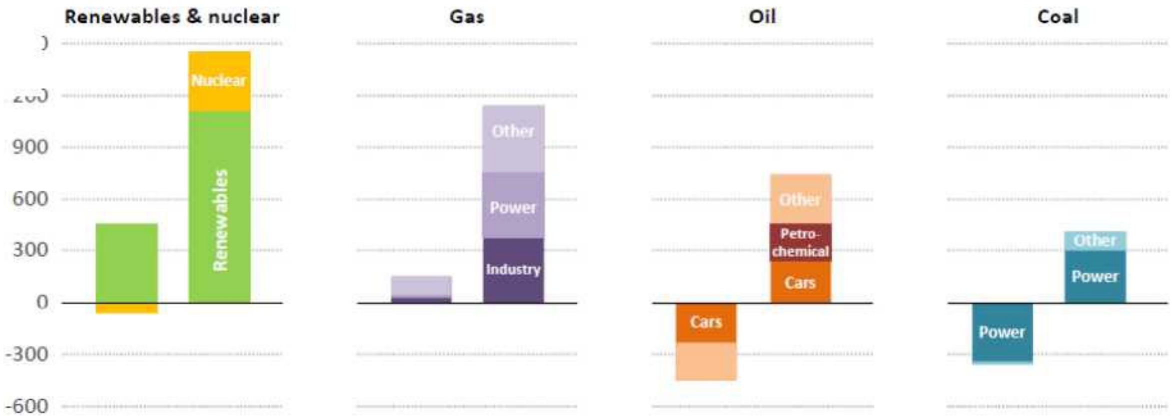
The international energy sector is being transformed in different ways due to shifts in supply, demand and technological trends. International energy trade flows are increasingly directed towards Asia, from the Middle East, Russia, Canada, Brazil and the United States. This is illustrated, inter alia, by the fact that Asia's share of global oil and gas trade is projected to rise from about half to more than two thirds by 2040. New ways of converting energy are also visible at regional level, as digitalisation and increasingly cost-effective renewable energy technologies allow the use of distributed and community-based energy supply models.

The electricity sector has been undergoing its most dramatic transformation since its inception about a hundred years ago. Electricity is increasingly a preferred fuel in economies that are more based on "lighter" industries, services and digital technologies. The share of the electricity sector in global final consumption is currently close to 20 % and its further development can be expected. Support for policies and the reduction of technology costs lead to a rapid growth of variable renewable generation, thus making the energy sector a frontrunner in emission reduction efforts. However, it is crucial to ensure that the whole system works in such a way as to ensure a reliable supply for the future.

The use of coal recorded a year-on-year increase in 2017, after two years of decline, but final investment decisions for new coal-fired power plants were well below the levels observed in recent years. Once the current wave of coal-fired power plants has come to an end, the flow of new coal-fired power plants that will gradually start will slow down after 2020. However, it is too early to depreciate coal from the global energy mix: the average age of coal-fired power plants in Asia is less than 15 years, compared to around 40 years in developed economies. Industrial coal use showing a slight increase up to 2040 can be assumed to have a relative stagnation in world consumption, while the decline in use in China, Europe and North America will be offset by an increase in use in India and South-East Asia.

Figure 30: *Changes in global energy demand by fuel according to WEO 2018 (IEA) in Mtoe*

1 500
1 200



Advanced Developing economies economies
Advanced Developing economies economies
Advanced Developing economies economies
Advanced Developing economies economies

Source: International Energy Outlook (WEO 2018)

Oil use in road transport is expected to peak around mid-2020. However, the use of oil in petrochemicals, cargo, aviation and shipping will still contribute to the overall growth in oil demand. The reduction in consumption in the conventional fleet due to increased propulsion efficiency will lead to a three-fold reduction in demand compared to 3 million barrels per day (mb/d), which will be replaced by ca. 300 million electric cars in road transport in 2040. However, the pace of change and fuel switching in the transport sector, which accounts for around a quarter of total oil demand, is not accompanied by equally rapid changes in other sectors. The petrochemicals industry is expected to be the largest source of oil use growth. Assuming that the overall plastic recycling rate doubles, demand would only decrease at around 1.5 mb/d of the total projected increase of more than 5 mbps/d by 2040. Overall oil demand growth to 106 mb/d in 2040 under the New Policies Scenario scenario comes almost exclusively from emerging economies.

Natural gas is expected to be “frontloaded” coal consumption around 2030 and will become the second largest fuel in the global energy mix. Industrial consumers will account for the largest part of the increase in natural gas consumption at 40 %. Gas trade in the form of LNG will more than double by 2040, especially in response to growing demand from emerging economies led by China. Russia remains the world’s largest exporter of gas due, inter alia, to its expansion in Asian markets, but an increasingly integrated European energy market gives buyers more gas supply opportunities. A higher share of wind and photovoltaic plants reduces the use of gas-fired capacity in Europe and upgrading existing buildings also helps reduce gas consumption for heating. However, gas infrastructure still plays a crucial role, in particular in securing heat demand in winter months and ensuring uninterrupted electricity supply.

4.1.1.4 Historical developments in international oil, coal and gas prices

This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

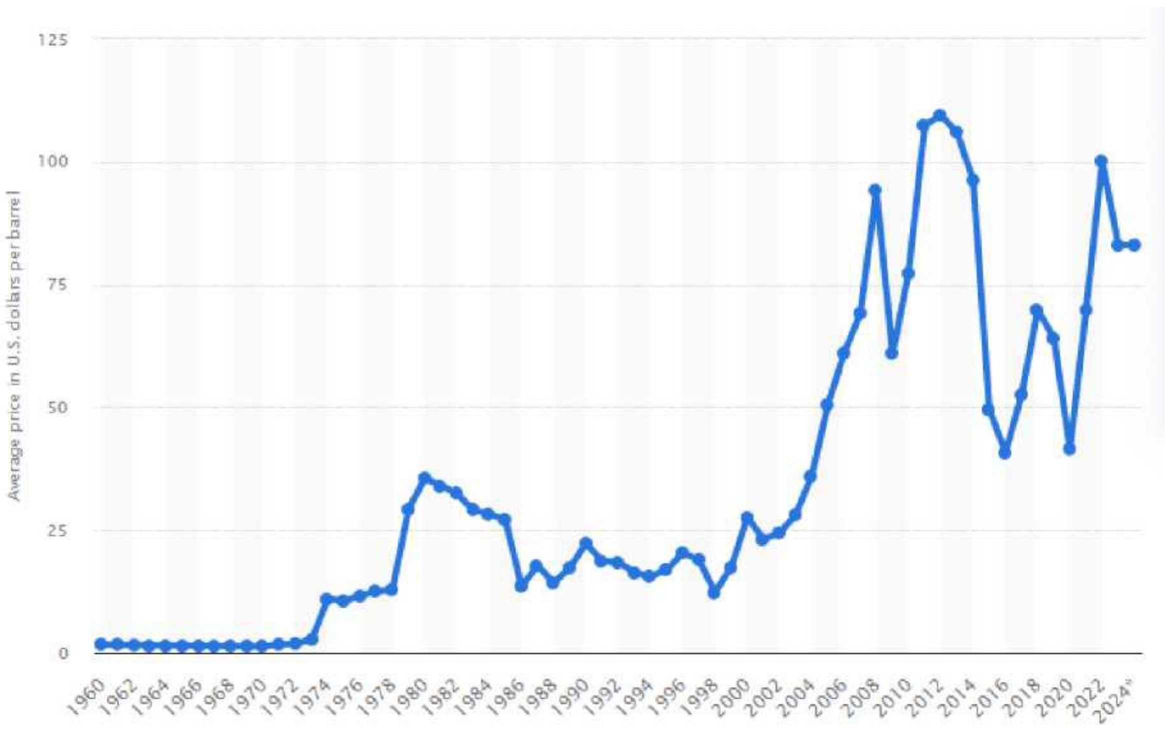
Historical oil price developments

Global oil markets are gradually recovering after four turbulent years, in which they were hit first by the Covid-19 pandemic and then by the invasion of Ukraine by the Russian Federation. Reference oil prices are back below pre-war levels and the ‘crack spread (refiner)’ has now reached historical peaks after rising stocks coincided with a marked slowdown in oil demand growth in advanced economies. The unprecedented reshuffling of global trade flows has made it possible to rebuild stocks for industry, thus alleviating market tensions.

While the market could hypothetically contract significantly as the production of OPEC+ reduced the rise in global oil supply, the outlook is improving over the forecast period 2022-2028. Russia’s invasion of Ukraine has sparked oil prices and raised security of supply concerns, which helped accelerate the deployment of new clean technologies and the ambition in research and innovation in this area. At the same time, the increase in investment in 2023 reached its highest level since 2015. The IEA predictions foresee that major oil producers will implement their capacity-building plans, even if demand growth is slowing down. The resulting spare capacity buffer of at least 3.8 mb/d, concentrated in the Middle East, should ensure sufficient supply to the world oil markets during the forecast period. As always, there are a number of risks in the IEA projections that could affect market balances in the medium term. Uncertain global economic conditions, the direction of the OPEC+ decision and China’s refinery industrial policy will play a key role in balancing oil and product markets. Growth in global oil demand in the second quarter of 2024 slowed down to only 710 kbps/d, the lowest quarterly increase in more than a year. Oil consumption in China, which has for a long time been a driver of growth in global oil demand, declined in April and May, and is now assessed slightly below previous year’s levels in the second quarter. This contrasts sharply with annual profits of 1.5 mb/d in 2023 and 740 kb/d in Q1. Demand for industrial fuels and petrochemical raw materials was particularly weak. By contrast, the second quarter gas oil and diesel supply data for OECD economies were higher than expected, which may signal a start-up in the "defeating" European manufacturing sector. While the recovery has temporarily pushed OECD quarterly demand growth back to positive levels, countries outside the OECD will be responsible for all this year's global gains. Global oil demand growth expectations for 2024 and 2025 remained largely unchanged to 970 kbps/da 980 kb/d.

At the same time, global oil supply grew, with production in the second quartile increasing by 910 kbps/d compared to the first quarter of the United States. Growth is expected to increase by a further 770 kbps/d in the third quarter, with a gain of 600 kbps/d outside OPEC+. For 2024 as a whole, global oil supply growth is projected to increase by an average of 770 kbps/d, increasing oil supplies to a record 103 mbps/d. Outside OPEC+ production is expected to increase by 1.5 mbps/d, while OPEC+ production is expected to decrease by 740 kbps/d year-on-year, provided that the current voluntary cuts are maintained. Global supply growth in 2025 is expected to be much stronger of 1.8 mbps/d, with profits outside OPEC+, notably in the United States, Canada, Guyana and Brazil, for the third consecutive year, 1.5 mb/d. In early June, OPEC+ presented a plan to release an extraordinary voluntary supply reduction of up to 2.2 mb/d from the fourth quarter 2024 to the third quarter of 2025.

Figure 31: Historical oil price developments (www.statista.com: Average annual OPEC crude oil price from 1960 to 2024)



Historical evolution of the price of coal

World hard coal prices, both contractual and current (spot), have traditionally been determined mainly by US and Australian coal prices. Historically, the prices of hard coal in the ports of north-west Europe were relatively stable and then substantially weakened in the context of the emerging global economic crisis. The gradual increase in prices has returned to around 120-140 USD/tonne in the following years. Since then, storage stocks have increased mainly for thermal coal. Over the past decade, coal prices have been volatile, but have tended to be on a downward path. It was only during the 2022 energy crisis that energy coal traded at much higher prices than ever before, driven by 'fundaments', very high prices for the main competing fuel (natural gas) and the so-called 'war premium'. The prices of several energy coal price indicators exceeded the record USD 400/tonne, well above the previous peaks. Moreover, coal prices were more than half a year above coking coal prices, which was unprecedented. As the coal market calmed in 2023, in line with other energy commodities, the price of coking coal returned to a higher level than for thermal coal and the average annual premium increased to 120 USD/tonne in line with historical levels. The relationship between the various coal prices thus shows a return to normal market conditions for fluctuations on the basis of fundamentals. For example, an increased price of hard coal between September 2023 and March 2024 was observed due to weak supply from Australia. Similarly, the 'low-quality' price of Indonesian thermal coal was slightly higher during 2022 and was approaching its 'standard' during 2023 and the first half of 2024, but shows lower price volatility overall.

Figure 32: *Historical evolution of the price of hard coal (USD/tice)*

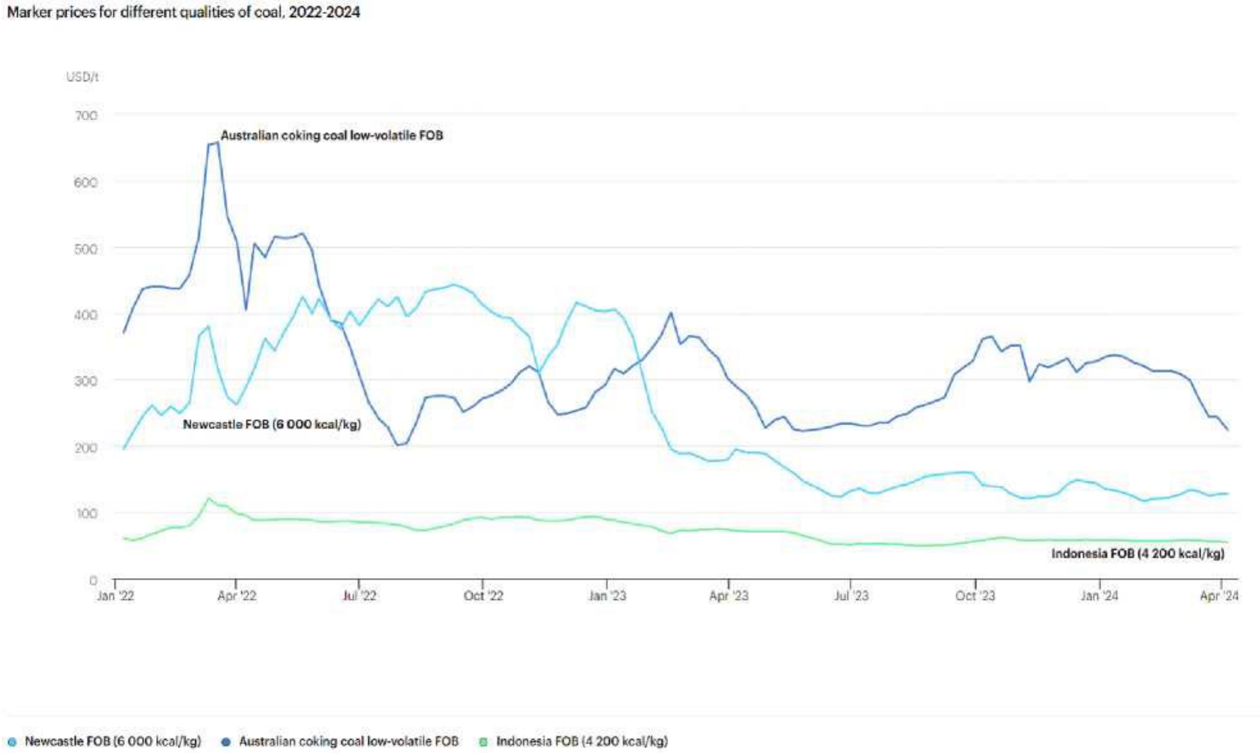
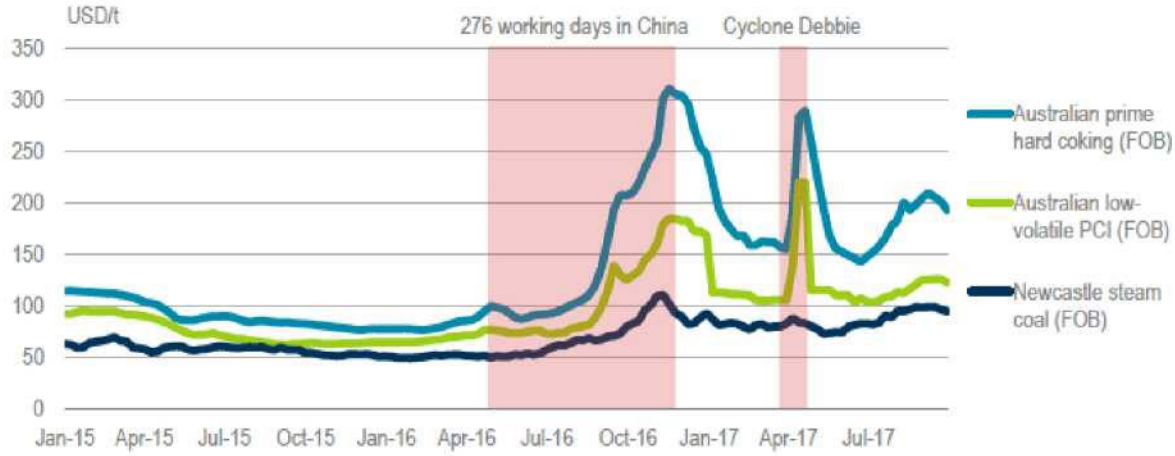


Figure 33: *Historical evolution of coal prices 2015-2017 (USD/t)*



Source: Coal 2017 – Analysis and Forecastst to 2022 (IEA); IHS Energy (2017)

Historical evolution of the price of natural gas

In 2010, international gas trade was still dominated by long-term oil-indexed contracts. This means that the gas price was derived from price developments in reference (competitive) commodities. The mechanism was established in Europe in the 1960s and was later extended to LNG trading in Asia. On the other hand, trading was rapidly dominated in trading centres in the United States, where the price of natural gas was created on the basis of current supply and demand. This form of liberalised market began to spread to Europe in the late 1990s. The first virtual trading hub – National Balancing Point (NBP) – was established in Great Britain. Later, the British pipeline system was connected to Belgium and market trading of natural gas started to be built in north-western Europe

Global natural gas consumption has grown the fastest of all fossil fuels in the long term. The industrialisation of emerging economies in Asia, the Middle East and Latin America has significantly contributed to increasing demand. Thanks to the increasing production and transport of natural gas to liquefied natural gas

(LNG), natural gas was also available in countries that were not located close to its production. According to the IEA, natural gas accounted for about a quarter (6 300 TWh) of global electricity production in 2020. Natural gas production in Europe has been roughly halved since 2010, both due to the decline in continental (Netherlands) and North Sea (UK) mining. Consumption was met by pipeline gas imports from Russia, Norway, North Africa and Azerbaijan and liquefied gas (LNG) imports. According to the IEA, gas from the US (26 %), Qatar (24 %) and Russia (20 %) had the largest share of LNG imports into Europe in 2021. Russia remained the largest supplier of gas to Europe through pipelines, giving priority to supplies on the basis of long-term bilateral contracts. It mainly used the new Nordstream pipelines (beyond the Baltic Sea) to Germany and Turkstream (beyond the Black Sea via Türkiye) to southern Europe for transport. Gazprom, a monopolistic exporter of Russian gas, has progressively restricted the supply of traditional pipelines through Ukraine or Belarus and Poland.

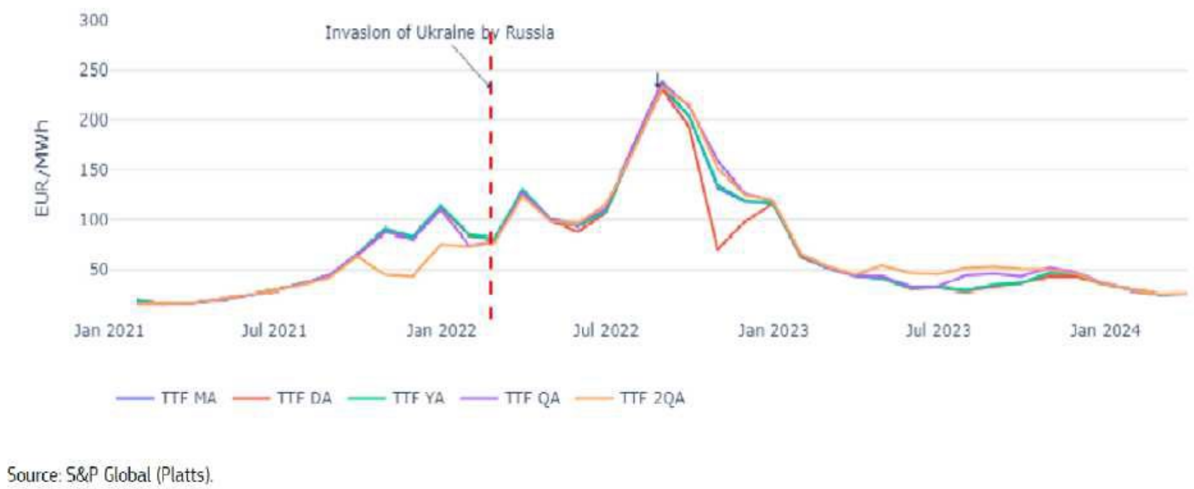
After the 2022 natural gas supply shock and gradual balancing in 2023, gas markets moved to stronger growth in the first half of 2024. First estimates suggest that global gas demand increased by 3 % (year-on-year) year-on-year during this period, well above the historical 2 % average growth rate between 2010 and 2020. Despite this strong growth, the recovery remains fragile. Global LNG production failed in the second quarter, while geopolitical tensions fostered price volatility. During the first quarter of 2024, gas prices fell to the level most recently observed before the global energy crisis, but prices have increased in all key markets in recent months, reflecting stricter supply and demand funds.

The share of imported gas remained stable by pipelines at 59 % in 2024, complemented by LNG imports at 41 %. Norway increased its share of EU gas supplies to 54 % from 50 % in the previous quarter, while the United States retained its 50 % share of EU LNG imports. The EU remained the largest LNG importer in the world, ahead of China and Japan. According to the gas market report, EU gas consumption was 111 bcm, a decrease of 2 % year-on-year and a quarter-on-quarter increase of 16 %, reflecting the usual higher winter demand. EU domestic gas production remained stable at 8 bcm of quarterly production, almost as in the previous quarter, but declined by 26 % compared to last year. The Netherlands remained the largest producer, accounting for one third of EU production (2.7 bcm, 33 %), followed by Romania (2.4 bcm, 29 %) and Germany (1 bcm, 1 %).

Gas storage levels in the EU decreased by 29 %, from 95 % to 68 %, as a quarterly average reflecting higher consumption rates in the winter season. Year-on-year, the storage filling rate was 1 percentage point higher than in the same period of the previous year (67 %), reflecting the continued above-average storage filling rate compared to historical levels. EU gas imports reached 70 bcm, a quarter-on-quarter decrease of 5 % and a decrease of 1 % year-on-year. Pipeline gas accounted for 59 % of imports (41 bcm) and LNG for 41 % (29 bcm).

Pipeline imports into the EU decreased by 5 % compared to the previous quarter and remained stable compared to the previous year. Norway remained the largest gas exporter to the EU with 54 %, followed by North Africa (18 %), Russia (17 %) and Azerbaijan (7 %). Total gross LNG imports to the EU decreased by 5 % quarter-on-quarter and 6 % year-on-year. Compared to 2021, EU LNG imports increased by 91 %. France was the largest importer to the EU with almost a quarter (22 %) of total volumes, followed by Spain (18 %) and the Netherlands (14 %). The United States remained the largest LNG supplier to the EU, accounting for half of EU LNG imports, followed by Russia (20 %) and Qatar (10 %). Russian gas accounted for 19 % of total EU gas imports, an increase of 2 percentage points compared to the previous quarter and an increase of 4 percentage points compared to the first quarter of the previous year. Compared to the first quarter of 2021 (pre-war level), the share of Russian gas recorded a decrease of 30 percentage points (out of 49 %). On average, European wholesale gas prices reached EUR 27.3/MWh in the first quarter of 2024, a decrease of 33 % compared to the previous quarter and 49 % lower year-on-year. February 2024 recorded the lowest wholesale price (EUR 25.7/MWh) since the start of the energy crisis and comparable to the price level most recently recorded in Q2-2021. Asian prices were 6 % or EUR 1.7/MWh higher than European prices as a quarterly average and remained higher throughout the quarter.

Figure 34: *International comparison of wholesale natural gas prices – TTF day-ahead vs forward contracts (EUR/MWh)*

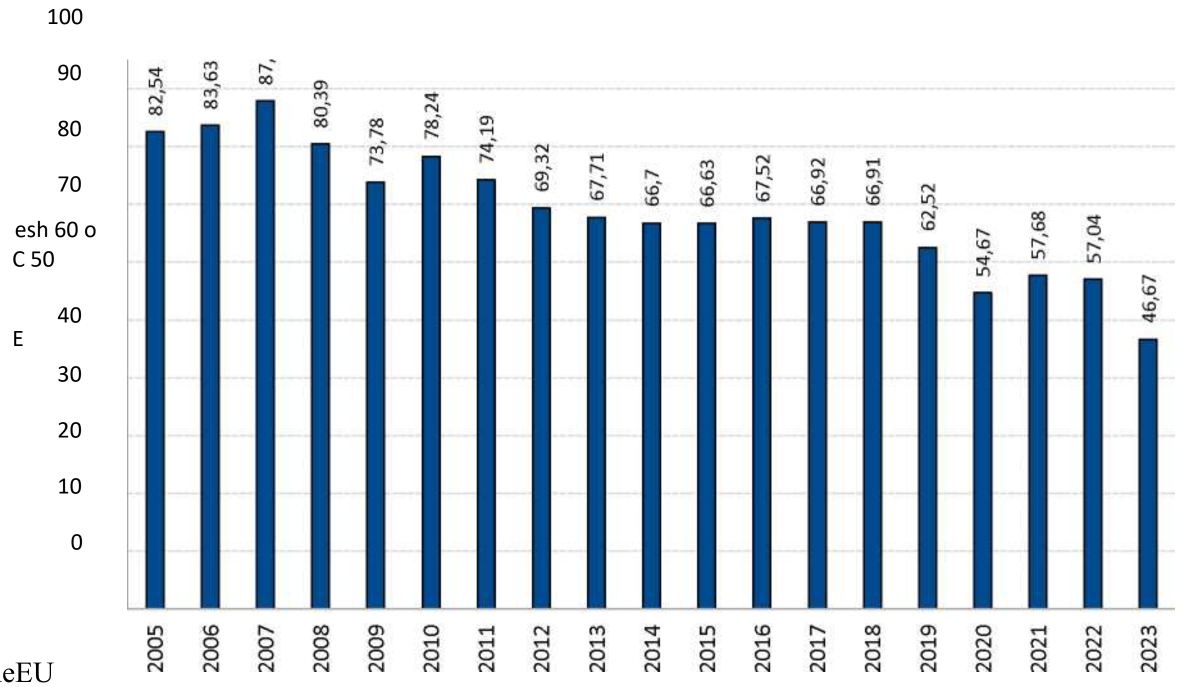


Source: Quarterly report on European gas markets, Volume 17 – issue 1, covering first quarter of 2024 (European Commission, available online)

4.1.1.5 Carbon price in the Emissions Trading System

TheEuropean Emissions Trading System (EU ETS) is a key instrument of EU climate policy as it covers almost half of all EU emissions (36 % according to the two most recent EC reports on the functioning of the EU ETS from October 2021 and December 2022 respectively). Trading in allowances is therefore one of the means of achieving the current target of reducing GHG emissions in the EU by at least 55 % compared to 1990, which means a 62 % reduction in emissions for sectors in the EU ETS compared to 2005. The scheme includes emissions of carbon dioxide (CO_2), nitrous oxide (N_2O)and perfluorocarbons (PFCs), followed by an increase in ambition in terms of reducing greenhouse gas emissions by at least 55 % compared to 1990, meaning a reduction in emissions of 62 % for sectors in the EU ETS compared to 2 005 in ETS1 and 43 % in non-ETS1.

Graph 35: *Verified emissions from stationary installations in the EU ETS (million t CO2eq.)*



TheEU ETS contains solidarity mechanisms with countries below average GDP/ob. (including the Czech Republic) receive more money from auction revenues and through other financial mechanisms (e.g. Modernisation Fund). Furthermore, the system contains a Market Stability Reserve (MSR), which reduces or increases the volume of allowances released to the market so that there is no surplus or shortfall in allowances.

The emission allowance is classified as an investment vehicle. This means that trading in it and its derivatives is subject to strict market protection rules, including legislation, requirements for traders, market surveillance authorities and enforcement tools. Market surveillance is carried out by ESMA (European Security Markets Authority), which, together with the European Commission, regularly presents a report on the state of the market.

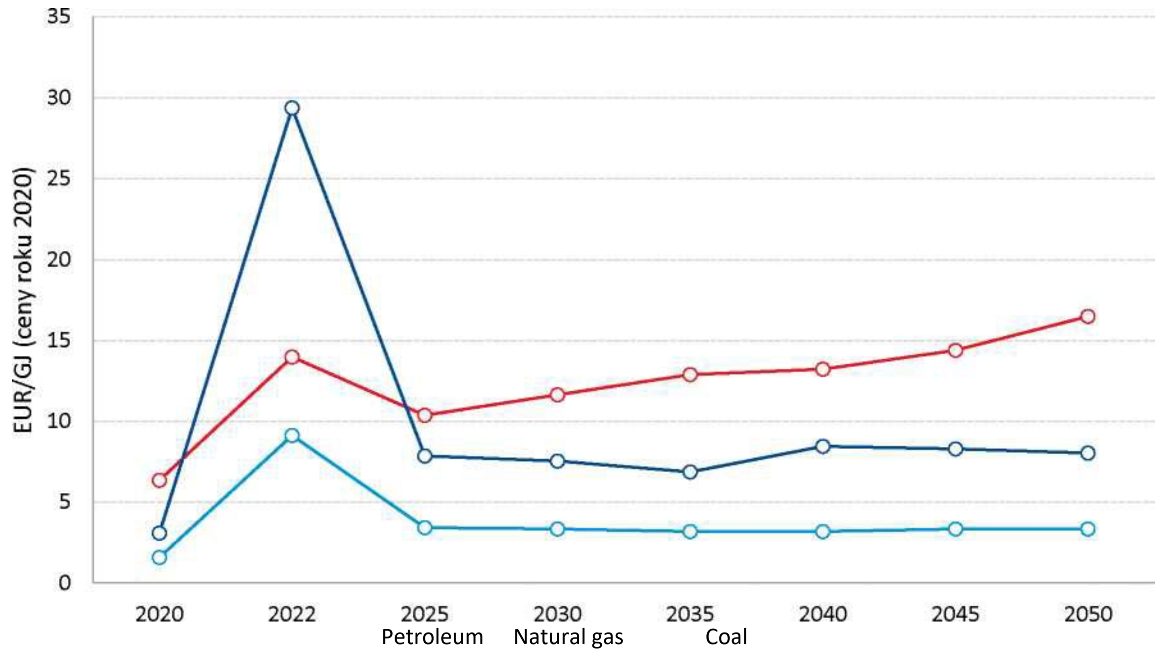
Figure 36: *Projected evolution of the price of emission allowances (ktCO2ev)*

Source: SEEPIA project outputs

4.1.1.6 Prices of internationally traded fuels

Figure 37 shows the outlook for prices of inter-nationally traded fuels (i.e. coal, natural gas and oil) used as input parameters for modelling, drawn from the recommended parameters for reporting greenhouse gas projections in 2025 (June 2024). The use of these parameters has been recommended by the European Commission for the purpose of preparing the update of the National Plans in accordance with Article 18 of Regulation (EU) 2018/1999 of the European Parliament and of the Council.In this regard, it is necessary to recognise that the outlook for internationally traded fuel prices is subject to significant uncertainty, inter alia, given the horizon of this prediction.

Graph 37: *Outlook for oil, gas and coal prices*



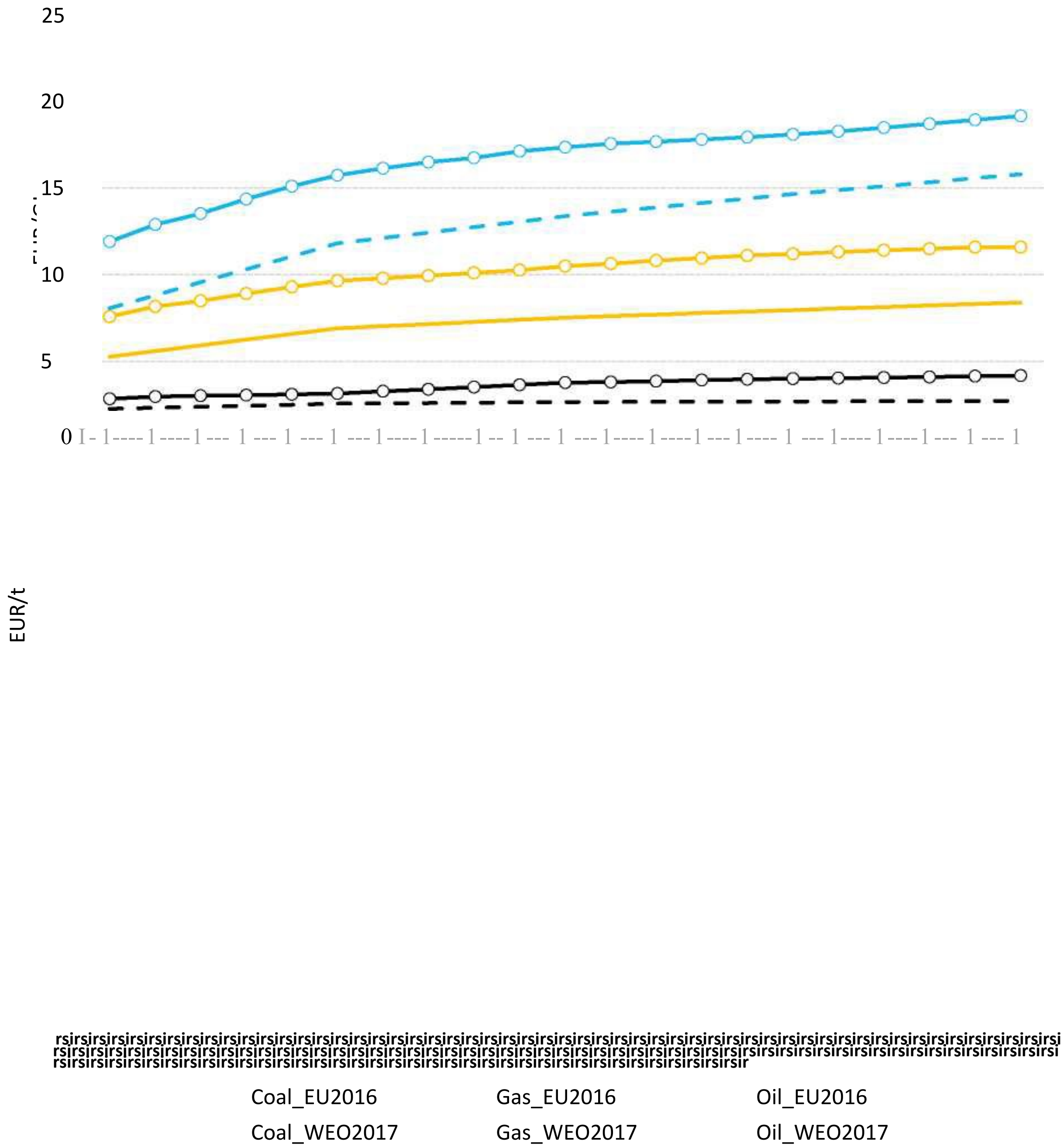
Source: Recommended parameters for the preparation of the national plan

4.1.1.7 Evolution of power electricity prices depending on input assumptions

This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

On the basis of input assumptions about basic fundamentals (in particular the prices of internationally traded energy commodities), the pan-European model created a outlook for the price of power electricity, which further feeds into energy modelling and from which, for example, the costs of future support for renewables are derived in more detail. The outlook is then briefed in a different way, which takes into account the possible uncertainty of future developments. An alternative price source for internationally traded energy commodities (coal, natural gas, oil) based on International Energy Agency resources (namely the 2017 World Energy Outlook) is used for comparison.

Figure 38: *Outlook for the price of base fuels*



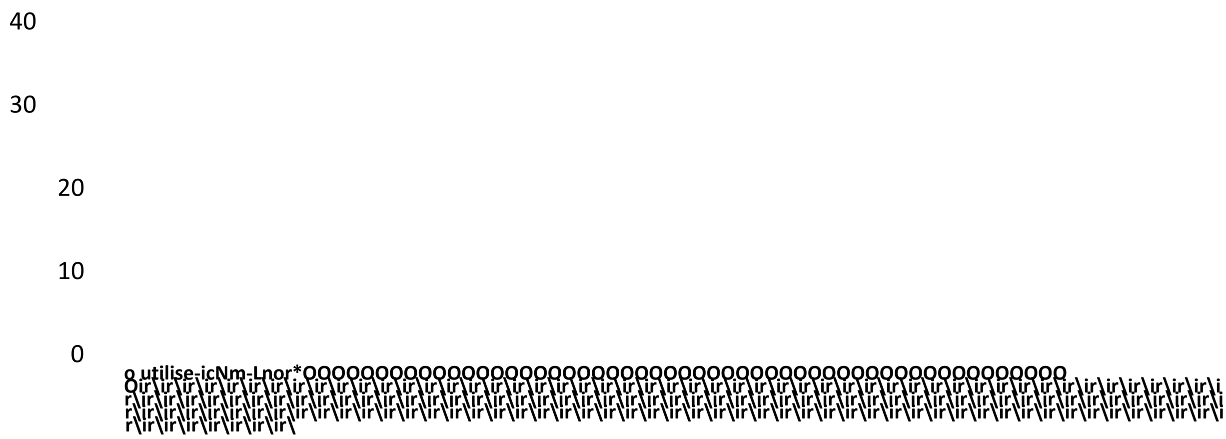
Source: Own analysis based on PLEXOS model

No 39: *Scenarios for the evolution of the price of emission allowances*

CO2_EU2016 —CO2_20

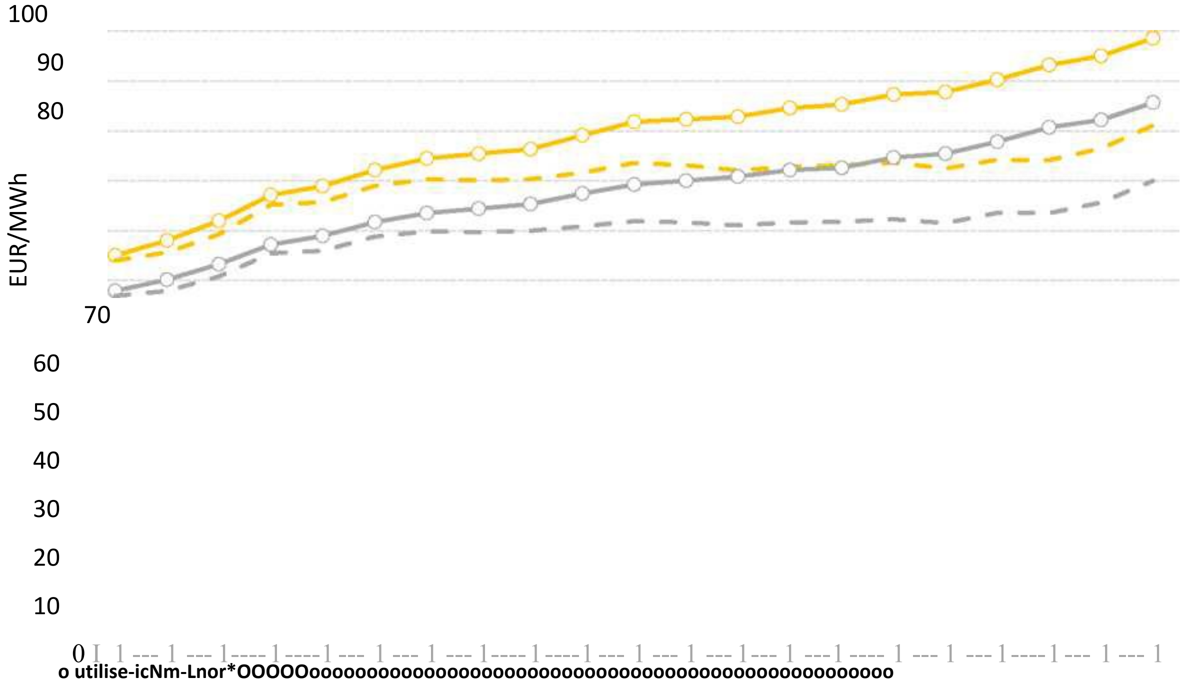
60

50

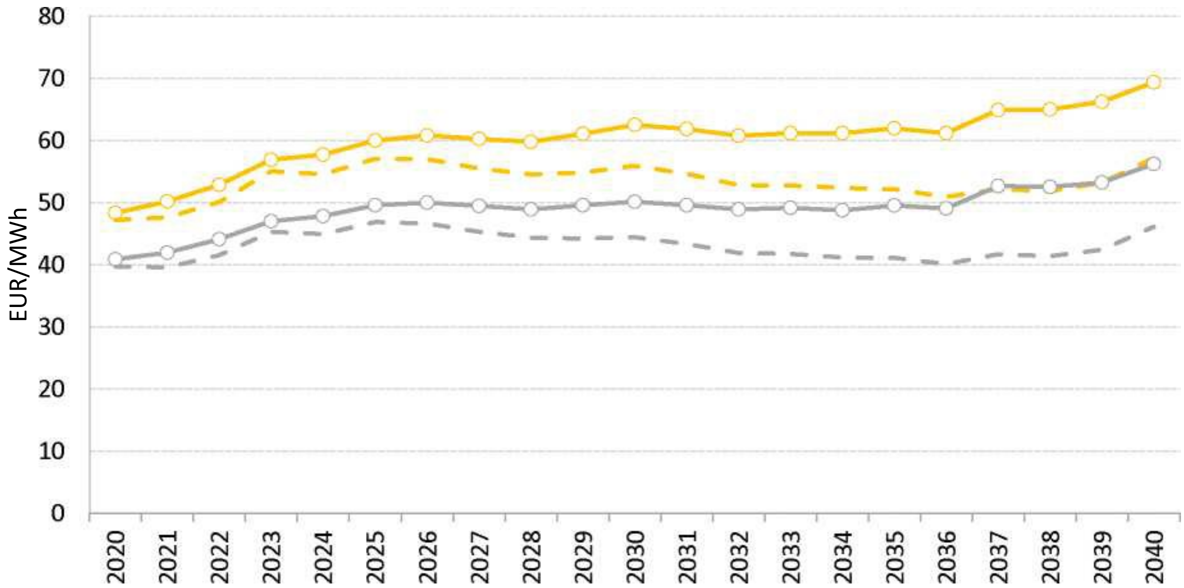


Source: Own analysis based on assumptions for the purpose of developing the National Plan

Figure 40: *Evolution of the power electricity price at the allowance price based on EU 2016 assumptions*



Czech Republic (EU 2016 fuels) De (EU 2016 fuels)
Czech Republic (WEO2017 fuel) De (WEO2017 fuels)



Source: Own analysis based on PLEXOS model

No 41: *Evolution of the power electricity price at the allowance price at EUR 20/tonne*

Czech Republic (EU 2016 fuels) De (EU 2016 fuels)
Czech Republic (WEO2017 fuel) De (WEO2017 fuels)

Source: Own analysis based on PLEXOS model

IV. Technology cost developments

The assumptions for the evolution of the costs of the different technologies used in the modelling are set out in Annex 2.Differentiation of carbon emissions

4.2.1 Greenhouse gas emissions and removals

1. Trends in current GHG emissions and removals in the trading system emissions, Effort Sharing and LULUCF and individual energy sectors

As one of the parties to the United Nations Framework Convention on Climate Change, the Czech Republic is required to prepare and regularly update the national inventory of reporting greenhouse gas emissions and sinks. In addition, membership of the European Union creates additional requirements for the Czech Republic to comply with the obligations specified in Article 26 of Regulation (EU) 2018/1999. The results of the National Inventory Report below present the level of greenhouse gas emissions for the 1990 to 2021 time series. An inventory of greenhouse gas emissions and sinks has been prepared in accordance with the IPCC methodological guideline: IPCC 2006 Guidelines (IPCC 2006).

According to data from the latest available inventory of greenhouse gas emissions and sinks, between 1990 and 2021 greenhouse gas emissions in the Czech Republic decreased by 33.70 % with LULUCF accounting[101] and by 40.70 % excluding LULUCF. The energy sector accounts for the largest share (70 %) of total emissions, 97 % of which is related to fuel combustion. Table 52, Table 53 and Chart 42 show the evolution of greenhouse gas emissions and sinks in this period by greenhouse gas and IPCC sector[102].

101Land use, changes in landscape use and forestry
102Intergovernmental Panel on Climate Change

Table 52: *Greenhouse gas emissions 1990-2021 [kt CO_2 eq.]*

	CO_2[1]	CH_4[3]	N_2BY[3]	HFCs	PFCs	NF_3	SF_6	Total[4]	
								WITH LULUCF	Without LULUCF
1990	164 250,44	26 870,31	7624,44		NO		86,83	192 141,74	200 727,48
1991	148 883,27	25 470,94	6459,90				86,66	172 694,08	182 629,01
1992	145 705,80	23 518,27	5766,47				88,03	166 603,02	176 672,61
1993	140 124,04	22 981,25	5182,96				89,22	159 291,06	169 978,92
1994	132 668,04	21 570,01	5137,37				90,35	151 612,06	160 995,00
1995	131 622,22	21 206,37	5414,42	86,87	0,01	NO	91,40	150 236,87	159 914,11
1996	135 018,67	21 217,99	5217,96	215,43	0,68	NO	101,32	153 824,14	163 237,28
1997	130 941,62	20 620,17	5221,27	388,92	1,62	NO	99,06	150 223,13	158 687,40
1998	125 608,82	19 708,88	5143,84	529,34	1,54	NO	97,89	144 313,17	152 468,54
1999	116 671,89	18 736,52	4967,55	635,90	1,08	NO	98,88	134 000,80	142 387,89
2000	127 235,99	17 660,61	5372,59	799,77	4,43	NO	111,73	143 224,57	152 392,44
2001	127 144,37	16 997,68	5585,50	997,94	9,15	NO	101,85	142 776,88	151 937,44
2002	123 696,96	16 637,44	5201,96	1098,28	15,17	NO	125,00	139 178,98	148 107,87
2003	127 571,70	16 505,88	4811,80	1211,48	8,36	NO	149,14	142 957,05	151 274,67
2004	128 291,63	15 955,20	5393,34	1327,48	12,41	NO	124,32	143 947,30	152 090,42
2005	125 690,74	16 587,31	5270,18	1346,93	14,38	NO	115,28	141 805,92	150 064,01
2006	126 555,14	16 822,60	5175,02	1586,29	29,02	NO	108,34	144 262,44	151 340,23
2007	128 382,09	16 281,80	5232,51	1943,85	27,20	NO	96,67	146 443,55	152 951,02
2008	122 951,00	16 331,96	5261,22	2202,65	37,05	NO	91,39	140 017,34	147 860,74
2009	114 999,01	15 505,13	4513,51	2221,14	42,14	NO	91,79	130 477,32	138 263,06

2010	117 490,71	15 770,66	4435,97	2438,10	44,34	0,14	85,30	134 001,15	141 156,01
2011	115 201,99	15 673,76	4990,98	2648,54	8,08	0,55	91,36	132 016,41	139 535,68
2012	111 298,44	15 610,99	4898,58	2751,78	6,17	0,83	95,28	127 839,89	135 533,90
2013	106 732,70	14 920,32	4672,49	2880,61	4,18	1,32	85,59	122 997,74	130 079,36
2014	104 256,20	14 912,89	4815,86	3060,06	3,12	2,22	82,36	120 878,77	127 913,14
2015	105 022,27	14 972,21	5173,94	3309,69	2,11	2,01	80,67	122 348,18	129 312,28
2016	106 680,87	14 526,36	5310,70	3528,34	1,78	2,01	81,04	124 770,72	130 878,00
2017	107 776,57	14 288,09	5090,67	3742,04	1,97	3,12	76,30	127 184,01	131 682,84
2018	106 358,39	14 190,41	4800,54	3793,36	2,07	2,91	72,72	130 891,68	129 889,85
2019	101 032,69	13 830,19	4741,16	3823,44	1,57	2,36	70,09	131 887,66	124 109,59
2020	91 697,36	13 131,58	4492,15	3734,29	0,97	2,02	67,16	124 987,37	113 719,52
2021	96 665,23	13 232,72	4691,18	3711,40	0,31	1,46	64,68	123 393,65	119 035,64
%[2)]	—41.15	—50.75	—38.79	4172,54	347 619,24	NA	—25.50	—33.70	—40.70

[1] *GHG emissions excluding LULUCF emissions/falls*

[2] *in relation to the base year*

[3] *including LULUCF*

[4] *including indirect emissions*

Source: ČHMÚ

Table 53: *Greenhouse gas emissions and sinks 1990-2021 broken down by IPCC sector [kt CO_2 eq.]*

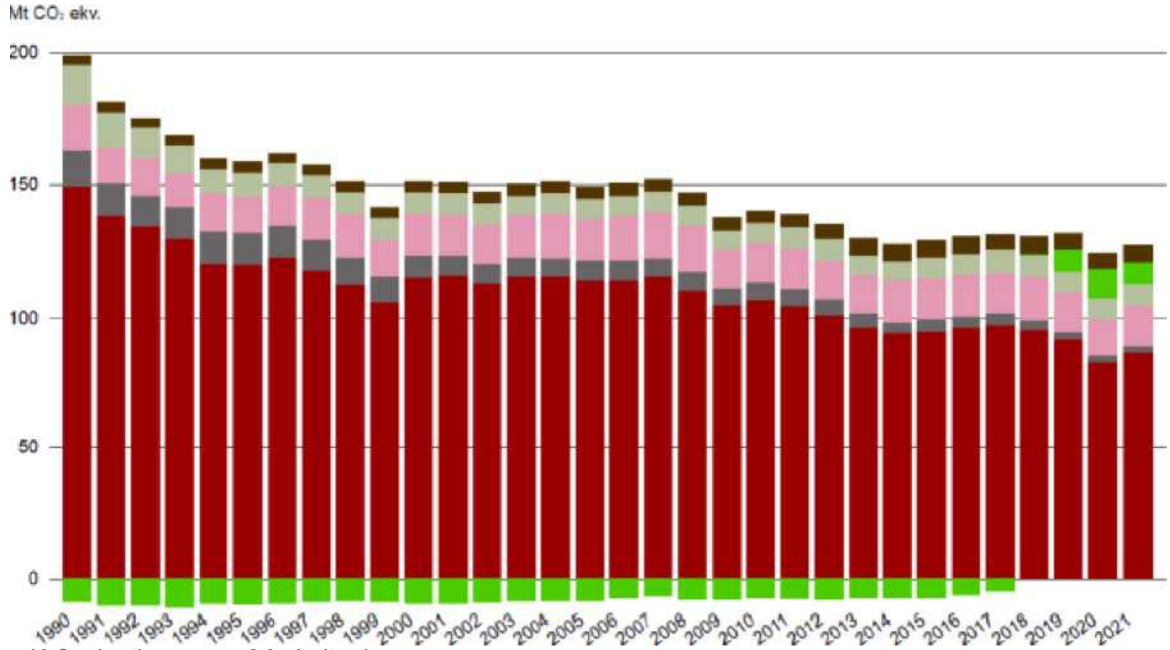
	1. Energy	2. Industrial processes and product applications	3. Agriculture	4. LULUCF	5. Wastes
1990	163 204,26	17 115,22	15 136,37	—8 585,74	3 319,42
1991	150 464,89	13 767,97	13 143,94	—9 934,93	3 482,86
1992	145 724,81	14 522,80	11 318,44	—10 069,58	3 468,80
1993	141 387,77	13 351,21	10 041,84	—10 687,22	3 542,85
1994	132 043,98	14 607,00	9 070,07	—9 382,93	3 689,59
1995	131 369,57	14 160,51	9 170,80	—9 677,24	3 671,07
1996	134 178,42	14 955,97	8 876,50	—9 413,14	3 698,76
1997	128 902,25	15 981,64	8 500,75	—8 464,27	3 815,72
1998	122 822,28	16 137,84	8 140,04	—8 155,36	3 934,44
1999	115 394,71	13 547,35	8 186,73	—8 387,08	3 933,21
2000	123 740,91	15 136,89	8 281,61	—9 167,87	3 979,80
2001	123 673,45	14 423,90	8 544,77	—9 160,56	4 118,03
2002	120 402,12	14 193,17	8 139,80	—8 928,89	4 230,67
2003	122 943,66	15 279,97	7 550,38	—8 317,62	4 378,88
2004	122 614,70	16 238,04	7 841,83	—8 143,12	4 315,41
2005	121 844,35	14 913,51	7 814,76	—8 258,09	4 362,37
2006	121 945,78	16 051,34	7 744,25	—7 077,79	4 425,41
2007	122 756,13	16 782,17	7 950,73	—6 507,47	4 340,86
2008	117 528,02	16 678,58	8 015,36	—7 843,40	4 546,62
2009	111 397,68	14 033,36	7 190,49	—7 785,74	4 658,77
2010	113 218,32	14 880,08	7 146,92	—7 154,86	4 922,25
2011	110 728,26	15 217,04	7 650,75	—7 519,27	4 971,95
2012	106 916,41	14 975,35	7 572,90	—7 694,01	5 145,52
2013	101 483,57	14 852,00	7 484,56	—7 081,62	5 431,57
2014	98 467,15	15 627,44	7 559,94	—7 034,38	5 425,52
2015	99 474,44	15 355,43	8 164,50	—6 964,10	5 512,08
2016	100 718,69	15 437,81	8 405,22	—6 107,28	5 545,24
2017	101 495,95	15 685,00	8 191,44	— 4498,83	5 579,54
2018	99 321,78	16 237,99	7 989,79	1 001,83	5 630,50
2019	94 310,67	15 537,88	7 933,44	7 778,07	5 669,27
2020	84 914,69	14 763,80	7 717,83	11 267,85	5 675,72
2021	88 662,03	16 173,01	7 844,54	8 358,01	5 702,11
[1]%	4.41 %	9.55 %	1.64 %	—25.82 %	0.46 %

2%	—45.67 %	—5.51 %	—48.17 %	—197.35 %	71.78 %

[1] *Difference with respect to previous year*

Source: ČHMÚ

Figure 42: Greenhouse gas emissions and sinks 1990-2021 broken down by IPCC sector [Mt CO_2 eq.]



- 1A Combustion energy • 3 Agriculture’ processes • 4 LULUCF
- 1B Fugitive emissions from mining • 5 waste and fuel treatment
- 2 Industrial Processes and product use

Source: ČHMÚ

Tables 54 and 55 show in more detail the trend of greenhouse gas emissions from IPCC categories for selected years.

Table 54: *Greenhouse gas emissions and sinks for selected years broken down by IPCC categories [kt CO_2 eq.] (Part 1)*

Categories	1990	1995	2000	2005	2010	2015	2020
Total emissions	**190189,53**	**148694,71**	**141971,34**	**140676,90**	**133012,72**	**121542,35**	**124339,90**
1. Energy	**163204,26**	**131369,57**	**123740,91**	**121844,35**	**113218,32**	**99474,44**	**84914,69**
A. Fuel combustion (sectoral approach)	149368,96	120105,03	115192,45	114219,28	106782,40	94541,41	82292,18
1. Energy industry	56830,03	61734,87	62034,93	63138,26	62175,65	53666,27	41 591,71
2. Manufacturing and construction	47105,11	24464,51	23422,11	18842,92	12112,49	9869,85	10 266,13
3. Transport	11249,60	10410,03	12238,29	17365,33	16795,00	17480,41	17 721,56
4. Other sectors	33989,81	23278,66	17318,39	14605,37	15377,55	13152,44	12 397,78
5. Other	194,42	216,95	178,73	267,40	321,70	372,43	315,00
B. Fugitive emissions	13835,30	11264,54	8548,46	7625,07	6435,93	4933,04	2622,51
1. Solid fuels	12637,63	10337,18	7569,76	6623,56	5436,18	4246,64	1 938,58
2. Oil and natural gas and other emissions from energy generation	1197,66	927,35	978,71	1001,51	999,75	686,39	683,93
2. Industrial processes	**17115,22**	**14160,51**	**15136,89**	**14913,51**	**14880,08**	**15355,43**	**14763,80**
A. Mineral industry	4082,45	3019,09	3633,37	3345,75	3048,42	3084,24	3 218,44
B. Chemical industry	2825,39	2694,75	2828,76	2706,44	2330,82	2035,86	1 611,91
C. Metallurgical	9811,61	7981,27	7434,79	7080,15	6610,22	6496,16	5 796,14
D. Non-energy use of products and use of solvents	125,56	103,75	140,30	120,85	123,73	145,37	133,31
E. Electronic Industry	NO,NE	NO,NE	11,16	6,17	38,28	5,20	4,51
F. Use of ODS	NO	86,88	801,88	1356,30	2445,92	3311,42	3 734,87
G. Manufacture and use of other products	270,21	274,78	286,27	297,50	282,43	276,61	263,78
3. Agriculture	NO	NO	0,37	0,36	0,26	0,57	0,84

A. Enteric fermentation	**15136,37**	**9170,80**	**8281,61**	**7814,76**	**7146,92**	**8164,50**	**7717,83**
B. Slurry management	6611,86	4275,50	3604,25	3376,57	3309,43	3492,23	3 631,11
D. Agricultural soils	2571,36	1760,28	1573,66	1311,80	939,40	730,91	777,56
G. Soil silencing	4607,91	2909,89	2869,93	2912,78	2672,69	3502,62	2 988,33
H. Urea application	1236,71	115,86	117,89	67,18	64,53	171,20	164,87

Source: ČHMÚ

Table 55: *Greenhouse gas emissions and sinks for selected years broken down by IPCC categories [kt CO_2 eq.] (Part 2)*

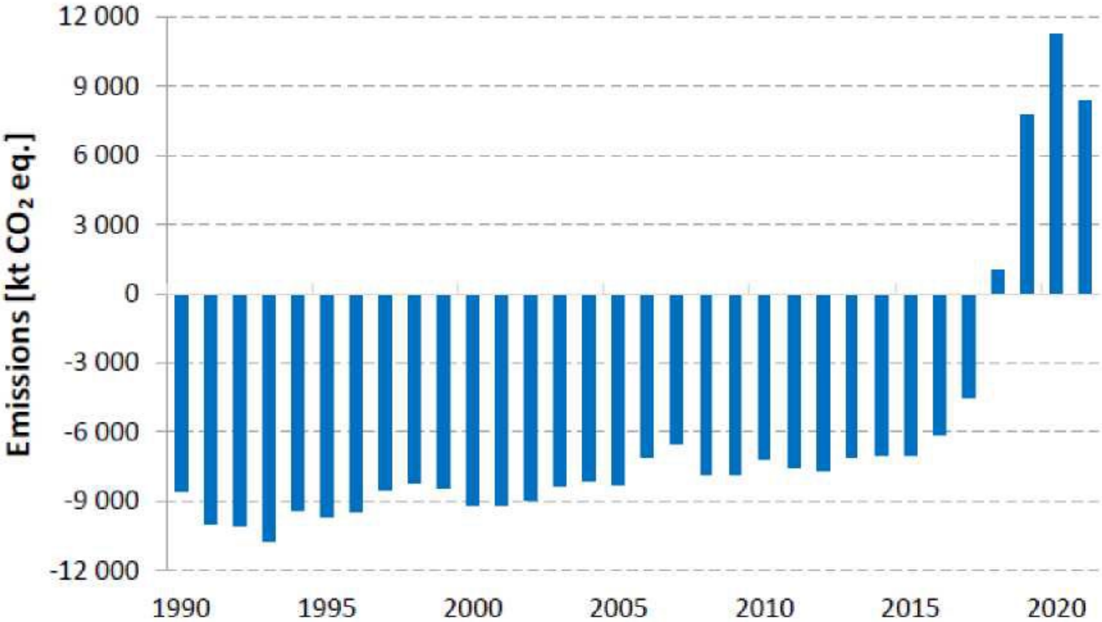
Categories	1990	1995	2000	2005	2010	2015	2020
4. Land use, changes in landscape use and forestry	**—8585,74**	**—9677,24**	**—9167,87**	**—8258,09**	**—7154,86**	**—6964,10**	**11267,85**
A. Forest land	—7222,05	—9009,86	—8010,28	—6878,69	—5543,70	—6325,46	14 239,51
B. Cropland	115,93	153,47	133,19	98,23	108,65	82,65	49,39
C. Pastvina	—143,84	—301,83	—364,80	—361,93	—354,20	—426,22	—477,26
D. Wetlands	24,11	12,16	37,84	24,61	41,15	27,36	36,35
E. Area built-up	318,81	294,74	306,05	292,62	212,78	154,32	211,55
F. Other	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
G. Harvested wood products	—1680,47	—827,19	—1270,88	—1433,82	—1620,46	—477,68	—2 792,16
5. Wastes	**3319,42**	**3671,07**	**3979,80**	**4362,37**	**4922,25**	**5512,08**	**5675,72**
A. Disposal of solid wastes	2007,82	2440,80	2830,43	3072,49	3468,89	3582,05	3 689,00
B. Biotreatment of solid waste	NO,IE	NO,IE	NO,IE	62,64	218,67	749,71	806,82
C. Incineration and open incineration of waste	20,43	59,97	51,22	107,20	120,24	106,36	113,37
D. Waste water treatment	1291,18	1170,29	1098,15	1120,05	1114,44	1073,95	1 066,53
MEMO items:							
International transport	674,58	583,49	498,01	977,37	961,51	904,39	349,06
Emissions from biomass	6445,39	5788,68	6658,56	8758,22	12487,52	16536,42	19 212,76
Indirect emissions N_2O	976,31	502,42	395,99	382,84	326,65	260,15	201,40
Indirect CO_2 emissions	1952,21	1542,16	1253,23	1129,02	988,43	805,83	647,47
Total emissions without LULUCF	**198775,27**	**158371,95**	**151139,21**	**148934,99**	**140167,57**	**128506,45**	**113072,05**
Total LULUCF emissions	**190189,53**	**148694,71**	**141971,34**	**140676,90**	**133012,72**	**121542,35**	**124339,90**

Total emissions including indirectCO_2, excluding LULUCF	**200727,48**	**159914,11**	**152392,44**	**150064,01**	**141156,01**	**129312,28**	**113719,52**
Total emissions including indirectCO_2 with LULUCF	**192141,74**	**150236,87**	**143224,56**	**141805,92**	**134001,15**	**122348,18**	**124987,37**

Source: ČHMÚ

For almost three decades since 1990, the LULUCF sector has compensated on average around 6 % of the Czech Republic's total greenhouse gas emissions per year. During this period, the sector's emission balance was negative, representing the fixation (link)of CO2 in ecosystems. This has changed since 2018, when forestry has tackled historically extreme spruce mortalities, mainly due to an exceptionally dry period in Central Europe. As a result of increased sanitary (random) mining, the forestry sector became a net emitter of CO_2 in 2018-2021, temporarily contributing to the Czech Republic's emissions to a very significant extent. The catastrophic situation peaked in 2020, emissions have fallen since 2020. Historical emissions and sinks from the LULUCF sector are shown in Figure 49 and further forestry outlook is estimated under the scenarios presented in Figure 4.

Graph 43: *Emissions and sinks from the LULUCF sector 1990-2021 [thousand t CO_2 eq]*



Source: ČHMÚ

Verified emissions from stationary sources included in the EU ETS decreased by 30.82 % between 2005 and 2022. Emissions in sectors outside the EU ETS show a rather fluctuating trend between 2005 and 2021. In particular, emissions from the waste and transport sectors are increasing. The Czech Republic has significantly exceeded its target for non-ETS sectors by 2020, which allowed a maximum increase of 9 % in emissions from these sectors compared to 2005, and has sold part of the surplus achieved to the Federal Republic of Germany. In the first year of the new period from 2021 to 2030, the Czech Republic's emissions were also significantly below the allocation for 2021. However, current projections show that in the second half of the new period, the Czech Republic may struggle to achieve the ambitious target of reducing emissions in these sectors by 26 % by 2030 compared to 2005. New or updated measures to achieve this objective should be included in the upcoming update of the Climate Protection Policy in the Czech Republic.

Table 56: *Verified emissions from stationary installations in the EU ETS (mil t. CO2eq.)*

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
EU ETS emissions	82,45	83,62	87,83	80,40	73,78	75,58	74,19	69,32	67,71
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
EU ETS emissions cover.	66,70	66,63	67,53	66,98	66,91	62,52	54,68	57,87	57,04

Source: EUTL

Table 57: *Emissions in non-EU ETS sectors (ESD/ESR) 2005-2021 (mil t. CO2eq.)*

	2005	2006	2007	2008	2009	2010	2011	2012	2013
ESD/ESR emissions	63,06	63,35	61,04	63,51	60,85	62,04	61,99	62,91	61,46
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
ESD/ESR emissions	57,62	61,28	62,82	62,40	60,62	60,54	58,65	59,32	—

Source: EUROSTAT, ČHMÚ

II. Estimates of changes in sectors in application of existing national and Union policies and measures up to at least 2040 (as well as for 2030)

Projections of greenhouse gas emissions are based on data from the latest available inventory of greenhouse gas emissions and sinks described in Chapter 4.2.1. (i). Emission projections include two scenarios (WEM – assuming the effect of current policies and measures on the evolution of greenhouse gas emissions, WAM – assumes the effect of planned policies and measures on the evolution of greenhouse gas emissions).

Projections for sectors 1. Energy and 2. Industrial processes and product utilisation are based on optimisation and simulation of TIMES-CZ (at Czech level) and E3ME (at EU level). The models used, the modelled scenarios and their assumptions are further described in Chapter 5.

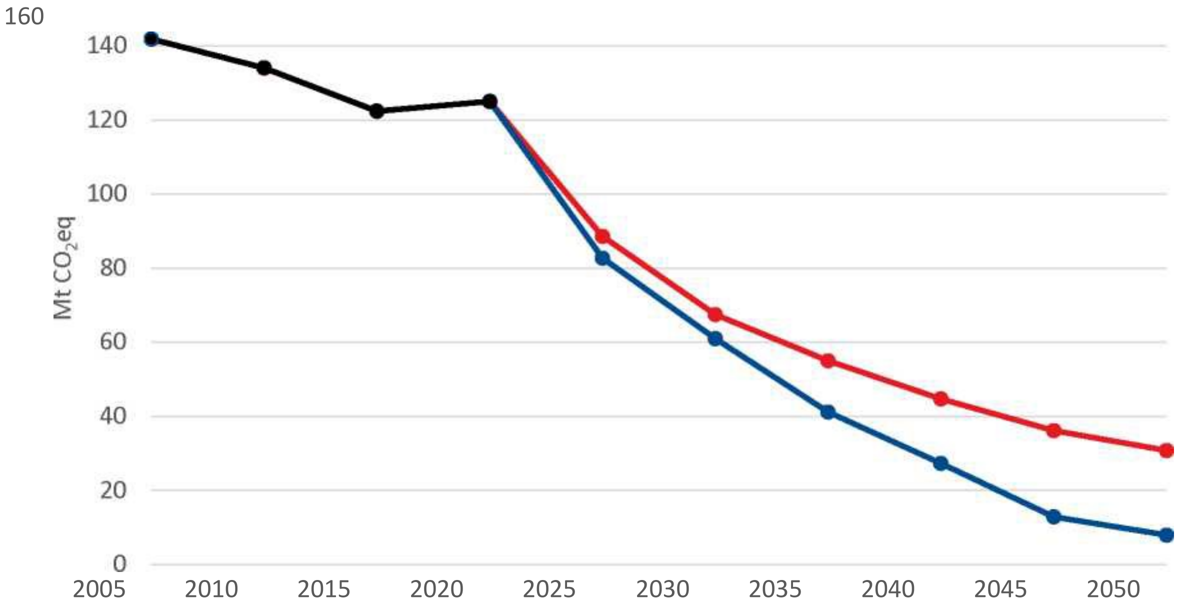
Projections for emission sectors not modelled by the TIMES-CZ model were prepared on the basis of the following projects and studies:

agriculture: projections from the study "Economic Impact Assessment Fit For 55" (ÚZEI, 2023) and the study "Overview of options reducing greenhouse gas emissions from agriculture in the Czech Republic" developed in cooperation with SEEPIA and ARAMIS projects (UK COŽP, 2023);
wastes, excluding emissions from municipal waste incineration plants and F-gases: European Commission Reference Scenario 2020 for the Czech Republic (EC, 2021);
LULUCF – Forestry: IFER 'Green Scenario' projection carried out under TAČR TL02000440 (Cienciala and Melichar, 2022) using the CBAM model. The 2024 'Green Scenario' update was used, including the contribution of harvested wood products.

Figure 44 and WAM scenario see a decrease in total greenhouse gas emissions by 68 % by 2030, 86 % by 2040 and 96 % by 2050 compared to 1990. In the WEM scenario, emissions are reduced by 64 % by 2030, 78 % by 2040 and 84 % by 2050. The larger differences between the two scenarios are particularly evident in the post-2030 period.

it presents the results of projections of total greenhouse gas emissions for the WEM and WAM scenarios.

Graph 44: *Results of projections of total GHG emissions for WEM and WAM scenario (including LULUCF)*



Source: ČHMÚ, SEEPIA

In the WAM scenario, overall greenhouse gas emissions decrease by 68 % by 2030, 86 % by 2040 and 96 % by 2050 compared to 1990. In the WEM scenario, emissions are reduced by 64 % by 2030, 78 % by 2040 and 84 % by 2050. The larger differences between the two scenarios are particularly evident in the post-2030 period.

Table 58: *Results of projections of total GHG emissions for WEM and WAM scenario (including LULUCF) [Mt CO_2 eq.]*

	Historic emissions				**Greenhouse gas emissions projections**					
	2005	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
WEM	141,81	134,00	122,35	124,99	88,55	67,43	54,95	44,65	36,15	30,75
WAM	141,81	134,00	122,35	124,99	82,70	60,96	41,10	27,32	12,85	7,92

Source: ČHMÚ, SEEPIA

Table 59: *Non-EU-ETS GHG projections results for WEM and WAM scenario [Mt CO2eq.]*

	Historic emissions				**Greenhouse gas emissions projections**					
	2005	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
WEM	64,54	62,04	61,28	58,65	55,23	47,52	41,82	34,19	27,56	22,43
WAM	64,54	62,04	61,28	58,65	53,07	41,74	34,64	25,74	13,34	10,27

Source: ČHMÚ, SEEPIA

Figure 62: Results of projections of total GHG emissions for WEM and WAM sector- **by-sector** scenario

	Historic emissions				**Greenhouse gas emissions projections**					
[MT CO2 **eq.]**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
WEM										
1. Energy	121,84	113,22	99,47	84,91	64,55	50,91	44,58	36,83	29,83	25,45
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	13,46	9,77	5,50	3,39	2,28	2,03
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52
WAM										
1. Energy	121,84	113,22	99,47	84,91	59,16	44,48	31,64	20,22	6,77	2,98
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	12,99	9,73	4,59	2,68	2,04	1,67
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52

Source: SEEPIA

Table *63* provides a more detailed view of the results of projections of greenhouse gas emissions from sector 1. Energy, which accounted for almost 70 % of the Czech Republic's total emissions (including LULUCF and indirect emissions) in 2020. For the Energy sector, greenhouse gas emissions are expected to decrease significantly over the 2030 horizon, following a decline in fossil fuel use, and this trend should continue until 2050, following decarbonisation and climate neutrality objectives.

Graph *45* and Table 62 show the results of projections of total greenhouse gas emissions by sector. The most significant decrease in total greenhouse gas emissions compared to the current situation is projected in sector 1. Energy. On the contrary, emissions from the 3 rd agricultural sector and other sectors not included in the EU ETS are decreasing most slowly. Thus, the WEM scenario does not meet the 2030 targets for these sectors. Separate scenarios have not been developed for the agriculture, waste and LULUCF sectors and the WEM and WAM scenarios are identical for these emission categories.

Emissions from energy-intensive industries (production of non-metallic minerals, iron and steel, chemical industry) and other industries mainly depend on the development of production as predicted by the E3ME corrected model in consultation with industry representatives, and the technologies used, including CCS.

A more detailed description of the different scenarios and the differences between them can be found in Chapter 5.

Figure 62: Results of projections of total GHG emissions for WEM and WAM sector- **by-sector** scenario

	Historic emissions				**Greenhouse gas emissions projections**					
[MT CO2 **eq.]**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
WEM										
1. Energy	121,84	113,22	99,47	84,91	64,55	50,91	44,58	36,83	29,83	25,45
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	13,46	9,77	5,50	3,39	2,28	2,03
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52
WAM										
1. Energy	121,84	113,22	99,47	84,91	59,16	44,48	31,64	20,22	6,77	2,98
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	12,99	9,73	4,59	2,68	2,04	1,67
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52

Source: SEEPIA

Table *63* provides a more detailed view of the results of projections of greenhouse gas emissions from sector 1. Energy, which accounted for almost 70 % of the Czech Republic's total emissions (including LULUCF and indirect emissions) in 2020. For the Energy sector, greenhouse gas emissions are expected to decrease significantly over the 2030 horizon, following a decline in fossil fuel use, and this trend should continue until 2050, following decarbonisation and climate neutrality objectives.

Figure 45: *Results of projections of total greenhouse gas emissions for the WEM scenarios under individual sectors*

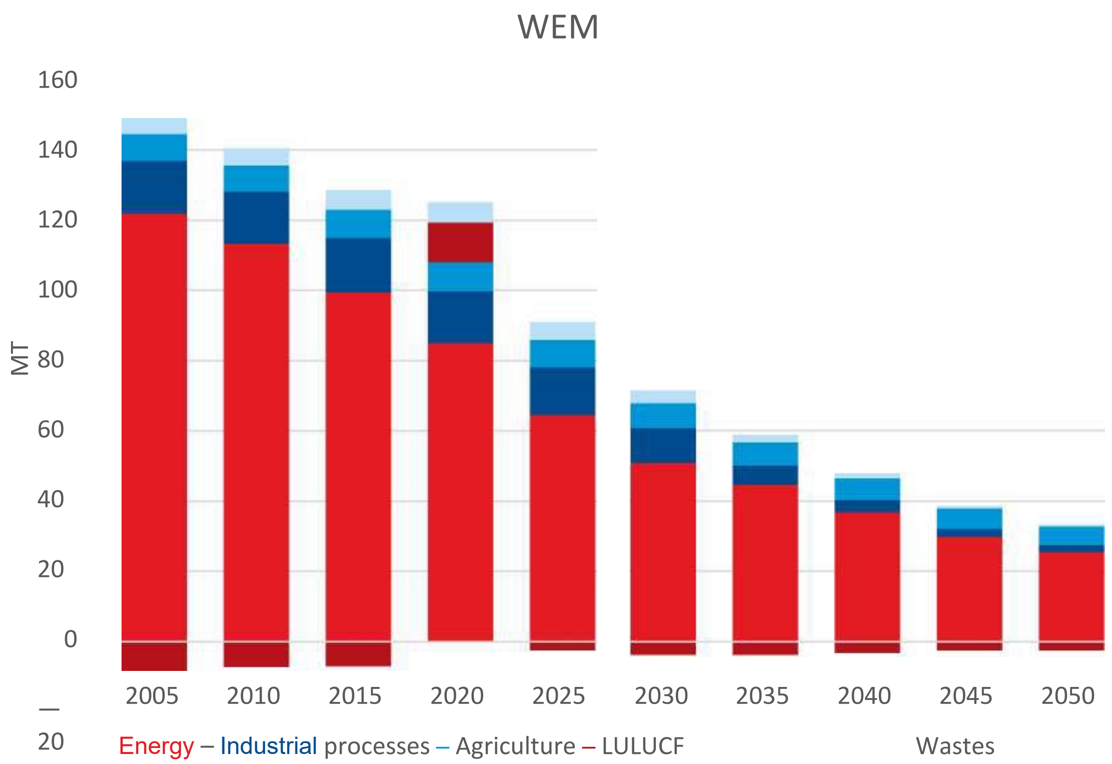
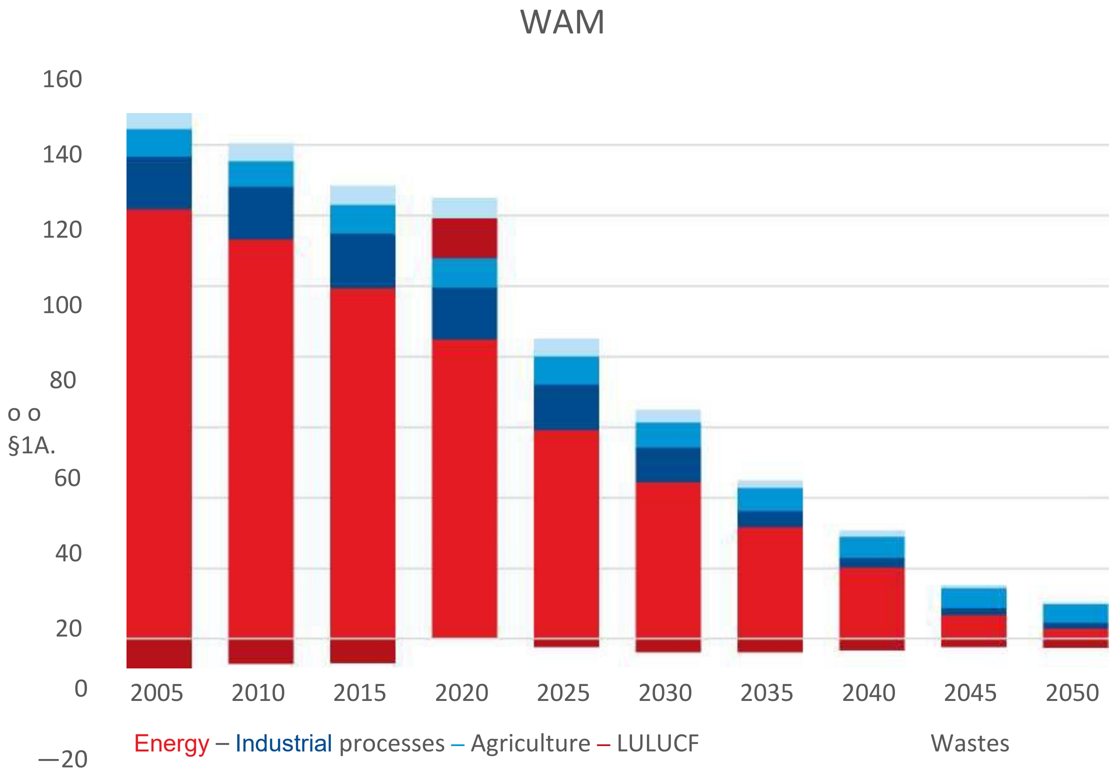


Figure 45: *Results of projections of total greenhouse gas emissions for the WEM scenarios under*
individual sectors



Source: ČHMÚ, SEEPIA

Figure 62: *Results of projections of total GHG emissions for WEM and WAM sector-by-sector scenario*

	Historic emissions				Greenhouse gas emissions projections					
[MT CO_2 eq.]	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
WEM										
1. Energy	121,84	113,22	99,47	84,91	64,55	50,91	44,58	36,83	29,83	25,45
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	13,46	9,77	5,50	3,39	2,28	2,03
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52
WAM										

	Historic emissions				Greenhouse gas emissions projections					
[MT CO_2 eq.]	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
1. Energy	121,84	113,22	99,47	84,91	59,16	44,48	31,64	20,22	6,77	2,98
2. Industrial processes and product applications	14,91	14,88	15,36	14,76	12,99	9,73	4,59	2,68	2,04	1,67
3. Agriculture	7,80	7,41	8,16	8,36	7,90	7,07	6,60	6,14	5,67	5,20
4. LULUCF	—8,26	—7,15	—6,96	11,27	—2,41	—3,78	—3,81	—3,22	—2,42	—2,45
5. Wastes	4,36	4,92	5,51	5,68	5,06	3,46	2,08	1,51	0,79	0,52

Source: SEEPIA

Table 63: *Results of projections of total GHG emissions from the Energy sector for WEM and WAM scenario*

	Historic emissions				Greenhouse gas emissions projections					
[MT CO_2 eq.]	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
WEM										
A. Fuel combustion (sectoral approach)	114,22	106,78	94,54	82,29	62,79	49,76	43,54	35,94	28,97	24,57
1. Energy industry	63,14	62,18	53,67	41,59	23,94	14,53	12,34	9,94	8,03	7,78
2. Processorand construction industry	18,84	12,11	9,87	10,27	8,64	8,07	6,58	5,99	5,67	4,29
3. Transport	17,37	16,80	17,48	17,72	18,45	17,54	15,68	12,33	7,35	3,40
4. Other sectors	14,61	15,38	13,15	12,40	11,76	9,62	8,94	7,67	7,91	9,10
5. Other	0,27	0,32	0,37	0,32	—	—	—	—	—	—
B. Fugitive emissions	7,63	6,44	4,93	2,62	1,75	1,15	1,04	0,90	0,86	0,88
WAM										
A. Fuel combustion (sectoral approach)	114,22	106,78	94,54	82,29	57,52	43,48	31,02	19,87	6,61	2,84

	Historic emissions				Greenhouse gas emissions projections					
[MT CO_2 eq.]	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
1. Energy industry	63,14	62,18	53,67	41,59	20,37	13,18	5,68	1,54	—0,44	—1.96
2. Processorand construction industry	18,84	12,11	9,87	10,27	8,42	7,74	7,00	4,37	3,51	3,74
3. Transport	17,37	16,80	17,48	17,72	18,23	16,77	14,12	11,48	2,05	0,74
4. Other sectors	14,61	15,38	13,15	12,40	10,50	5,79	4,23	2,48	1,49	0,32
5. Other	0,27	0,32	0,37	0,32	—	—	—	—	—	—
B. Fugitive emissions	7,63	6,44	4,93	2,62	1,64	1,00	0,62	0,35	0,16	0,14

Source: ČHMÚ, SEEPIA

(III) Interaction with policy on air quality and emissions to air

The national plan's link with air protection issues was implemented by building on the preparation of the update of the National Emission Reduction Programme. This central air protection strategy document meets the requirements for Member States to draw up national air pollution control programmes under Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants. This Directive also sets national emission reduction commitments, known as emission ceilings, for 2020, 2025 and 2030.

The update of the National Emission Reduction Programme is currently under preparation. The preparation is coordinated with the preparation of the National Plan, as it uses its structures and parameters as input assumptions for calculating the emission projections of selected air pollutants. The revised national emission projection prepared and reported as of August 2023 indicates that, as of 2025 and 2030, the Czech Republic will meet all the established national emission reduction commitments without the need to lay down additional measures to reduce emissions of monitored pollutants (SO_2, NO_X, volatile organic substances other than methane (NMVOC), ammonia (NH_3) and primary $PM_{2.5}$. However, close attention needs to be paid to ammonia emissions as there are some risks of non-compliance with national commitments given the results of the national emission projection. The following update of the national emission projection in 2025 will be key for further assessment.

The NPSE update also assessed the contribution of foreign sources to air pollution in the Czech Republic. According to modelling results with an advanced chemical model, the relative contribution of foreign sources to the average annual concentration of PM_{10} in most territories is 30-60 %, but it may be lower in areas with higher pollution from Czech sources (e.g. local heating, industrial or mining activities). In border areas, or in areas with no Czech sources, it ranges between 60–80 %. For PM2.5,$_{the}$ situation is similar, only the contribution from foreign sources is on average 5 % higher.

In particular, increasing the share of non-combustion renewable energy sources, increasing energy efficiency, improving energy intensity and increasing the use of waste heat can be seen as positive interventions in this area with a positive impact on air quality. Furthermore, from the perspective of SO2 emissions, the positive substitution of fossil fuels (primarily coal) is by other energy sources, but the emissions projection developed shows compliance with the set emission reduction commitments for SO_2 with a significant margin, for all years analysed (2020, 2025, 2030). Problematic in terms of maintaining and improving air quality is the heat production sector in sources with a rated thermal input of up to 300 kW, i.e. the residential district heating sector, where the national plan envisages a significant share of the target for renewable heat production. The increased use of biomass is linked to air pollutant emissions, which need to be offset by technological change in resources and by improving the quality of resource management, which are ensured by the requirement to operate boilers of at least 3 rd and higher classes (according to ČSN EN 303-5) from 2024, by a set of subsidy titles to promote the exchange of resources and by measures to raise awareness among resource operators of the correct heating method (measure DB11).

The road transport sector accounts for about 28 % of total nitrogen oxide emissions and is the most important source of these emissions to air. Emission reductions can be achieved by a higher fleet renewal rate and a stronger expansion of alternatively fuelled vehicles, both for passenger and trucks and for public transport vehicles (e-mobility and hydrogen mobility), but a zero-emission method of producing these fuels instead of fossil-based production needs to be sought. There is also significant potential for shifting transport performance from road to rail, as targeted by measure AB23 Update of the NPSE. The different options for meeting the set share of renewables in transport do not differ significantly in terms of total transport emissions, and higher electricity representation leads to a positive displacement effect of emissions from transport-loaded locations, thus reducing the impact on air quality. An increase in the share of natural gas/biogas at the expense of conventional fuels (petrol and diesel) has some positive impact on emission reductions. The Czech National Emission Reduction Programme contains a comprehensive measure ‘Additional emission reductions for 2030 from the road transport sector’, which envisaged an additional reduction in emissions from the transport sector, based on the conclusions of the analytical and conceptual documents ‘Analysis of vehicle charging in the Czech Republic’ and the update of the National Action Plan Clean Mobility’. Given that the conclusions of the first of these documents were vague in view of the objectives of the Czech National Emission Reduction Programme, the project ‘Prediction of emission savings from road transport by 2030 achieved through the application of selected tax and tax instruments’, supported by the TA ČR programme ‘Measures for Life’, was created. The solution to project SS03010156 is CDV and partner organisations (CO-P UK, MENDELU, YE). The main objective of the project is to evaluate the possibilities of achieving the reduction target of 5 kt of NO_X emissions from transport by 2030 compared to the NPSE-WM scenario (defined by the 2019 National Emission Reduction Programme of the Czech Republic) using tax and fee instruments. The project will end in 2023.

Ammonia is a problematic pollutant, with emissions from more than 90 % from agriculture. The Czech Republic’s National Emission Reduction Programme contains several measures directed towards this sector and, as part of the ongoing update, measures that have not yet been met will be reformed in order to maximise their impact and to ensure cooperation with the Ministry of Agriculture.

Overall, following the update of the National Emission Reduction Programme, it is proposed to maintain 3 priority measures to reduce emissions of selected air pollutants, 13 support measures and 6 cross-cutting measures. None of these measures are redefined, most of them persist from the 2019 update, and a small part from the Czech National Emission Reduction Programme approved in

2015. Some measures were complied with and were therefore removed from the catalogue of measures. Similarly, measures whose further implementation was no longer possible or effective on the basis of binding decisions or analyses carried out have been discarded. The measures are mainly targeted at the public energy sectors, heat production, domestic local heating, transport and the agricultural sector.

Table 64: *National emission projections for 2025 and 2 030 in kt/year*

	NOX		NMVOC		SO2		NH3		PM 2.5	
Emissions 2005 (kt)	283		343		208		74		74	
Emissions 2021 (kt)	140		261		61		67		59	
Commitment 2025	49 %	(144 kt)	34 %	(226 kt)	55 %	(94 kt)	14 %	(64 kt)	38 %	(46 kt)
2030 Pledge	64 %	(102 kt)	50 %	(171 kt)	66 %	(71 kt)	22 %	(58 kt)	60 %	(30 kt)
Projection 2025 (kt)	99		163		46		60		29	
Projection 2030 (kt)	84		151		36		58		26	

Source: ČHMÚ

4.2.2 Renewable energy

i. Current share of energy from renewable sources in gross final consumption of energy and by sector (heating and cooling, electricity and transport), as well as technologies in each of these sectors

The overall share of renewable energy sources in gross final energy consumption according to the EUROSTAT methodology reached 17.67 % in 2021. Table 65 shows the evolution of the share of renewable energy sources in gross final consumption in 2010-2021.[103] Figure 47 presents the same graphically.

Table 65: *Share of RES in gross final consumption 2010-2021 (percentage)*[104]

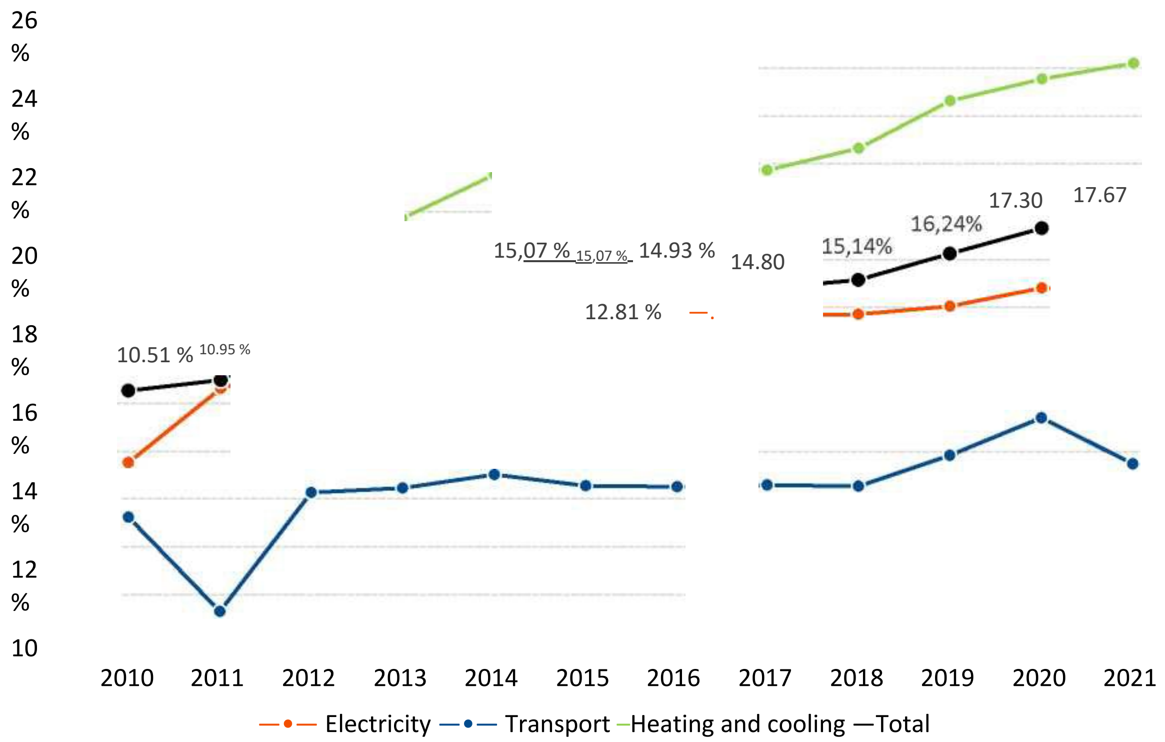
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electricity	7,52	10,61	11,67	12,78	13,89	14,07	13,61	13,65	13,71	14,05	14,81	14,54
Transport	5,22	1,29	6,25	6,44	7,00	6,54	6,5	6,62	6,56	7,84	9,38	7,49
Heating	14,1	15,39	16,25	17,71	19,53	19,79	19,88	19,73	20,64	22,63	23,53	24,19
Total	10,51	10,95	12,81	13,93	15,07	15,07	14,93	14,80	15,14	16,24	17,30	17,67

Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

103 More information is available within the statistics of the Ministry of Industry and Trade (link)

104 In view of the approval of the Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, there has been a partial change in methodology (in particular in the field of transport). This methodology is also applied for the period before 2020.

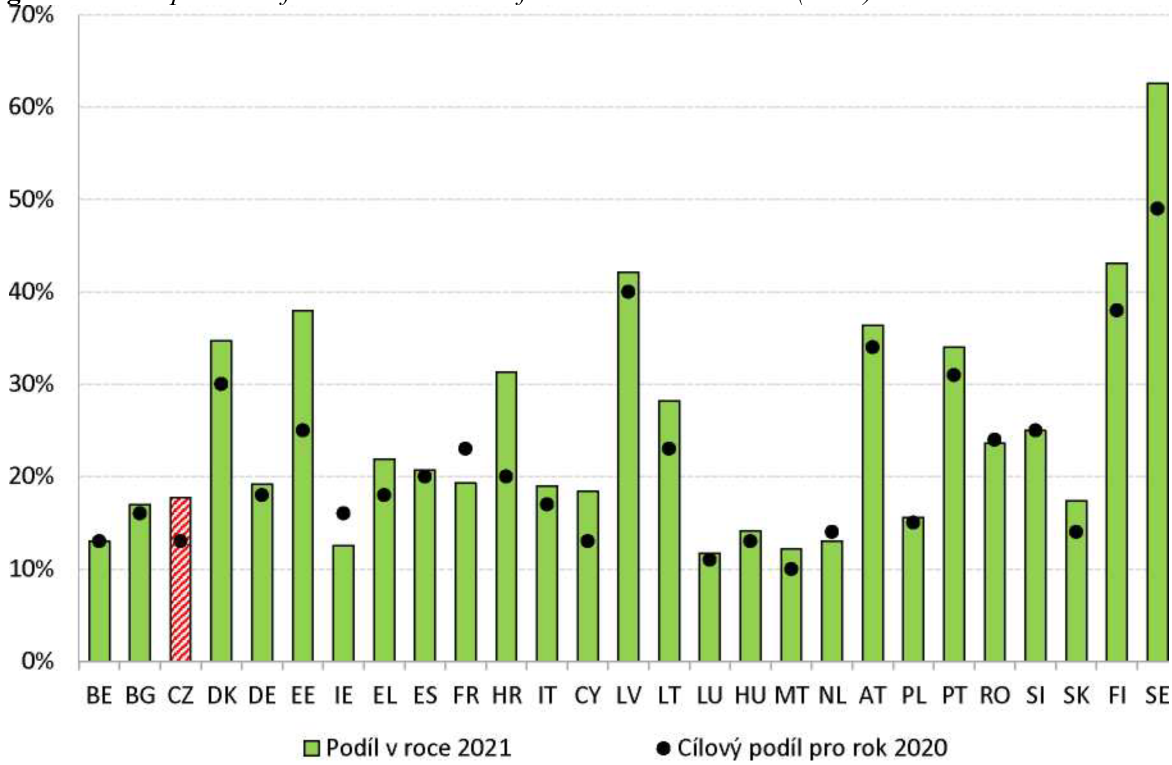
Figure 47: *Share of RES in total gross final consumption*



Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

The following graph shows the comparison of the share of renewable energy sources in each Member State in 2 021 in the EUROSTAT methodology, including the 2020 renewable share targets for each Member State.

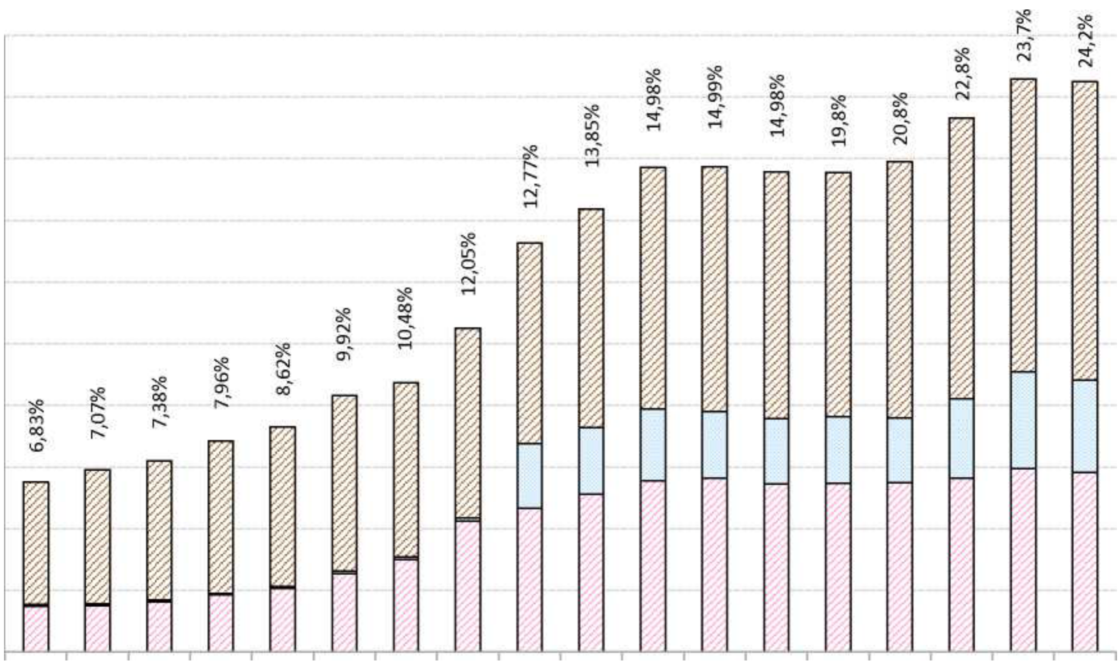
Figure 48: *Comparison of the overall share of renewables in the EU (2021)*



Source: share of RES based on EUROSTAT methodology (link)

Figure 50 shows the evolution of the share of renewable energy sources in gross final consumption in the electricity sector since 2004, broken down by fuel. In 2021, the share of renewables in the energy sector reached 14.54 %. Renewables used in electricity production account for approximately 3.01 % of the total share. Graph 51 shows the evolution of the share of renewable energy sources in gross final consumption in the transport sector between 2004 and 2021, broken down by fuel. Renewable energy consumption reached 7.49 % of total gross final consumption in the transport sector in 2021. The share of renewables in transport contributes only around 1.28 % to the overall share. Graph 52 then shows the evolution of the share of renewable energy sources in the heating and cooling sector, broken down into individual fuels, which accounts for the largest share at around 10.60 % of the total share. The share of renewables in the heating and cooling sector is also the highest compared to other sectors, compared to 24.19 % in 2021.

Graph 49: *Share of RES in gross final consumption (contributions by 'sectors') in 20042021*



50 %

45 %

40 %

35 %

30 %

25 %

20 %

15 %

10 %

5 %

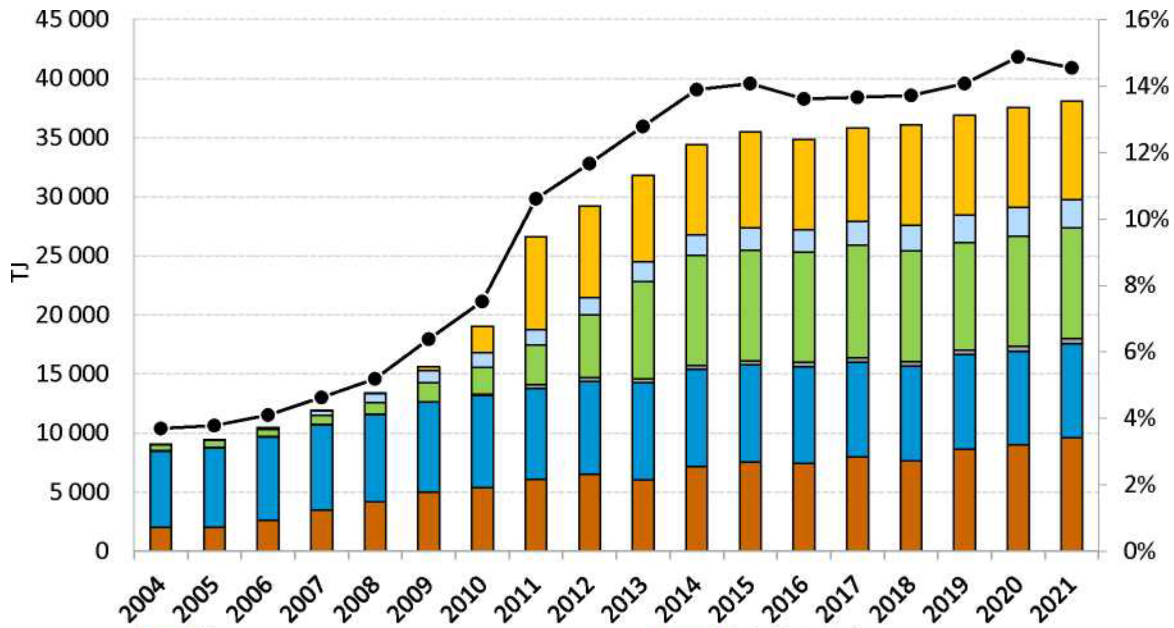
0 %

EL Electricity □ Transport 0 Heating and cooling

Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

Figure 50: *Share of RES in gross final consumption in the electricity sector 2004-2021*

—•— Share

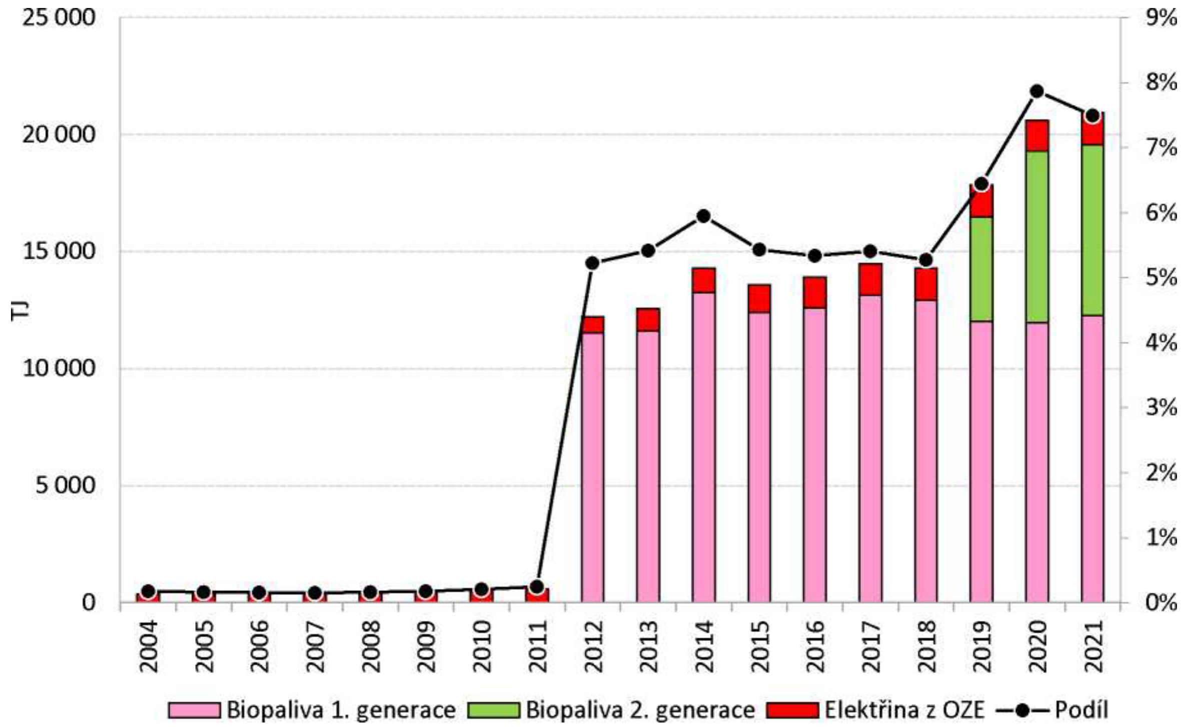


Biodiverse part of MSW

Biogas plants (and biogas from the network)

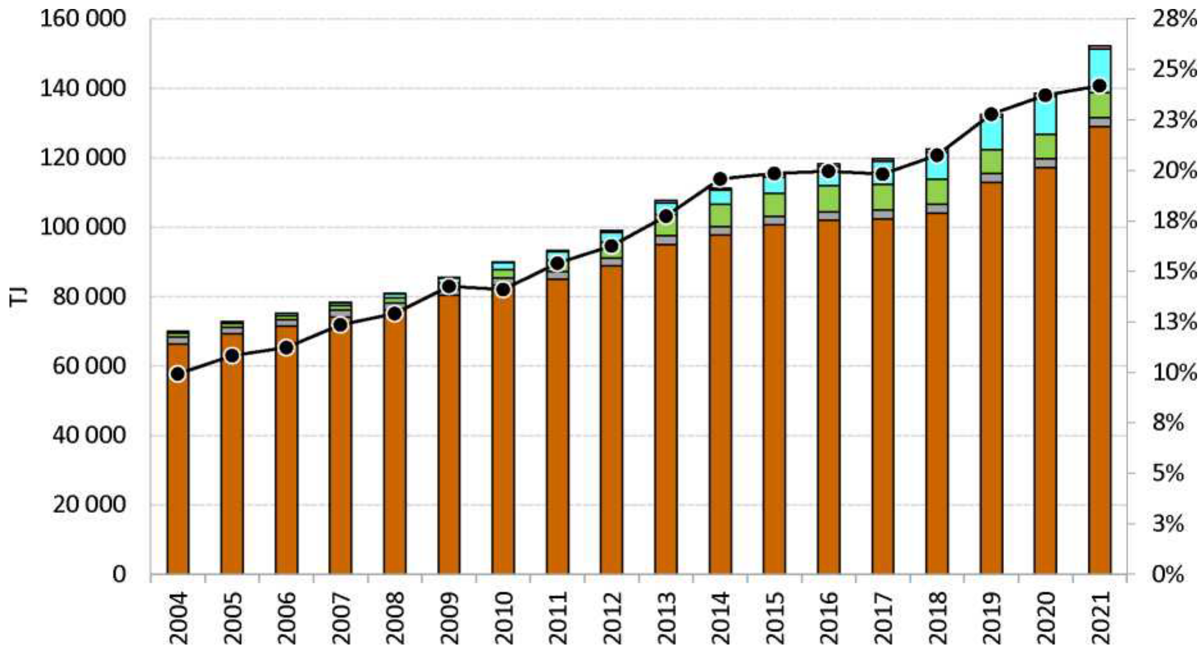
Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

Figure 51: *Share of RES in gross final consumption in the transport sector 2004-2021*



Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

Figure 52: *Share of RES in gross final consumption in heating and cooling sector 2004-2021*



Biomass Biodiverse part of MSW Biogas station
Heat pumps Solar thermal collectors – Share

Source: share of RES based on EUROSTAT methodology (MPO, Czech Statistical Office)

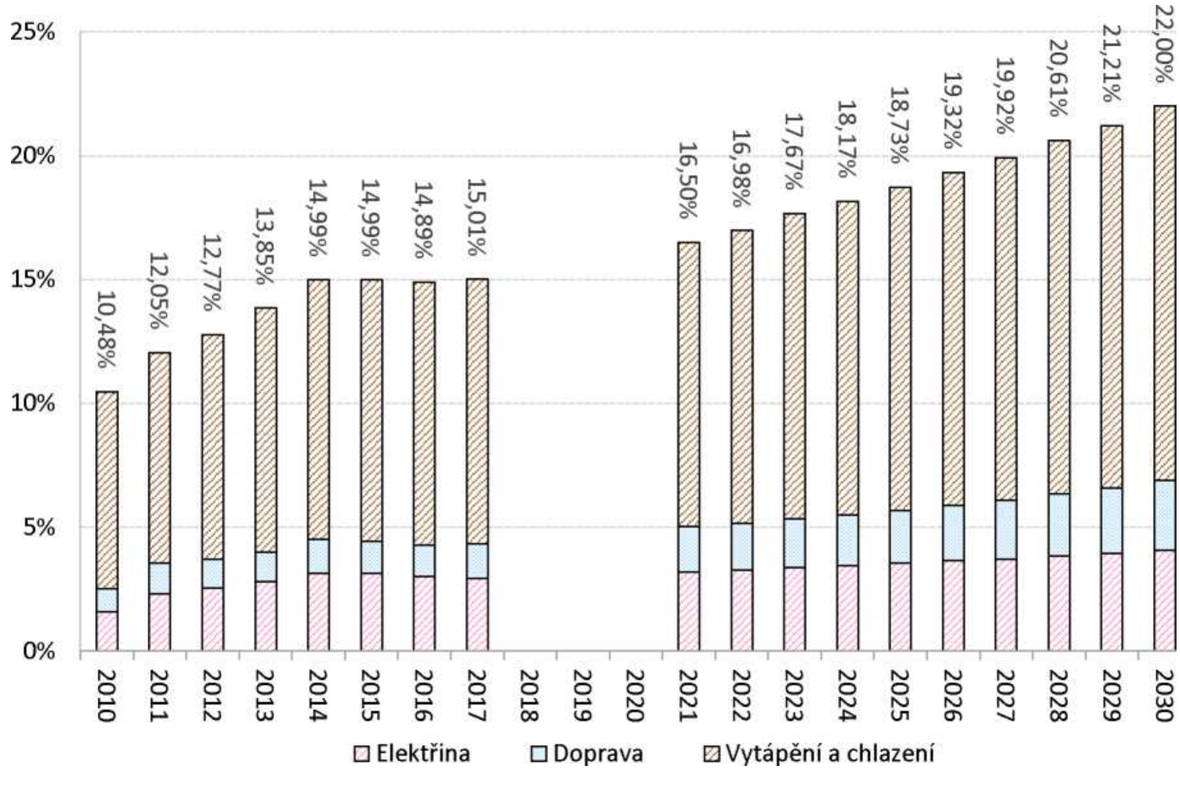
ii. Indicative projections of developments in the implementation of existing policies for 2030 (with a perspective to year)
2040)

Estimation of the evolution of the share of RES in the implementation of existing policies

This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

Estimated developments in the implementation of the policies and measures referred to in Chapter 3.1.2 are presented in Chapter 2.1.2. The proposed policies are designed to achieve the objective, so the estimated developments in the implementation of existing and upcoming policies are identical to those set out in Chapter 2.1.2. Graph 53 shows the expected evolution of the RES share by sector based on the policies set out in the relevant section of this document. In this respect, there is a relatively large treasury machine entitled 'Development of supported energy sources by 2030', which provides detailed estimates of the development of individual renewable energy sources by 2030 (this material is only available in Czech). By 2050 renewable sources should account for 36-44 % of primary energy sources and 33-47 % of gross electricity production, according to the draft update of the Czech Republic's State Energy Concept.

Figure 53: *Estimation of the evolution of the RES share by sector until 2030*



Source: Actual processing of MITs for the purposes of the National Plan

Estimated development of renewable gas

The Czech Republic currently consumes about 500 TWh of primary energy, of which fossil sources account for about 330 TWh, i.e. 70 %. In particular, coal will be gradually replaced by renewable energy sources, nuclear resources and natural gas, in particular in the electricity and heating sectors. Natural gas will play an important role as a transitional fuel in the domestic energy mix. It will then make a significant contribution to achieving the ambitious CO2 reduction targets in the coming years. However, natural gas will also need to be gradually replaced towards 2 050 in view of the objectives of the European Green Deal. It will be replaced by biomethane and hydrogen in the future.

Thus, with the gradual replacement of fossil fuels, alternative energy sources that are continuously available for industry, transport, electricity generation and heat supply must be provided in a timely manner. This is particularly true for coal substitution, which today accounts for a high share of electricity production and central heating (around 150 TWh).

Given the increasing use of renewable energy sources and their intermittent nature, on the one hand, and the specific climate constraints on renewable energy production in the Czech Republic, on the other, the deficit in electricity and heat production increases significantly when needed. The Czech Republic will therefore need energy resources that are permanently available throughout the year, which can be stored in the long and short term and are competitive with other energy sources in terms of costs. Gaseous fuels can play an important role, both because of their technological possibilities to compensate for imbalances in the electricity system and because of the possibility of converting electricity into gaseous fuels. This has the potential to significantly enhance the stability of the whole system, for example by making gaseous fuels easier and cheaper to store and transport, as well as to help more efficient use of renewable resources. In this form, the benefits of already existing energy infrastructure can be maximised for the most effective transition to a low-emission economy combining natural gas with decarbonised and renewable gases. As a result, renewable gases can play an important role in increasing the share of electricity generation from intermittent renewable sources.

The development of renewable gases depends on several factors. A key issue will be the existence of public support for the production, transmission, distribution and storage of renewable gases. Therefore, the future set-up of both financial and institutional support for the development of renewable gas production (see chapter 3.1.2.2) will be key. This includes, inter alia, the transformation of existing biogas plants into biomethane production, as well as new biomethane stations, including their connection to the gas system. Apart from biogas and biomethane plants, there are hydrogen production technologies as well as bioLPG technologies. While these technologies are now well known, the operation of these plants is currently unprofitable, not least because of high operating costs.

Renewable hydrogen is also included among renewable gases. The Ministry of the Environment and the Ministry of Industry and Trade have long plans to support the development of hydrogen production on the territory of the Czech Republic, taking into account the production rules defined in the delegated act for the production of renewable fuels of non-biological origin, which are part of the Directive for the promotion of the use of renewable energy sources. The Czech Republic will be obliged to meet the sectorial renewable hydrogen targets and massive imports from countries with more appropriate conditions cannot be assumed by 2030, except for the possibility of importing a blend of hydrogen with natural gas. For this reason too, it is appropriate to set the aid in proportion to the projected production of renewable hydrogen in the Czech Republic, taking into account that renewable hydrogen will initially be most frequently consumed where it will also be produced. The high investment and operating costs will need to be addressed in order to kick-start renewable hydrogen consumption. At the same time, part of the existing gas transmission system will need to be prepared for the expected imports of renewable hydrogen after 2030.

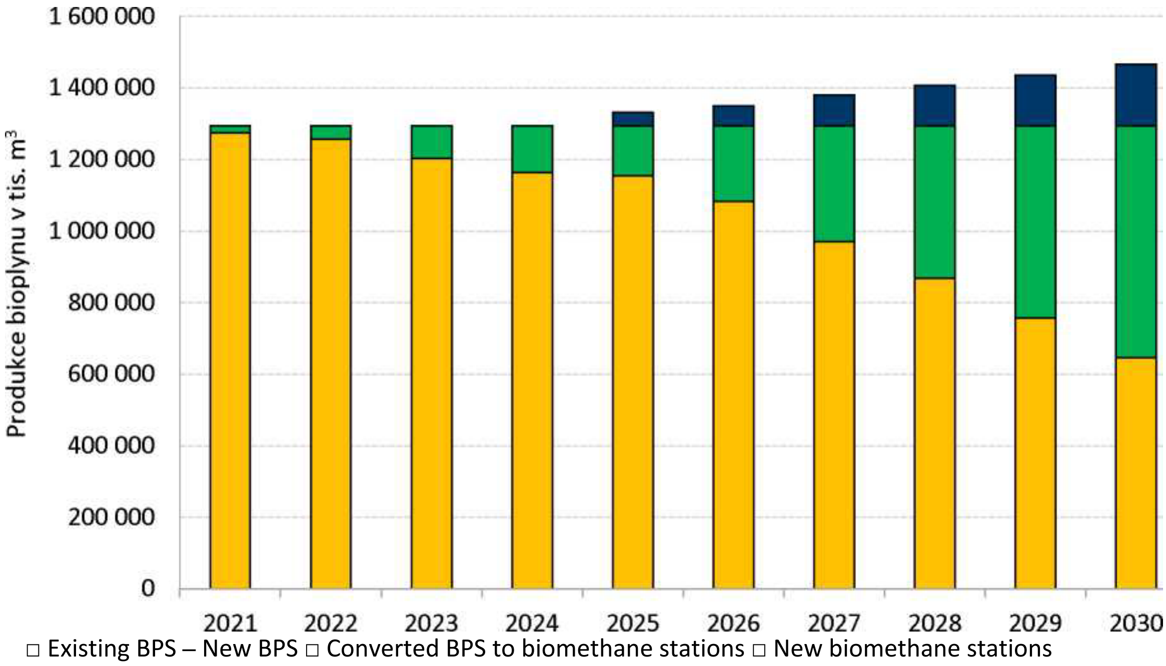
Gas from renewable energy sources can already play a significant role in 2021-2030 and beyond, not only in electricity generation, but also in the transport and heating and cooling sectors, and according to the revision of Directive 2018/2001, which was also approved in June 2 023 in industry and transport. There are currently around 400 biogas stations in operation in the Czech Republic, more than 100 municipal and industrial sewage treatment plants producing sludge gas and almost 70 landfill gas production plants. Biogas plants[105] account for approximately 1.5 % of the current share of total final energy consumption from RES (see Section 2.1.2). The vast majority of biogas plants produce heat and electricity as part of the combined production of electricity and heat. The biogas sector is very well suited for extending the provision of flexibility, the installation of Power to Gas systems, biomethane production and/or CO_2 capture. In the Czech Republic, biomethane is currently produced and injected into the gas network in the unit of the plant (the Biogas Station Rapotín, Litomyšl, Mladá Boleslav, Horní Suchá and ÚČOV Praha).

In the context, inter alia, of the target for the share of RES in the transport sector, measures (see section 3.1.2) are prepared to provide partial incentives for the transformation of part of existing biogas stations into biomethane stations and the creation of new biomethane stations in the period 2021-2030. This conversion should take place mainly at biogas plants with lower use of useful heat and near high-pressure pipelines, which should also have positive effects on increasing the use of primary energy sources. The following chart shows the expected biogas production split into existing, converted and new biogas production. In order to reduce the cost of operation and increase efficiency, efforts will be made to inject gas to the lowest pressure level of pipelines. By adapting legislation and standards, bi-directional pressure reduction stations can be implemented and thus used to connect a low-pressure distribution network. This measure will reduce both operating and investment costs and increase the connectivity of the plants.

Figure 54: *Expected biogas production split into existing, converted and new* [106]

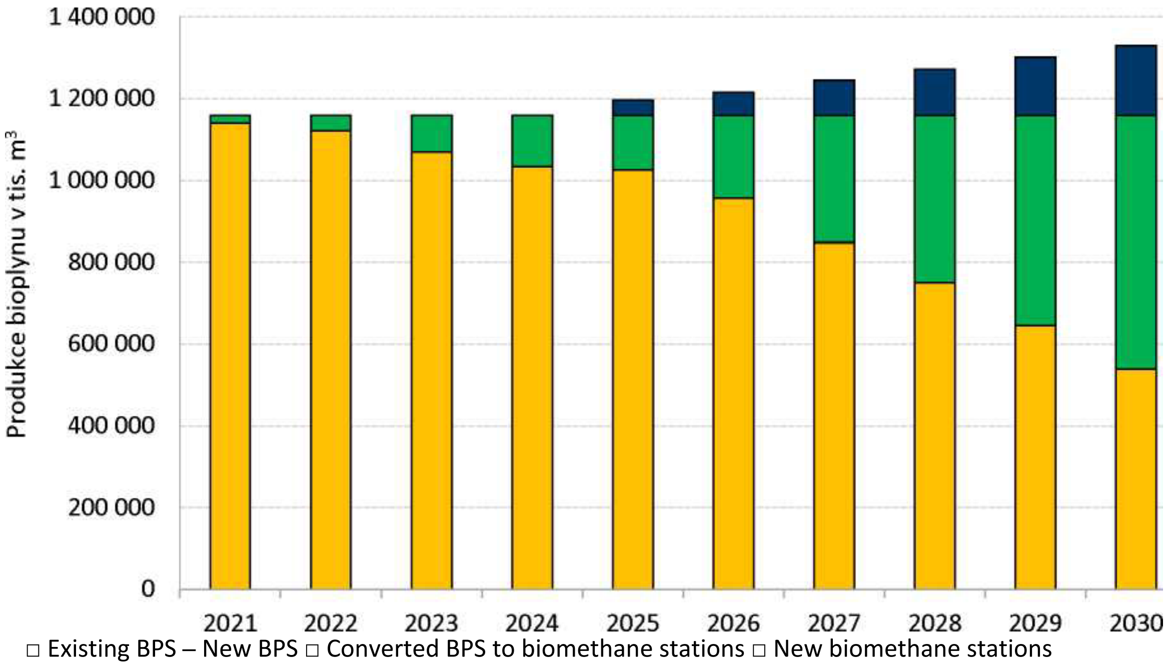
[105] Biogas plants, including sewage treatment plants, through the production of sludge gas and landfill gas production plants. Unless otherwise stated, the term ‘biogas stations’, including waste water treatment plants and landfill gas production plants.

Several new biogas plants are[106] expected to be constructed, but their overall biogas production is relatively low compared to other categories.



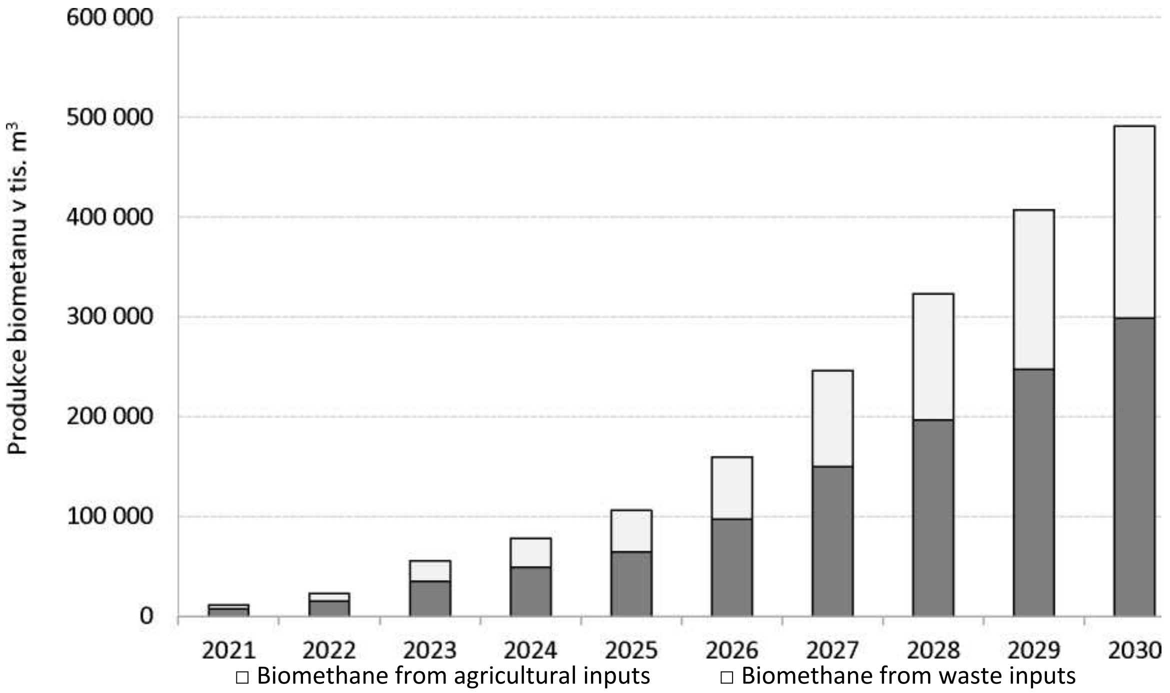
Source: Actual processing of MITs for the purposes of the National Plan

Figure 55: *Expected biogas production (agricultural biogas plants)*



Source: The actual processing of MITs for the purposes of National Graf Plan 56 shows the expected distribution of biomethane by feedstock. The practical availability of biodegradable waste and agricultural secondary raw materials is a prerequisite for this distribution. For the transport of biomethane to the point of consumption, the use of the existing gas system is envisaged, taking into account in the analysis the distance of existing biogas stations to the gas system so that they can be physically connected. The Czech Republic would like to declare the allocation of the full volume of "advanced" biomethane to the transport sector and will seek to find an acceptable reporting mechanism for this purpose. 'Non-advanced' biomethane from agricultural raw materials is mainly assumed to be consumed in the heating and cooling sector.

Figure 56: *Expected biomethane production by source*



Source: Actual processing of MITs for the purposes of the National Plan

The table below shows the expected final consumption of biogas by sector. The reason for the decrease in final consumption in the electricity sector, due to the projected conversion of parts of the plants, is described in more detail above. In the transport sector, it is assumed that only "advanced" biomethane from waste raw materials will be consumed (the table shows consumption without taking into account multipliers).

Table 66: *Final biogas consumption by sector in TJ*

Final biogas consumption	2016	2020	2025	2030
Electro-energy	9 320,5	9 469,5	8 970,0	5 683,0
Transport	0	0	1 416,1	6 554
Heating and cooling	7 489,0	7 595,0	8 926,5	13 582,8
Total	16 809,5	17 064,5	19 312,6	25 819,8

Source: Actual processing of MITs for the purposes of the National Plan

In this respect, it is assumed that all biomethane from waste raw materials (i.e. advanced biomethane) injected into the gas network will be consumingly allocated within the transport sector (while respecting the 'mass balance' approach), while unadvanced biomethane injected into the gas network will be consumed in the same proportion to the consumption of natural gas. Chapter 2.1.2 (v) provides information on the expected consumption of biogas and biomethane, respectively, in so-called heat sold.

The above is only a summary of the relatively comprehensive analysis published in the background document entitled “Development of supported energy sources by 2030.”

As already mentioned in the introduction to the chapter, hydrogen is another of the gases that can be classified as renewable when produced from renewable energy sources. Currently, there is a strong political will in the European Union to promote hydrogen as an important energy vector to achieve ambitious decarbonisation goals. Hydrogen will be used not only in hard-to-abate industrial areas, but also in heat production, transport and other applications. The willingness to use hydrogen is expressed, inter alia, by the European Commission’s European Hydrogen Strategy and by each EU Member State through its national hydrogen strategies. The Czech Republic is not an exception in this regard. On 27 July 2021, the Ministry of Industry and Trade (‘MIT’) issued the first National Hydrogen Strategy for the Czech Republic, which was approved on the day before by the government, updated in 2024 to reflect legislative and technological developments. The updated hydrogen strategy of the Czech Republic was approved by the government on 17 July 2024. The Czech Republic’s Hydrogen Strategy (hereinafter also referred to as the ‘Strategy’) analyses different options for the production and use of hydrogen and identifies priority areas for further development. Its strategic objectives include reducing greenhouse gas emissions and promoting economic growth. The hydrogen strategy is built on four fundamental pillars:

- low-carbon hydrogen production;
- the use of low-carbon hydrogen;
- hydrogen transport and storage;
- hydrogen technologies.

The Hydrogen Strategy defines three stages for the 2050 decarbonisation targets:

- Local islands;
- Global bridges;
- New technologies

Building on the European Hydrogen Strategy and the objectives of the European Green Deal, the strategy focuses on the period 2021-2050, at the end of which the Czech Republic should achieve climate neutrality. The early stages of the Strategy put emphasis on ensuring a balance between hydrogen production and consumption to ensure efficient use of available resources. The strategy analyses the pillars and identifies priority areas that need to be developed, but also those whose development is rather not advisable. The strategy aims to accelerate the implementation process of hydrogen technologies across economic sectors while minimising the associated costs.

In the field of hydrogen production, the Strategy emphasises not only the production of renewable sources but also the use of other alternative low-carbon hydrogen production options, such as the use of natural gas with CO2 capture and processing, the pyrolysis/plasma gasification of organic waste and the production of hydrogen using electricity and nuclear power plants. Hydrogen deployment should start where the use of hydrogen is most cost-effective. According to the Strategy, priority should therefore be given first to the deployment of hydrogen in transport and only then, following a fall in price, to its use in the energy sector and as chemical raw materials and heat generators in industry. In addition to direct use in industry or transport, surplus energy produced from RES can be stored in the form of hydrogen. Power-to-Gas hydrogen as an energy carrier can play an important role in the future energy mix of the stabilisation and balancing medium of the entire energy system.

While hydrogen will help to make efficient use of surplus energy generated from RES, domestic hydrogen production will not be able to fully meet future domestic demand. In its REPowerEU plan, the European Commission itself envisages the use of 660 TWh of hydrogen in the EU in 2030, with half of the hydrogen consumed being imported from outside the EU. In order to facilitate hydrogen imports, the European Commission will support the development of several hydrogen corridors, e.g. through the Mediterranean, the North Sea region, North Africa, South-East Europe and as soon as conditions allow, and through connections with Ukraine (see Central European Hydrogen Corridor). In the future, according to the Strategy, the Czech Republic is expected to have to import hydrogen from countries where the conditions for producing renewable hydrogen are more favourable because they have more sunshine and wind. Infrastructure will need to be developed for hydrogen imports and hydrogen could replace current imports of natural gas and oil. The strategy further states that the Czech Republic can be a major player in the field of hydrogen transport from south to north and east to west. But this requires timely preparedness of our gas transmission system for the transmission and distribution of hydrogen. For more information see chapter 3.4.2.

4.3. Dimension 'Energy efficiency'

i. Current primary and final energy consumption within the economy and per sector (including industry, housing, services and transport)

Table 67: *Current primary and final energy consumption within the economy and per sector*

	Greas e j[107]	One stick	2016	2017	2018	2019	2020	2021
Primary energy consumption	1	I.E.	1 722 299	1 799 801	1 804 260	1 782 909	1 681 895	1 777 503
Total final energy consumption	1	I.E.	999 234	1 030 453	1 018 403	1 019 143	999 041	1 067 510
Final energy consumption by sector:								
industry	1	I.E.	269 332	282 092	280 723	277 492	275 121	293 484
transport	1	I.E.	268 680	277 057	278 836	283 814	267 063	288 046
households	1	I.E.	302 981	308 163	300 073	295 771	302 982	332 751
services	1	I.E.	129 535	133 338	131 017	133 759	125 146	124 192
Final energy consumption according to the Europe methodology 2020-2030	2	I.E.	1 039 409	1 067 746	1 060 494	1 057 998	1 025 465	1 095 906
Primary energy consumption according to the Europe methodology 2020-2030	2	I.E.	1 663 847	1 689 592	1 694 846	1 663 957	1 573 720	1 656 670

[107] Sources: 1 – Aggregated Energy Balance (MIT, Eurostat 2017 methodology); 2 – Eurostat; 3 – Ministry of Transport; 4 – Czech Statistical Office

Gross value added by sector – 2005 prices:								
Industry	2	milli on.	1 478 630	1 577 321	1 600 188	1 631 646	1 469 897	1 518 627
Services	2	milli CZ	2 222 873	2 334 310	2 448 397	2 541 595	2 454 597	2 570 372
Gross value added by sector – current prices:								
Industry	2	milli CZ	1 602 603	1 671 637	1 719 045	1 826 073	1 751 957	1 848 845
Services	2	milli CZ	2 612 003	2 815 824	3 052 304	3 299 045	3 332 288	3 589 275
Disposable income of households	2	milli on.	2 496 929	2 666 442	2 841 747	3 029 061	3 105 556	3 331 115
Gross domestic product (GDP) – 2005 prices	2	milli on. CZ	4 141 785	4 355 863	4 496 125	4 632 352	4 377 435	4 532 954
Gross domestic product (GDP) – current prices	2	milli on.	4 796 873	5 110 743	5 410 761	5 791 498	5 709 131	6 108 717
Electricity generation from thermal power plants	1	GWh	77 479	81 226	82 384	80 844	75 094	78 544
Electricity generation from combined heat and power	1	GWh	17 113	16 690	16 141	15 872	16 078	15 624
Heat generation from thermal power generation	1	I.E.	127 519	122 851	118 123	116 266	112 845	121 343
Production of heat from cogeneration, including waste heat from industrial processes	1	I.E.	99 023	94 710	90 221	87 830	85 752	91 927
Fuel consumption for energy production from heat energy sources	1	I.E.	889 383	924 497	933 186	907 701	843 885	882 153
Number of person-kilometres	3	milli on	118 957	124 165	129 967	132 996	90 600	111 721
Number of tonne-kilometres	3	milli on	68 172	62 936	60 327	57 888	73 529	82 493
Population (mean)	4	person	10 565 284	10 589 526	10 625 695	10 669 324	10 700 155	10 499 812

Source: 7. Progress report on the achievement of national energy efficiency targets in the Czech Republic

ii. Current potential for the application of high-efficiency cogeneration and efficiency district heating and cooling107

More information can be found in the 'Assessment of the decarbonisation of district heating in Czechia' 108. The medium-term framework for the development of cogeneration is set out in Government Regulation No 189/2022 on the definition of the development of supported energy sources.

107In accordance with Article 14(1) of Directive 2012/27/EU.

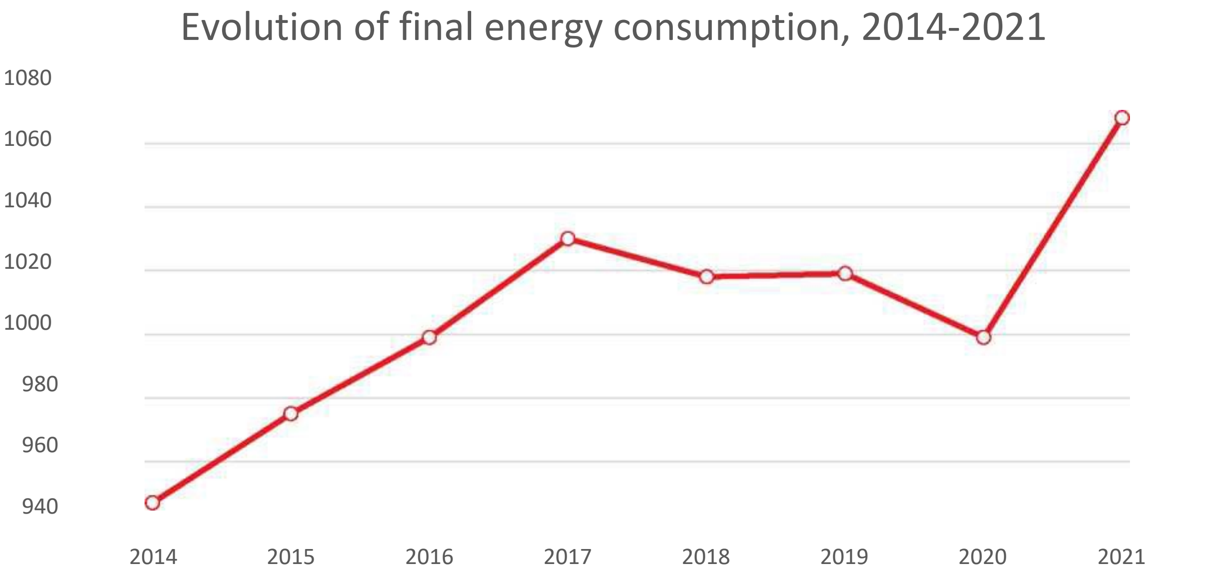
108https://www.mpo.gov.cz/cz/energetika/strategicke-a-koncepcni-dokumenty/posouzeni-Decarbonisation-Danube-vytapeni-v-cesk-268470/

iii. Projections considering existing energy efficiency policies, measures and programmes as described under 1.2. ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)109

4.3.1.1 National energy efficiency target for 2020

The trend in final energy consumption, which is based on the Czech Republic's overall energy balance, shows a year-on-year decrease since 2017, up to 2020, which was nevertheless marked by the Covid-19 pandemic. In 2021, there was a step increase and overshoot of final energy consumption also compared to pre-pandemic 2019.

Figure 57: *Evolution of final energy consumption, 2014-2021*



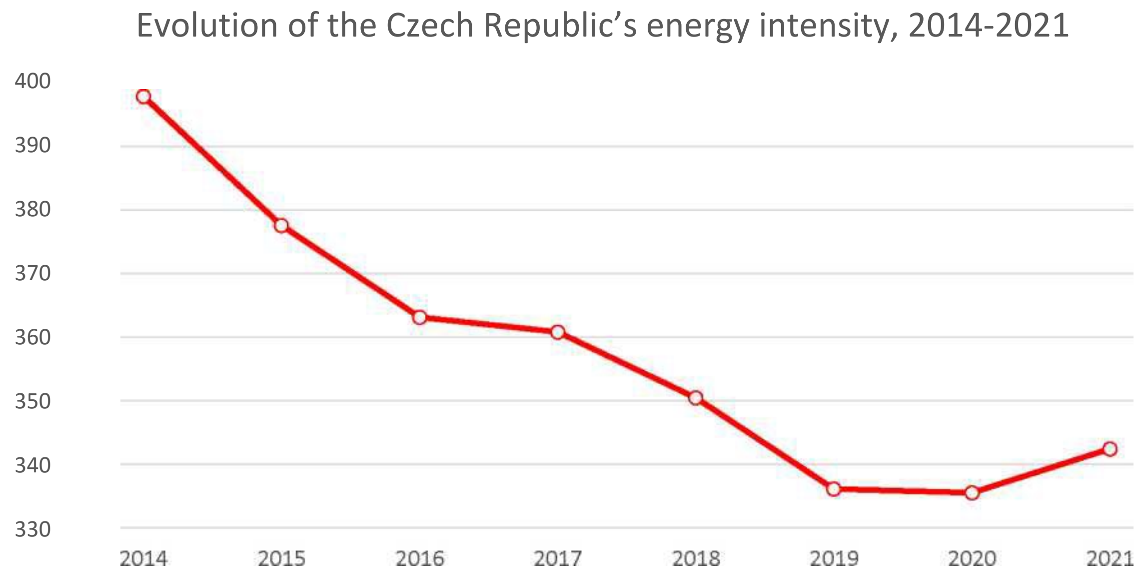
Source: MINISTRY OF INDUSTRY AND TRADE

Significant fluctuations are noted when monitoring the trend in final consumption without any adjustment for external effects, and their origin is hard to identify. For this reason too, it is interesting to look at energy efficiency improvements through an indicator other than the absolute value of final consumption, for example from the point of view of the Czech Republic's energy intensity. In 2021, the level of energy intensity increased for the first time after a long period of time, thus abandoning a long-lasting downward trend. In 2021, it reached 342 GJ/CZK million of GDP, which is comparable to the value before 2019110. The energy intensity curve thus follows the final energy consumption curve.

109This reference business as usual projection shall be the basis for the 2030 final and primary energy consumption target which is described in 2.3 and for conversion factors.

110Gross domestic product at market prices in 2010 (source: Eurostat).

Figure 58: *Evolution of the Czech Republic's energy intensity, 2014-2021*



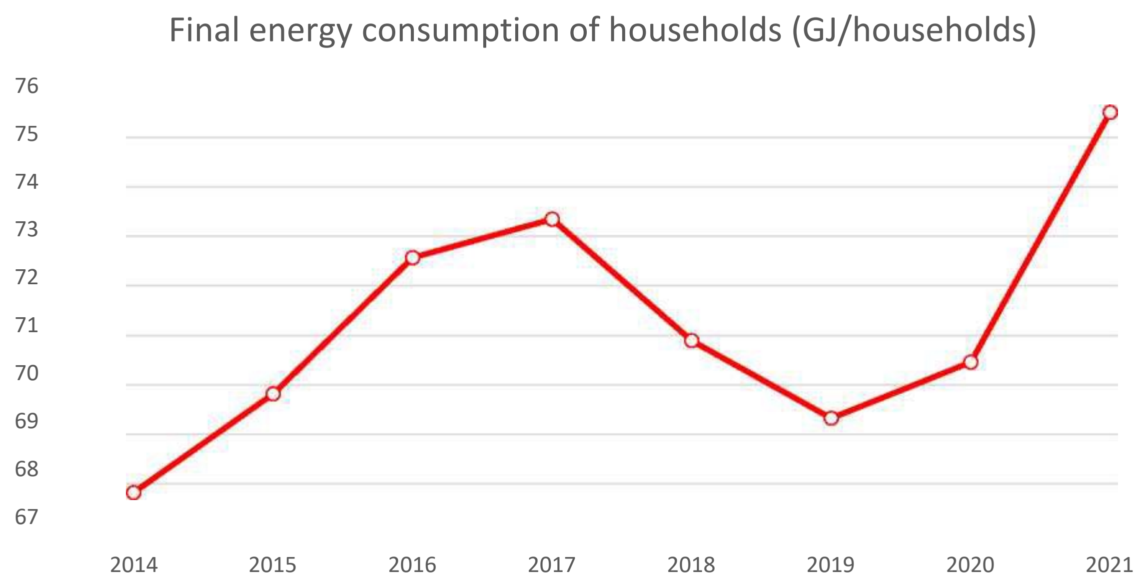
Source: Ministry of Industry and Trade, Eurostat

A more detailed analysis of the evolution of final energy consumption by sector is presented below.

Households sector

The household sector experienced a surge in energy consumption caused by pandemic measures, where residents spent much more time in their homes. The energy intensity of households, expressed per dwelling, is also growing in 2021, reaching 76 GJ/byte.

Figure 59: *Final energy consumption per household, 2014-2021*

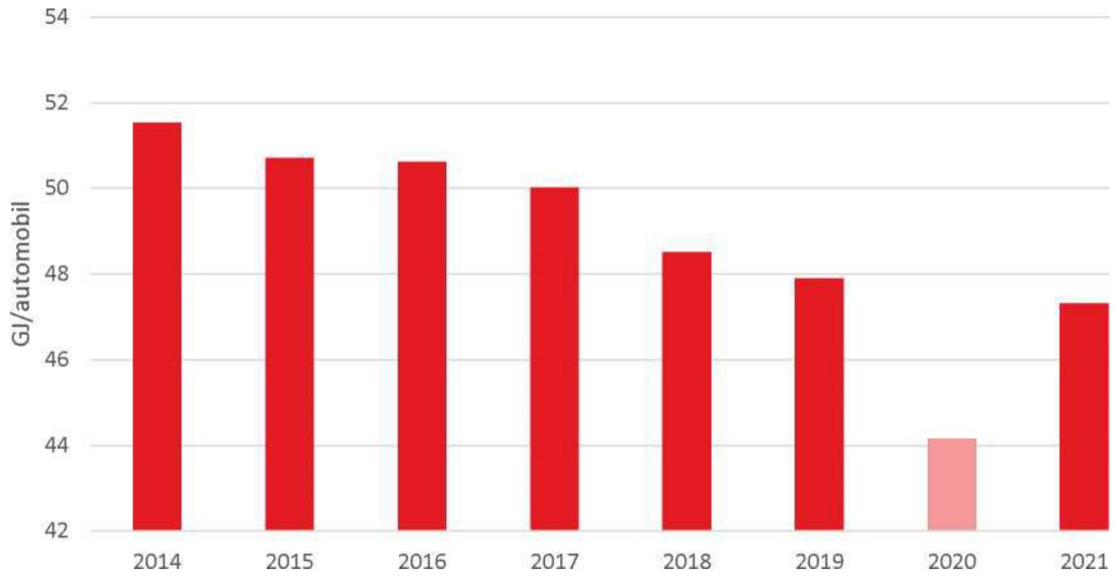


Source: MINISTRY OF INDUSTRY AND TRADE

Transport sector

Energy consumption in the transport sector returned to the 2019 baseline in 2021, after a significant decrease in 2020 caused by pandemic measures. In value terms, consumption is kept at 288 PJ.

Graph 60: Energy consumption in the transport sector per car, 2014-2021



Source: Ministry of Transport, Ministry of Industry and Trade

In terms of energy consumption per car (including only individual car transport), there has also been an increase, but the value is similarly high as in 2 019.47 GJ/car.

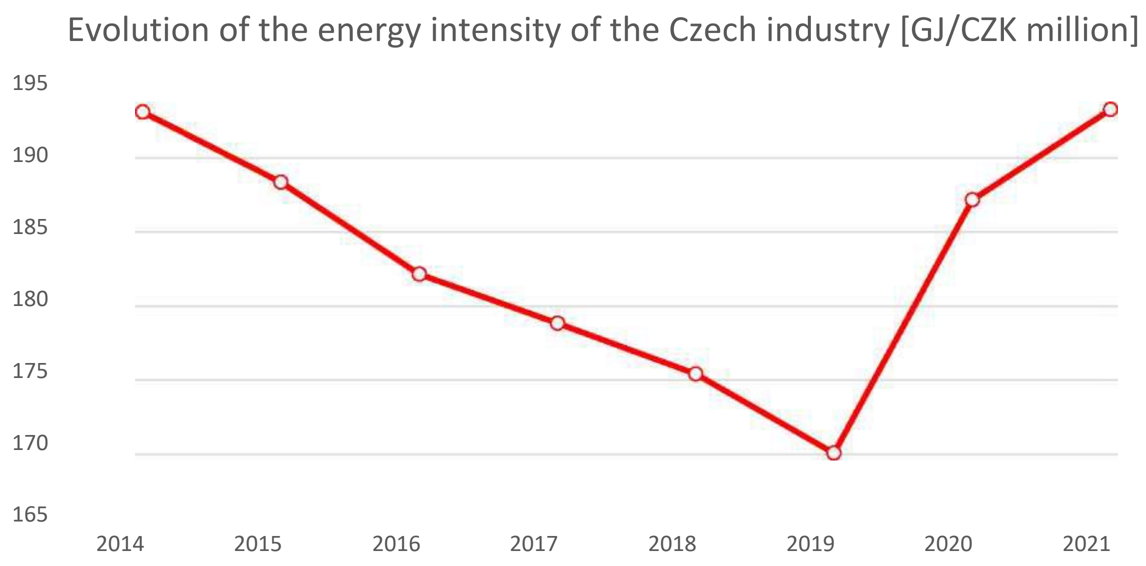
Industry sector

Compared to the pre-pandemic year, the industry sector shows an increase of 5.8 % in final energy consumption, reflecting the increase in energy intensity of industry (Graph 61). In addition to the increase in energy consumption, the growth in the energy intensity of industry was also due to the decline in gross value added (GVA) to which it relates.

As regards the ratio of energy consumption to industrial production, which is measured against the Industrial Production Index (IPP111), there was a slight decrease of 0.3 % year-on-year, but it did not reach a pre-COVID-19 baseline.

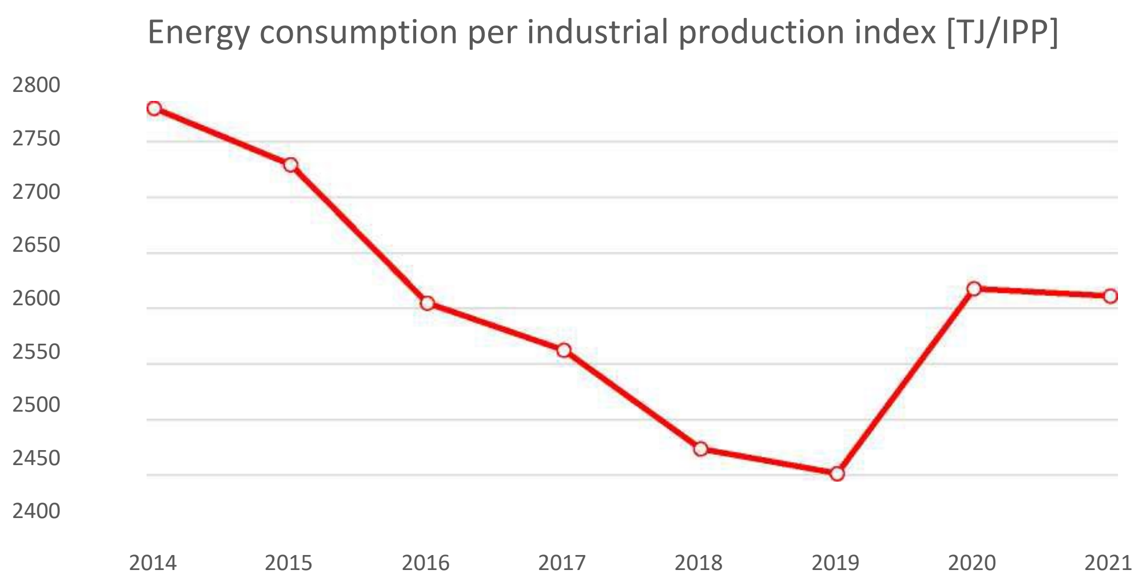
111The industrial production index (IPI) measures own output from industries, price-adjusted. The index is primarily calculated as a monthly basic index, currently for an average month in 2015.

Graph 61: Evolution of the energy intensity of Czech industry, 2014-2021



Source: Czech Statistical Office, MIT

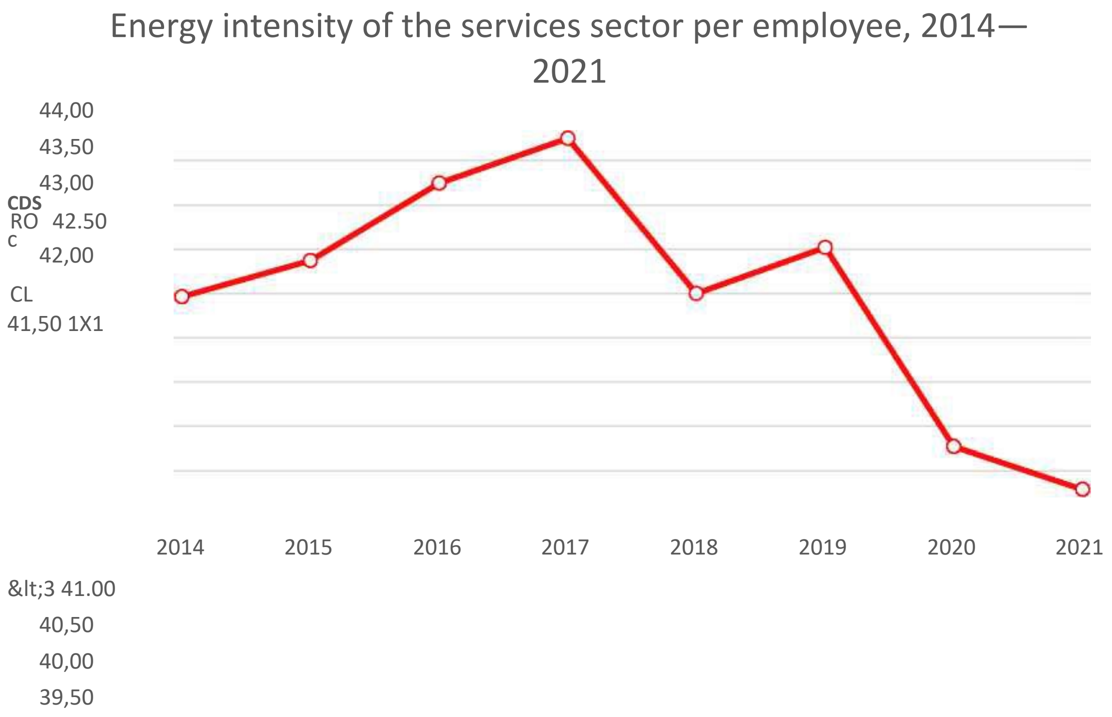
Graph 62: *Energy consumption linked to industrial production, 2014-2021*



Services sector

The services sector is the only one showing a long-term decline in energy consumption, which has not been disrupted by the pandemic. As a result, energy intensity in the services sector also fell to 39.8 GJ per employee and by 1.2 % year-on-year.

Graph 63: *Energy intensity of the services sector per employee, 2014-2021*



Source: Czech Statistical Office, MIT

4.3.1.2 Czech Republic's contribution to the EU's 2030 energy consumption targets

For the purpose of determining the national contribution, Member States may use the formula in Annex I to the 2021 Energy Efficiency Directive, where the Czech Republic considers it most appropriate to determine the contributions in accordance with this calculation for the 2030 period**.** The indicative contribution to the binding EU target for final energy consumption is calculated at 852 PJ. The indicative contribution to the non-binding primary consumption target is calculated at 1 222 PJ.

This potential takes into account the effects of the planned strategies, policies and measures to be implemented in the period up to 2030, under the following conditions:

- taking into account climatic conditions, no increase in the number of tropical days in summer and significant changes and intensities of the heating season compared to 2016 is foreseen;
- GDP growth in line with the assumptions set out in Chapter 4.1.1.2;
- annual increase in residential area in the light of demographic trends in the Czech Republic, in accordance with the assumptions set out in Chapter 4.1.1.1;
- growth in transport performance in the transport sector;
- changing the structure of the economy (growth in the service sector and declining heavy industry);
- increase/decrease in production in the industrial sector.

Strategies and policies affecting the level of final energy consumption include in particular:

- The long-term building renovation strategy referred to in Article 2a of the EPBD;
- the obligation under Article 5 of the Energy Efficiency Directive;
- the commitment under Article 7 of the Energy Efficiency Directive;

- legislative and regulatory measures resulting from the transposition and implementation of national and EU legislation;
- planned strategies and policies in additional packaging, including, but not limited to, the transport sector and expressed in the following conceptual materials:

  on the Czech Republic's State Energy Concept;

  on the National Reform Programme;

  o State Environmental Policy;

  on climate protection policy in the Czech Republic;

  on the strategic framework for sustainable development of the Czech Republic;

  o National Clean Mobility Action Plan. Czech Republic's transport policy for 2021-2027 with a view to 2050

  o

IV. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

In 2010, the European Parliament adopted Directive 2010/31/EU on the energy performance of buildings (EPBD II). Member States were required, in accordance with the Directive, to introduce legislation by 2012 requiring the improvement of the energy performance of both new and renovated buildings. The specification of the improvement of energy performance in buildings must be done by each Member State on the basis of a cost-optimal level, so that the legislative measures required are cost-effective. The EU requests that the input data for the cost-optimal calculations be updated by 2017 at the latest.

For the desired optimisation, the European Commission issued methodological guidelines in June 2011, which partially clarified the generally encoded methodological framework set out in the Directive.

Article 5 of Directive 2010/31/EU

Calculation of cost-optimal levels of minimum energy performance requirements

1. The Commission has established, by means of delegated acts in accordance with Articles 23, 24 and 25, a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements.

The comparative methodology framework has been established in accordance with Annex III and distinguishes between new and existing buildings and between different categories of buildings.

2. Member States have calculated cost-optimal levels of minimum energy performance requirements using the comparative methodology framework developed in accordance with paragraph 1 and relevant parameters, such as climatic conditions and the practical availability of energy infrastructure, and compare the results of that calculation with the minimum energy performance requirements in force.

Member States shall report to the Commission all input data and assumptions used for those calculations and the results of those calculations. The report may be included in the Energy Efficiency Action Plans referred to in Article 14(2) of Directive 2006/32/EC. Member States shall submit those reports to the Commission at regular intervals, which shall not be longer than five years. The first report shall be submitted by 30 June 2012.

3. If the result of the comparison performed in accordance with paragraph 2 shows that the minimum energy performance requirements in force are significantly less energy efficient than cost-optimal levels

of minimum energy performance requirements, the Member State concerned shall justify this difference in writing to the Commission in the report referred to in paragraph 2, accompanied, to the extent that the gap cannot be justified, by a plan outlining appropriate steps to significantly reduce the gap by the next review of the energy performance requirements as referred to in Article 4(1).

In this respect, it should also be noted that the Czech Republic sent an update of the optimal level of minimum energy performance requirements in 2018.112 The Czech Republic prepared a third report, which was finalised in May 2023 and will be notified to the European Commission. Dramatic increases in the price of building materials are both a major change and a major increase in energy prices. Methodologically, the calculation of cost-optimal levels is significantly larger than the previous reports. The basic number of variants per building is around 4000. At the same time, the number of buildings has been expanded to include an administrative building with a light envelope. In view of the significant shift in technology, technology has also increased significantly in terms of variants. Extensive data collection was also carried out with the involvement of construction companies, calculation experts and professional organisations.

Conclusions:

The cost-optimal level of parameters for packaging structures for new buildings is around the recommended values under Decree No 264/2020 on the energy performance of buildings. This is due to the increase in the prices of building measures and energy prices, which did not allow for a shift towards a higher building envelope standard.

- A heat pump is identified as the most appropriate way of heating, depending on the possibility of deploying it from water-to-water, ground-to-water and air-to-water. The seasonal coefficient of performance is decisive. Installing a photovoltaic system is also cost-optimal.
- The cost-optimal level of parameters in the case of modifications to completed structures (reconstructions) is at the recommended values under the Energy Performance of Buildings Ordinance.
- Forced air exchange with recovery will significantly reduce the parameters of the energy supplied. By evaluating forced and natural variants, it can be said that the cost of natural ventilation variants is lower than that of forced ventilation variants. Forced ventilation is particularly important with a view to ensuring long-term quality indoor environments and comfort for the operation of the building. Therefore, the setting of NZEB requirements (currently forcing the installation of forced ventilation) cannot be perceived as inappropriate.
- Lighting quality has a moderate influence on calculation changes, cost-optimal for most efficient lighting options with steering.

4.4. Dimension 'Energy security'

1. Current energy mix, indigenous energy sources, import dependency, including relevant risks

4.4.1.1 Current and expected energy mix

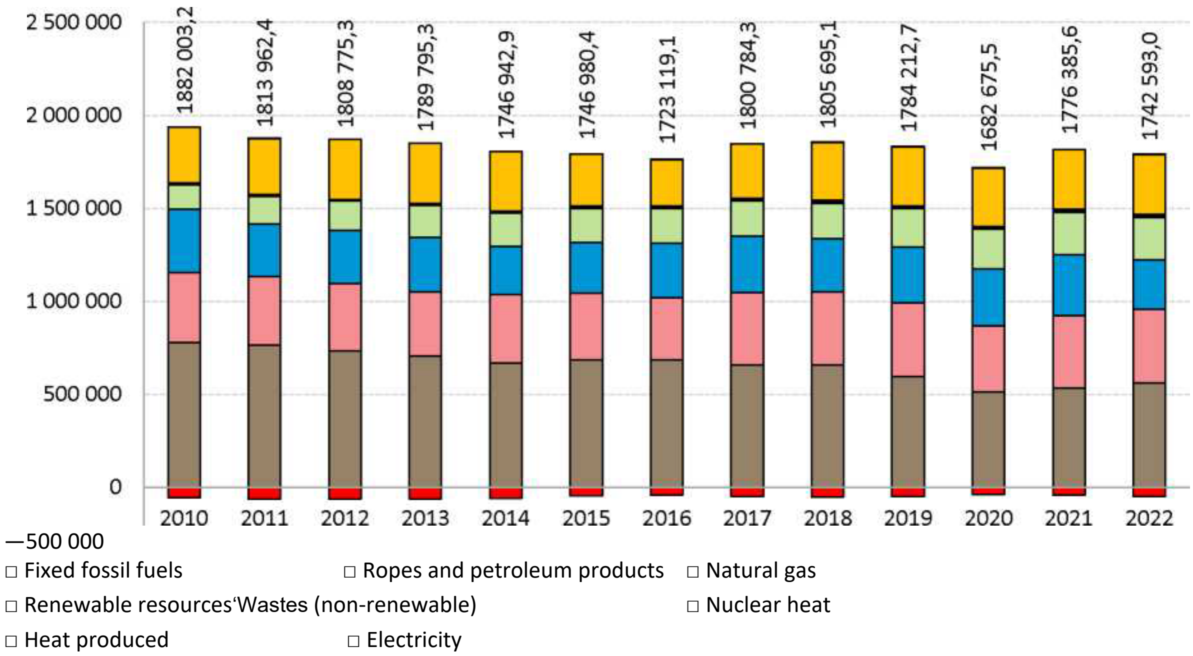
This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

112 It is a document titled: Updating the inputs to the cost optim of buildings in the Czech Republic pursuant to Article 5 of the EPBD II, available here: reference.

Current energy mix

Figure 64 shows the evolution of the energy mix at the level of primary energy sources. In 2016, total primary energy sources were 1 742.6 TJ. The largest share is still solid fossil fuels, in particular lignite and coal, which is used in the transition, i.e. for electricity and heat generation. However, the role of solid fossil fuels in the energy mix is gradually decreasing. Between 2010 and 2022, primary energy sources from solid fossil fuels decreased by almost 30 %. In absolute terms, the use of crude oil and petroleum fuels is broadly stagnating. In relative terms, however, there is partial growth, mainly due to continued growth in energy consumption in the transport sector, which is only partially offset by the use of alternative fuels. Natural gas is mainly used in individual heating, so the evolution of consumption is relatively sensitive to temperature conditions. The role of natural gas remained relatively stable in absolute terms over the period 2010-2022. After the start of the conflict in Ukraine, there was a relatively significant decrease in natural gas consumption. The use of primary energy from renewable sources increased relatively significantly over the period 2010-2022, increasing from 133.0 PJ to 227.3 PJ, an increase of around 75 %. Nuclear energy is then a stable pillar of the Czech Republic's energy mix.

Graph 64: *Evolution of the energy mix at primary energy source level*

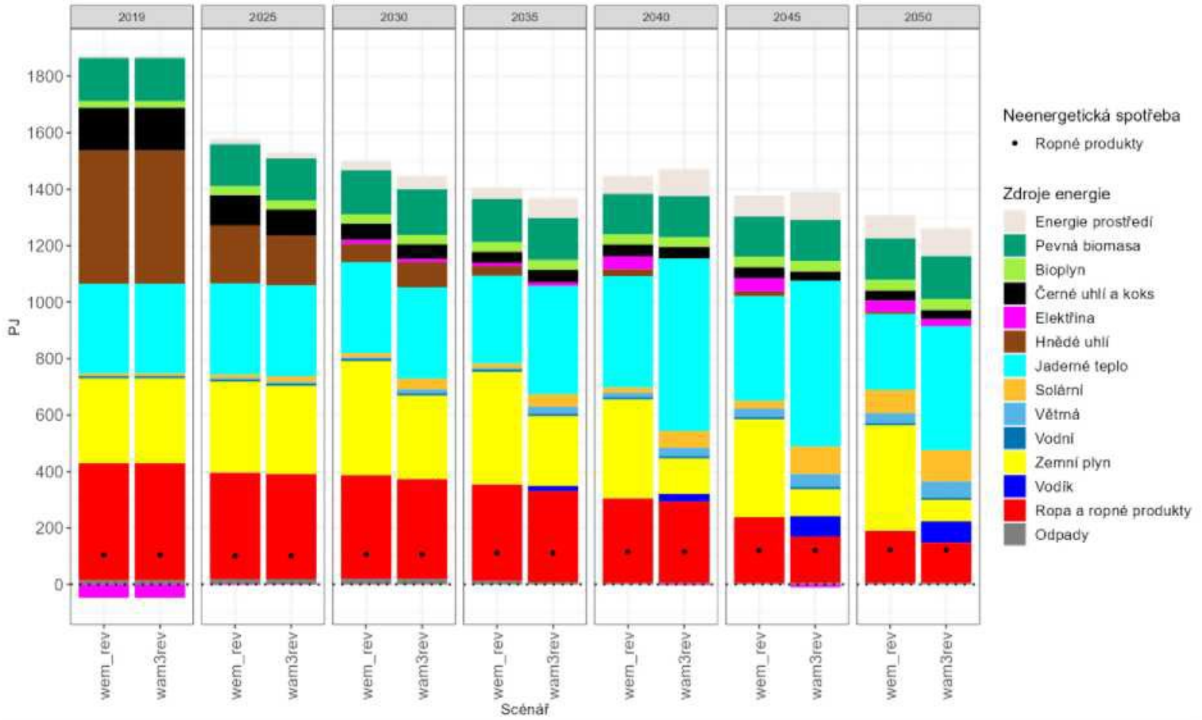


Source: Energy balance according to EUROSTAT methodology

Expected energy mix

Graph 65 shows the expected evolution of the energy mix at the level of primary energy sources. The evolution of the energy mix with regard to energy security can be seen as rather positive. Despite the partial replacement of coal-fired power using indigenous coal for imported natural gas, at the same time there will be an increase in the share of renewables and nuclear energy, which also uses imported fuel, but which is relatively easy to store, allowing stocks to be built up. It is expected that there will be an overall decrease in primary energy sources, which also has positive effects on energy security.

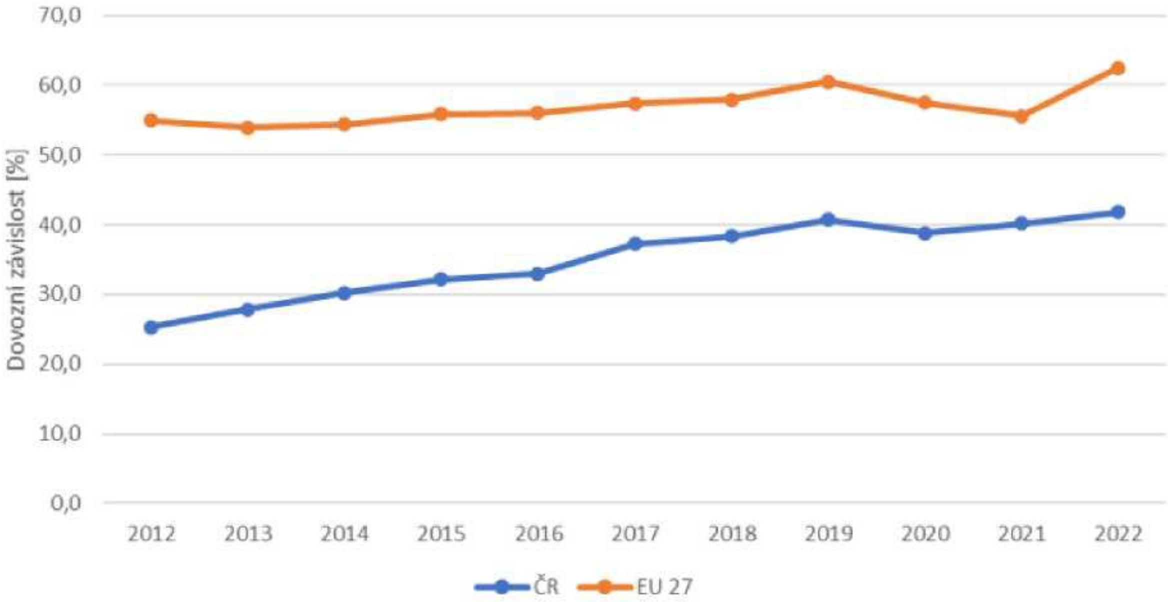
Graph 65: *Expected evolution of the energy mix at primary energy source level*



4.4.1.2 Import dependency

The Czech Republic'soverall energy import dependency has been on an increasing trend over the last decade. It increased from 25.3 % in 2012 to 41.8 % in 2022. Compared to the EU-27, the Czech Republic is among the countries with low energy import dependency (seventh lowest). Changes in resource diversification during 2022 related to the war in Ukraine resulted in the Czech Republic's energy import dependency on Russia falling from 25.4 % to 20.4 % year-on-year. The import dependency of solid fossil fuels gradually increased from -12.0 % in 2012 to 14.0 % in 2022. The Czech Republic is almost exclusively dependent on imports of natural gas and crude oil. The import dependency indicator for these commodities was around 100 %, with year-on-year fluctuations due to changes in stocks. Import dependency in 2022 for natural gas was 113.4 %, for crude oil 99.6 %.

Graph 66: *Import dependency of the Czech Republic and the EU27*



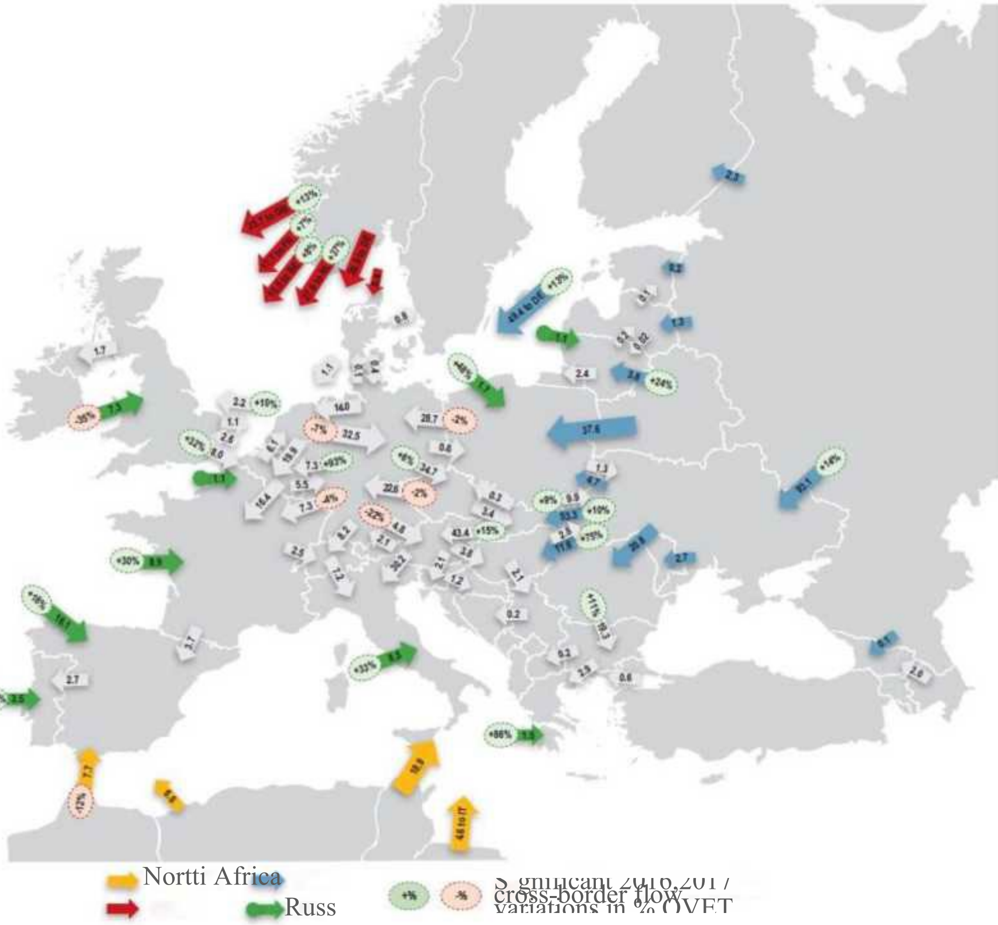
Source: Energy import dependency of the Czech Republic in 2012-2022[114]

4.4.1.3 Diversification of natural gas

Ensuring sufficient gas supplies to the Czech Republic from abroad enables developed cross-border interconnection infrastructure as well as domestic transport. Gas supplies to the Czech Republic have been almost exclusively via the Federal Republic of Germany for several years (see Figure 6). The Czech Republic's dependence on imports of natural gas is almost 100 % and would not change significantly even if there is a greater use of unconventional gas resources in the Czech Republic.

114 https://www.mpo.gov.cz/assets/cz/energetika/statistika/energeticke- Balance sheet/2024/3/Doimportni_zavislost_2012-2022_1.pdf

Figure 6: *Physical gas flows within the EU in 2017 and their changes compared to 2016*

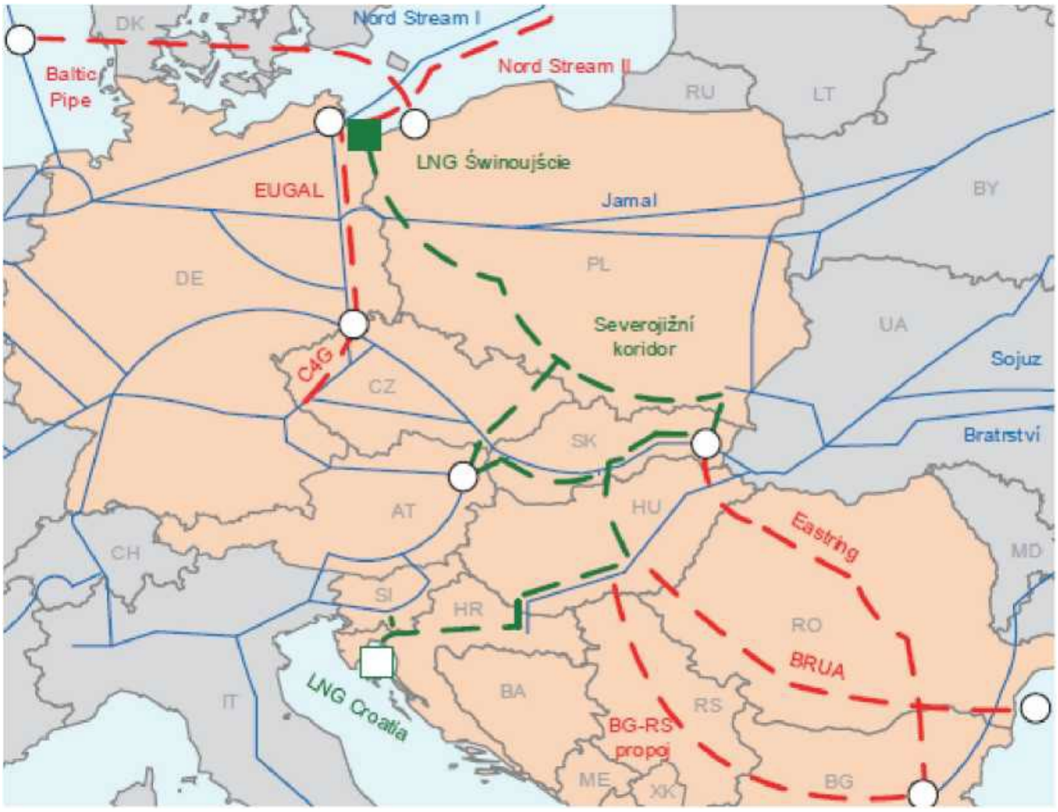


Source: ACER based on IEA (2017).
Notation: The domestic production ofMSs is not included. The reported Norwegian flows into Denmark originating from offshore tields that are only connected to the Danish system.

Source: Monitoring the Internal Electricity and Natural Gas Markets in 2017 (ACER/CEER)

The main measures in the area of diversification of natural gas are the development of infrastructure with neighbouring countries, measures to integrate the gas market and measures aimed at increasing the production of gas from RES. Figure 7 shows transnational development projects and LNG terminals relevant for the Czech Republic. It appears that increasing physical diversification (i.e. diversification of natural gas sources) is difficult for the Czech Republic to ensure, even in the event of the continued development of cross-border infrastructure. The contribution of the continued development of infrastructure enabling the access of a new supplier to the markets of EU countries (in particular TANAP, TAP and, where appropriate, LNG projects) to the Czech Republic's source diversification can be described as relatively limited.

Figure 7: *Transnational development projects and LNG terminals*

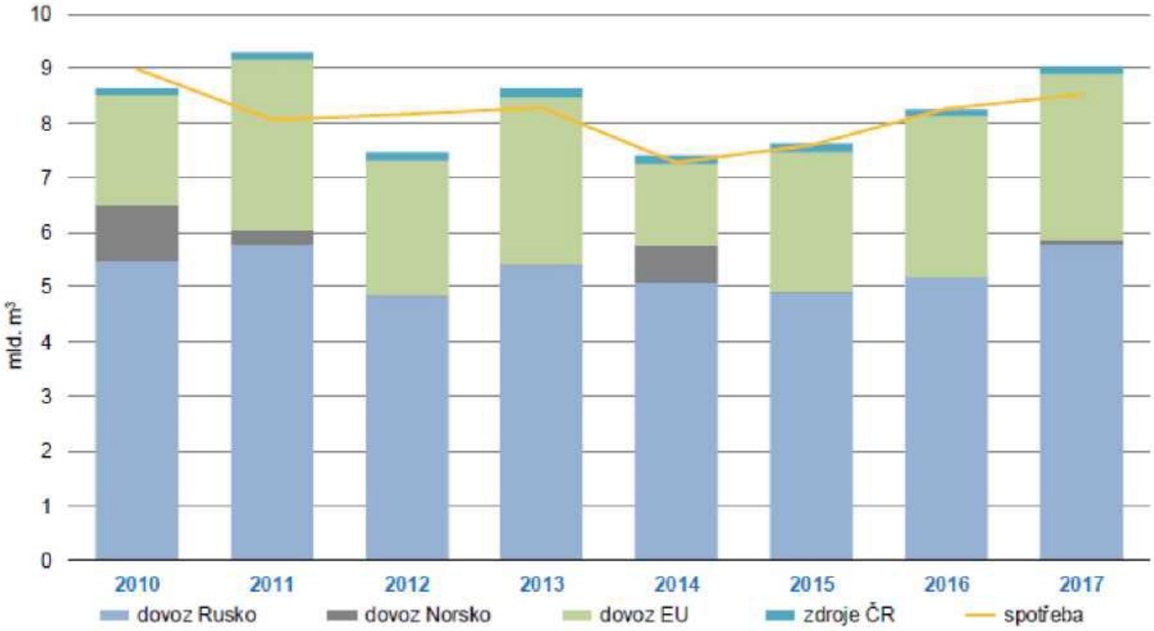


Q end point of | | project design LNG terminal fat fat ice LN G te rminá I
_ — planned pipeline — projected section of the North -South corridor Transit Pipeline

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2018)

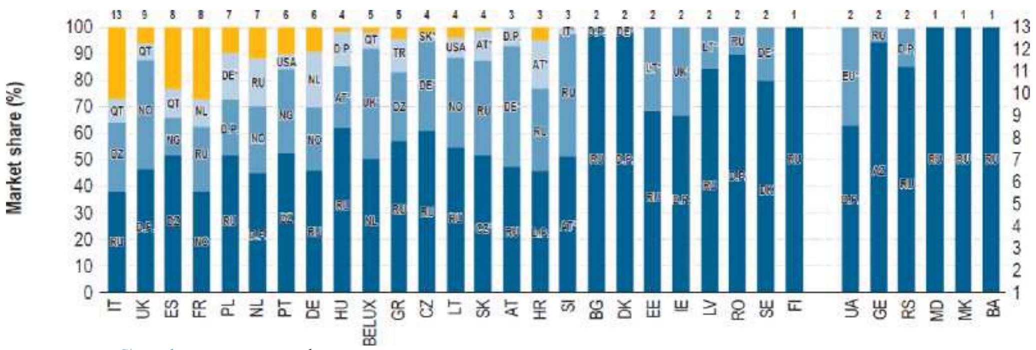
In the Czech Republic's view, the continued integration of the natural gas market, which contributes to commercial diversification, is beneficial with regard to the diversification of natural gas supplies. Figure 67 shows a gas balance showing that about a third of imported gas is purchased through the EU market, even though it is a molecular gas from the Russian Federation. The development of local production of biomethane, possibly synthetic methane and hydrogen, is also an important measure contributing to reducing the import dependency of natural gas or its diversification, and in particular hydrogen is a significant enhancement of energy security (resilience). REPowerEU and its measures also have a significant impact on the diversification of gas supplies. An estimate of the development of renewable gas is provided in Part 0.

Graph 67: *Gas balance in the Czech Republic*



Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2018)

Graph 68: *Estimated diversification of natural gas sources (2017)*



1 S| supply source I 2nd supply source B 3-supply source M Other supply sources

Source: ACER based on Eurostat, IEA, Brítish Petroleum and EnC Secretariat data.

Notation: D.P stands for domestic production. The Asterisk refer to MSs with liquid hubs where gas is thought to háve is purchased. For Denmark, the share of domestic production including the Norwegian offshore fields that are part of the Danish upstream network.

Source: Monitoring the Internal Electricity and Natural Gas Markets in 2017 (ACER/CEER)

4.4.1.4 Hydrogen diversification

As part of the preparation of the European Hydrogen Backbone, the conversion of the existing gas transmission system to transport clean hydrogen is under preparation. However, some sections of the system will need to be rebuilt.

For the Czech Republic, it is important to:

- Central European Hydrogen Corridor (CEHC);
- Czech-German Hydrogen Interconnector (CGHI).

Both corridors could be completed by 2030 and each would provide a transport capacity of around 144 GWh/day (1.5 million tonnes of renewable hydrogen per year). The corridors have their entry points:

- **Lanžhot**, connection to Slovakia – renewable hydrogen from Ukraine, Southern Europe, North Africa, etc.
- **Brandov**, connection from Northern Germany – renewable hydrogen from northern Germany, imports into German ports from all over the world.

Figure 8: *European Hydrogen Backbone*

Source: European Hydrogen Backbone

Figure 9: *Hydrogen transport corridors in the Czech Republic* red line: Central European Hydrogen Corridor (CEHC) Green Line: Czech-German Hydrogen Interconnector (CGHI)

Source: Net4Gas

4.4.1.5 Diversification of crude oil and petroleum products

In 2023, a total quantity of 7 404.9 thousand tonnes of crude oil was imported into the Czech Republic, which is slightly above the average value of annual imports in the period 2012-2023 (average import value was 7 024.2 thousand tonnes).

Domestic oil production is negligible in terms of total consumption, showing a downward trend since 2010, accounting for around 1.5 % of total domestic consumption in 2020.

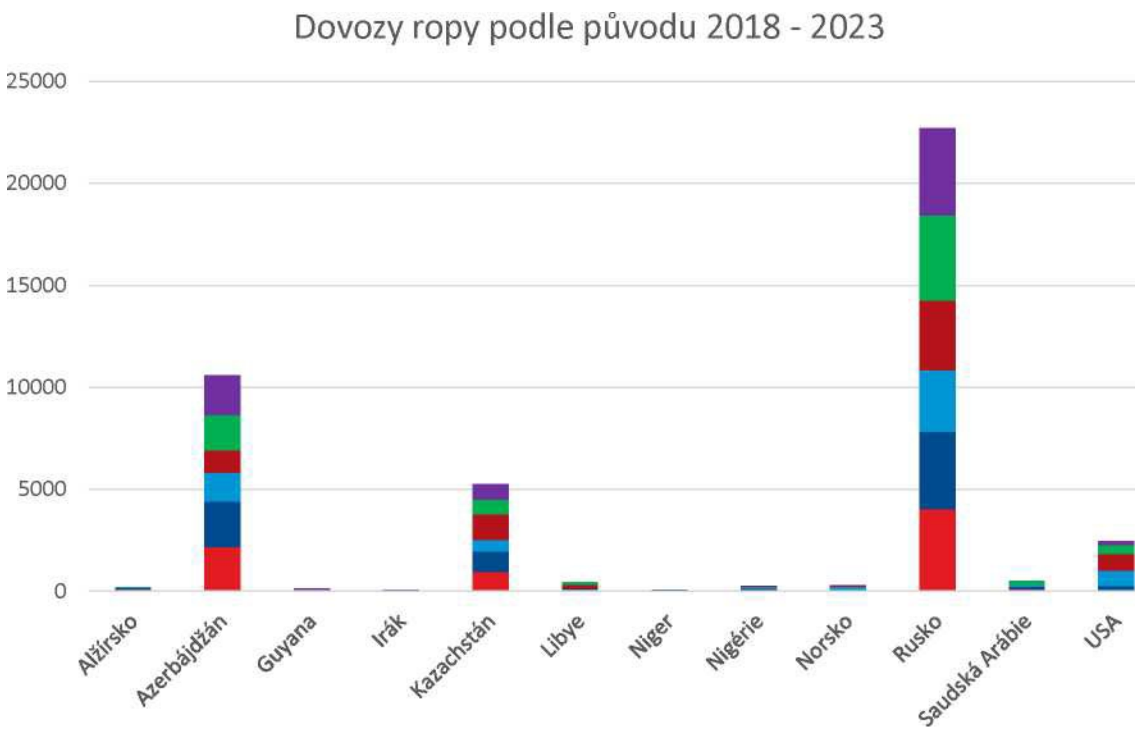
The Czech Republic uses two oil pipelines to transport oil, the Družba pipeline (the transport capacity available to the Czech Republic is 9 million tonnes of oil per year), which mainly transports oil from Russia and the IKL pipeline (transport capacity equivalent to 10 million tonnes of oil per year), which transports oil from non-Russian sources. The Czech Republic therefore has long at its disposal both by diversifying sources and diversifying transport routes. In 2023, transport of oil to the Czech Republic was carried out through the Družba pipeline at 58.0 %, and 42.0 % of imports were carried out through the IKL pipeline. Fluctuations in the transport share of individual oil pipelines are linked to agreed deliveries in quantities and modes of transport by the oil processor.

In the Czech Republic, oil processing takes place in two refineries, namely the Litvínov and Kralupa refineries, which are operated by ORLEN Unipetrol, the parent company of which is the Polish company PKN ORLEN, majority owned by the Polish State. Litvína refinery – Zalji is mainly processing sulfur oil from the Russian Federation (Russian Export Blend), which is transported to the Czech Republic via the Druzhba oil pipeline. The Kralupy refinery processes so-called sweet oil, i.e. low sulphur oil imported into the Czech Republic via the IKL pipeline, in particular oil from the Caspian region, i.e. the types of oil referred to as Azeri, CPC and Turkmeni blend and other non-Russian oil sources. The combined processing capacity of the two refineries corresponds to approximately 8.7 million tonnes of crude oil per year.

Domestic refineries cover about 80 % of domestic consumption of petrol and diesel through their production so-called refinery output. Some of this production is exported to the neighbouring countries, while imports take place, particularly diesel. The countries with the highest fuel trade in Czechia are Germany, Slovakia, Austria, Poland and Hungary. In 2020, the Czech Republic imported half of the diesel fuel from Germany (over 1.3 million tonnes) and combined imports from Germany and Slovakia accounted for 85 % of all diesel imports into the Czech Republic. Motor gasoline was imported into Czechia in 2020 of 560 thousand tonnes. Imports from Slovakia were predominant, accounting for about half of all imports, but the trend is still decreasing.

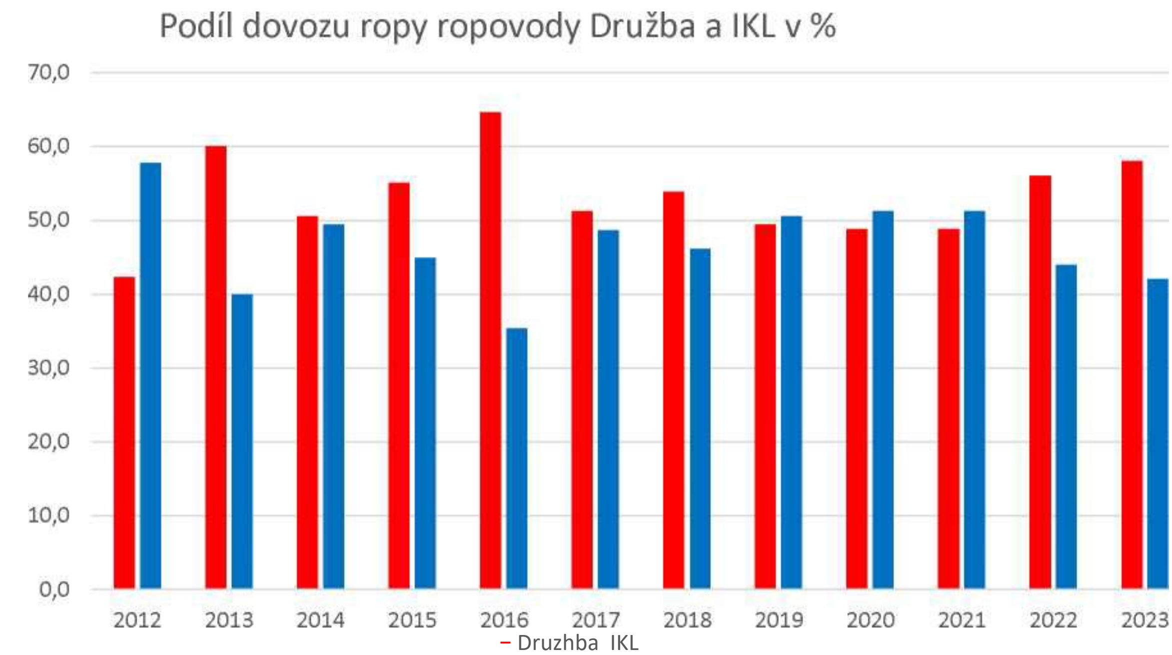
An essential and strategic project in the field of oil safety is the currently implemented TAL-Plus project, the implementation of which will enable the capacity of the TAL pipeline between the Italian Trieste and Ingolstadt, Germany, to be increased by 4 million tonnes per year, which can be imported from the west via the IKL pipeline from non-Russian sources. The project is on track and the required capacity will be reached at the end of 2024. During the first half of 2025, the necessary preparations (completion of backup, infrastructure completion, technological and logistical preparations in refineries) for the definitive and complete transition from Russian oil from mid-2025 will be completed. The project is managed, implemented and financed by the operator of the oil pipelines by the State company MERO ČR.

Graph 69: Imports of crude oil into the Czech Republic by country of origin in 2018-2023 (source of MIT)

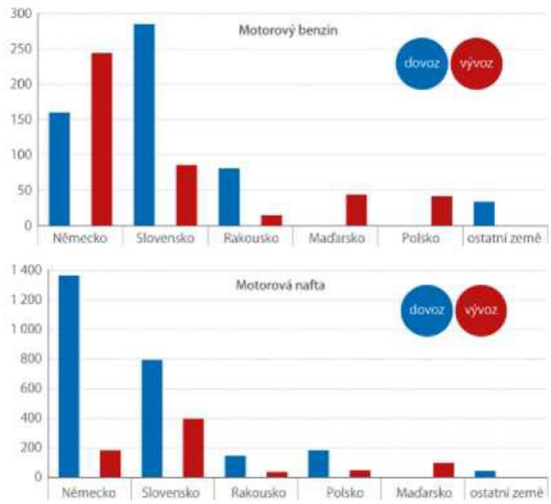


2018 ‘2019) ‘2020) 2021 2022 2023

Graph 70: Development of imports of crude oil into the Czech Republic by Družba and IKL in 2012-2023 (source of MIT)



Graph 71: Imports and exports of fuel 2 020 in 1 000 tonnes (source of the Czech Statistical Office)



4.4.1.6 Development of generation capacities and ensuring electricity balance in the long term

The transmission system operator ČEPS, a.s., thoroughly analyses the current risks associated with the development of generation capacities in the EU. To this end, and in accordance with Articles 23 and 24 of Regulation (EU) 2019/943 of the European Parliament and of the Council, it prepares and issues annually a resource adequacy assessment of the EC Czech Republic. The current evaluation covers the period until 2040 and its full version is available on ČEPS, a.s. (Czech version: https://www.ceps.cz/cs/zdrojova-primerenost English version: https://www.ceps.cz/en/resource-adequacy) and MIT.

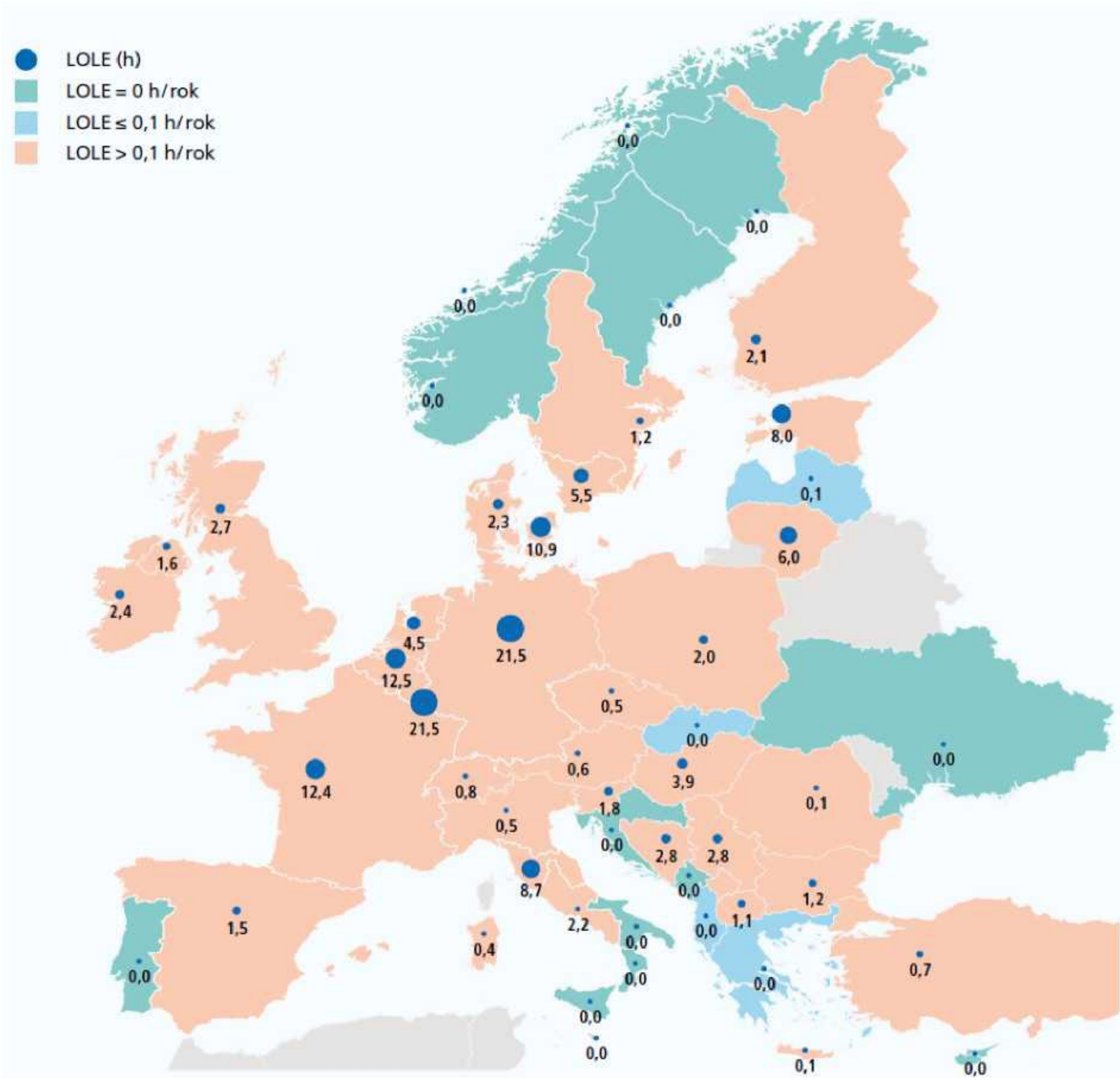
The 2022 resource adequacy assessment of the EC CR was prepared in line with the ENTSO-E methodological recommendations. In addition to the established medium-term resource adequacy outlook, it also includes a longer-term strategic outlook until 2040.

Like other EU TSOs, ČEPS has a legislative obligation to participate in the development of the European Resource Adequacy Assessment (ERAA), which follows on from its predecessor Mid-term Adequacy Forecast (MAF). The European evaluation shall be carried out by ENTSO-E on an annual basis and shall include central reference scenarios that map the possible trajectory for the development of European electricity over the medium term of ten years.

Regulation 2019/943 requires producers and other market participants (e.g. traders, customers, market operators, etc. in the Czech Republic) to provide transmission system operators with data on the expected use of generation resources, taking into account the availability of primary resources and appropriate scenarios of forecasted demand and supply. The data received from TSOs shall, together with the central assumptions established by ENTSO-E, enter the simulations of the central reference scenarios. These scenarios may be further expanded in the national resource adequacy assessment if changes in the energy sector Regulation 2019/943 can be envisaged in a given country compared to the central reference scenarios of ENTSO-E, in particular with regard to the resource adequacy assessment methodology. The new procedures and principles are being implemented in particular to refine the modelling of cross-border transmission network capacities using the Flow-Based (FB) method and the Economic Viability Assessment (EVA). The EVA model, based on economic parameters, evaluates the economic merits of the operation of the resource and, in order to reduce the system price, decides whether the source is shut down, prolonged its lifetime or whether it is worth investing in a new resource. In addition, ERAA also aims at a gradual shift to calculations for all years over the chosen 10-year horizon and the use of a single modelling tool.

In particular, the European assessment may recall the results of the central reference scenario of EVA without capacity mechanisms, which shows the prediction of European energy developments for the 2025, 2027 and 2030 target years. The results for a wide range of countries indicate a risk of resource disproportionality already in 2025, and the application of EVA further aggravates this risk by shutting down a large number of resources deemed to operate as non-economic. Germany and Luxembourg (> 20h), followed by France, have the highest number of LOLE hours in 2030.

Figure 10: *ERAA 2022 Results – Central EVA Reference Scenario without capacity mechanisms, LOLE values in 2030*

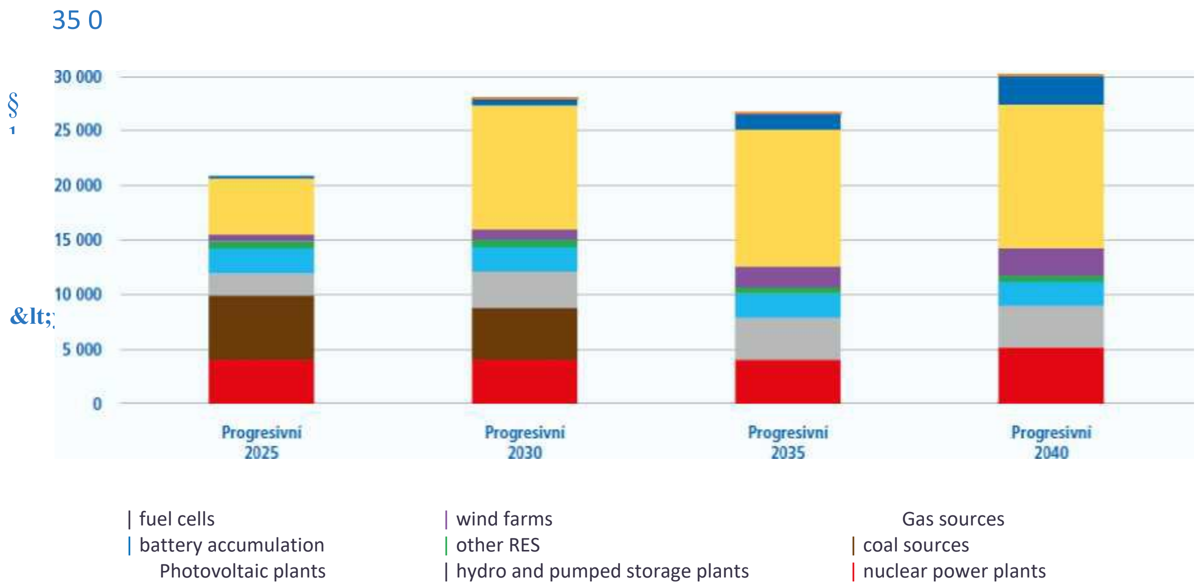


ENTSO-E source

Under MAF CZ 2022, calculations were made showing in a progressive scenario (which ČEPS considers the most likely trajectory for the development of the Czech energy mix) that after 2030 there are situations where there is insufficient electricity to cover consumption, expressed by EENS 1.2 GWh

The progressive scenario represents an accelerated phase-out of coal resources by 2033 and a higher level of penetration of renewables under the Modernisation Fund and other instruments to support their development. The scenario is based on a development prediction that takes into account the EU's ambitious emission reduction targets and envisages an increase in electricity consumption due to large-scale electrification. The complete completion of the heat and plant energy transition from coal to natural gas, biomass, waste or other alternative fuels is under consideration by the end of 2030.

Graph 72: *Net installed performance in Progressive scenario per year and resource categories*

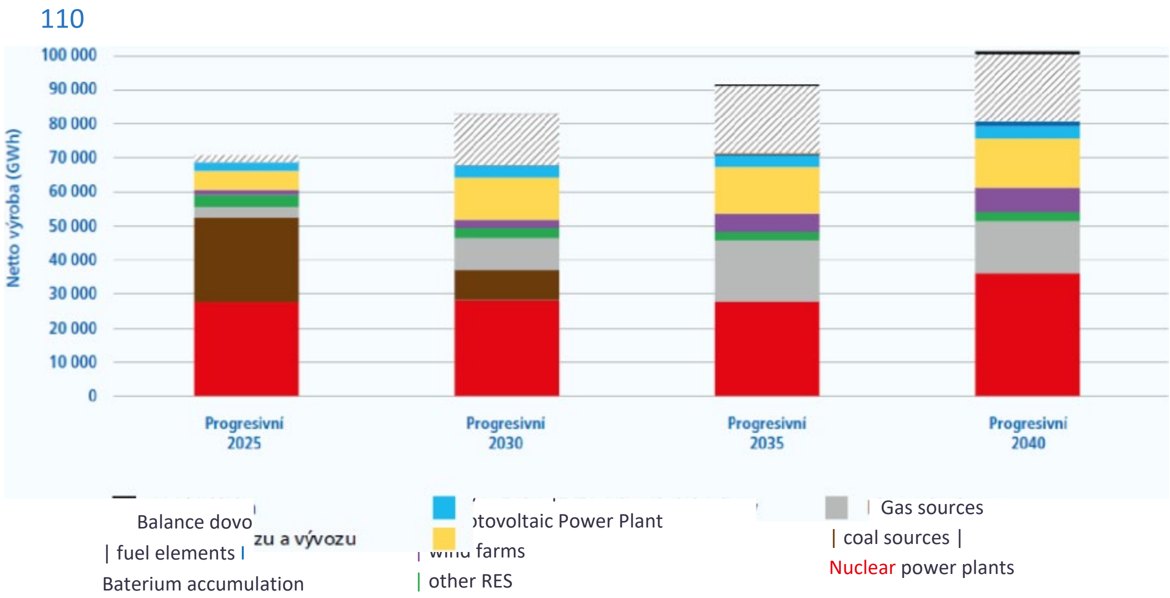


Installed capacity	Progressive 2025	Progressiv	Progressive 2035	Progressive 2040
Fuel cells	0 MW	5 MW	13 MW	29 MW
Battery accumulation	220 MW	637 MW	1 491 MW	2 585
Photovoltaic plants	5 159	11 406 MW	12 567 MW	13 238 MW
Wind plants	617 MW	958 MW	1 959 MW	2 500
Other RES	688 MW	655 MW	558 MW	584 MW
Hydro and pumped	2 241	2 241 MW	2 241 MW	2 241
Gas sources	2 071	3 381 MW	3 811 MW	3 790
Coal sources	7 222	5 747 MW	0 MW	0 MW
Nuclear power	4 047	4 047 MW	4 047 MW	5 187

Source: ČEPS analyses

The graph below, showing the annual balance in a progressive scenario, shows how the system affects the end of coal-fired power generation in 2033, when the EENS' non-delivered energy value rises to 305 GWh by 2035, while the national reliability standard, expressed in LOLE, is being exceeded. In 2035, the LOLE is at 146 h/yr, leading to resource inadequacy in a progressive scenario, despite a significant increase in gas source production and an increase in the volume of imported energy. The evolution of the EENS indicator for 2040 shows that even the launch of a new nuclear resource in Dukovany in 2036 cannot compensate for the decline in fossil resources and the EENS continues to grow to 798 GWh per year.

Graph 73: *Annual balance in progressive scenario per year and source categories*

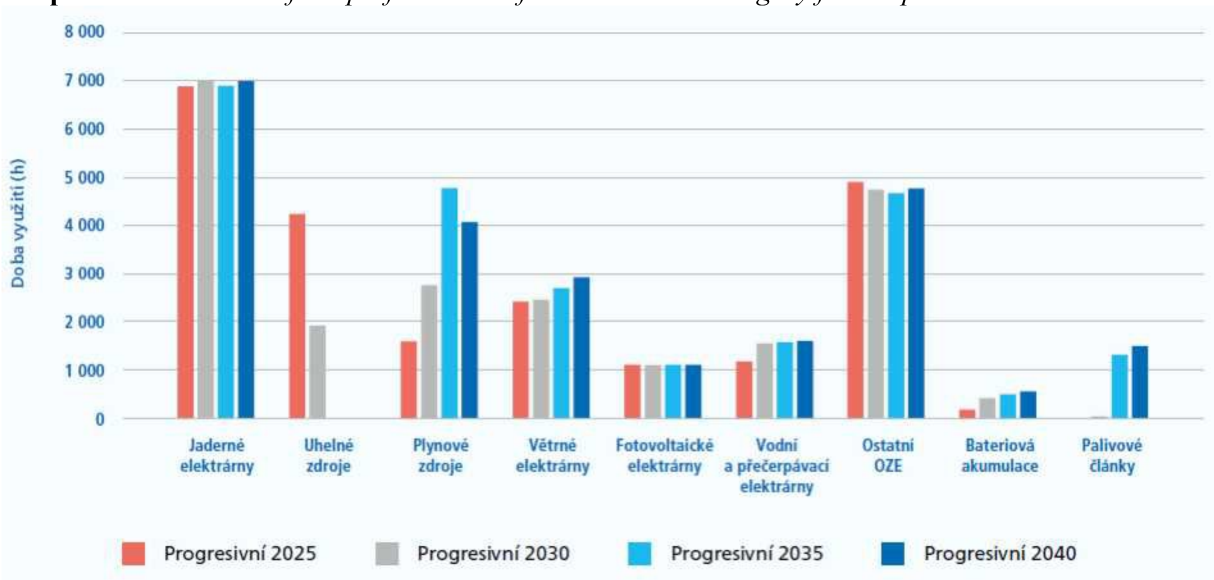


	Progressive 2O2S	Progressive 2030	Progressive 2035	Progressive 2040
Non-delivery	OGWh	1 GWh	305 GWh	798 GWh
External balance of goods	2 121	15 218 GWh	19 981 GWh	19 961
Fuel cells	OGWh	OGWh	16 GWh	42 GWh
Battery accumulation	36 GWh	256 GWh	718 GWh	1 401
Hydro and pumped	2 605	3 452 GWh	3 495 GWh	3 554
Photovoltaic plants	5 658	12 469 GWh	13 782 GWh	14 518
Wind plants	1 484	2 349 GWh	5 258 GWh	7 280
Other RES	3 374	3 109 GWh	2 605 GWh	2 784
Gas sources	3 273	9 298 GWh	18 195 GWh	15 437
Coal sources	24 961 GWh	9 039 GWh	OGWh	OGWh
Nuclear power	27 883 GWh	28 381 GWh	27 921 GWh	36 326

Source: ČEPS analyses

The graph below shows the evolution of the annual hourly use of each resource category, again demonstrating the impact of coal shutdown together with increasing consumption. It is precisely the combination of coal-fired power generation, higher consumption and resource scarcity abroad that leads to a significant increase in gas production after 2040. The duration of the use of renewables does not change much over time, due to the link between the operation of these technologies and natural conditions. Equally, the annual hourly use of nuclear sources, which are operated as baseload sources for economic reasons while maintaining a constant level of production, is not transformed.

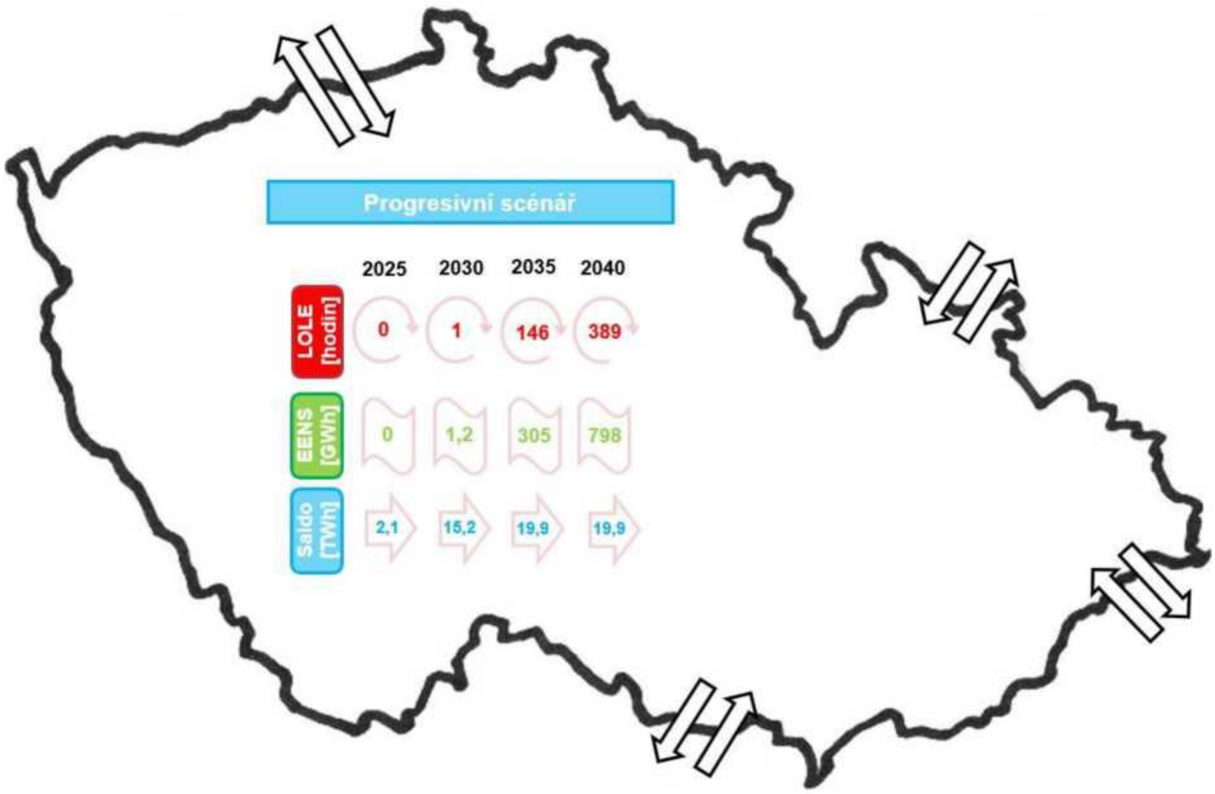
Graph 74: *Annual use of the performance of each resource category for the period 2025-2040*



Source: ČEPS analyses

The progressive scenario, which envisages a decrease of coal sources by 2033, a more ambitious increase in installed RES capacity and an increase in consumption in 2035, indicates 146 h of lost load and the EENS is at 305 GWh. In 2040, the LOLE is up to 389 hours with an EENS of 798 GWh. The progressive scenario does not meet the requirements for reliability of electricity supply from 2035 onwards. The system would thus be disproportionate in terms of resources, mainly due to the end of coal-fired electricity generation as early as 2033 without replacement in the form of new sources. There is also a risk that this situation will occur earlier than 2033 for economic reasons, mainly due to the rising price of emission allowances, when coal sources cease to be competitive on the market.

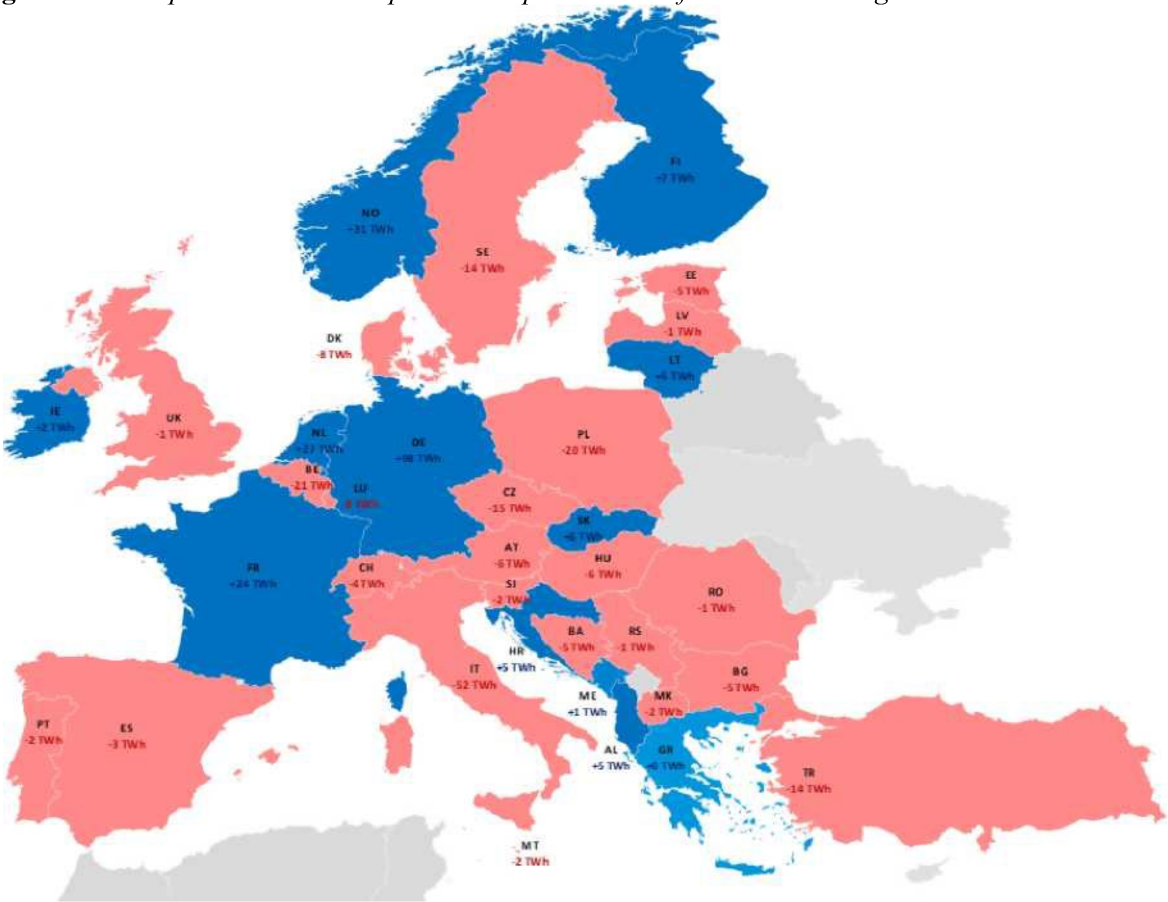
Figure 11: *LOLE and EENS probabilistic indicators for the 2025-2040 Progressive scenario, including the balance*



Source: EC CZ resource adequacy assessment by 2040 (MAF CZ 2022)

The analyses show that due to the phasing out of coal sources and the end of life of nuclear sources, the level of installed capacity will decrease. According to the above calculations, the planned development of RES and decent production contributes only to a limited extent to addressing the security of electricity supply. Given the evolution of the performance balances of the surrounding countries in our region, import alone cannot be relied on to ensure a secure and reliable supply.

Figure 12: *European countries' import and export balance for the 2030 Progressive scenario*



Source: Analysis by ČEPS, a.s.

The results of simulations of the evolution of the electricity system show that imported electricity is increasing due to a lack of domestic generation capacity and increasing electricity consumption due to electrification (especially in transport, heating but also in industrial productions). In 2035 and 2040, the import value shall be at the maximum technically possible import of 20 TWh. With regard to the possibilities to import electricity from wheeled countries, the scenario indicates a more significant surplus in particular in France and Germany. However, the changes in the German and French energy strategies, together with the published terms of the taxonomy and the Fit for 55 package, will trigger an increased consumption of hydrogen (notably from RES), which will affect the available import options from abroad.

There is currently no new resource in the Czech Republic with installed capacity in the order of hundreds of MW that could be operational in the 2030 perspective. In the medium term, additional investment in fossil fuel resources can be limited. The main reason for this is green measures for fossil resources and therefore the need for more investment to implement them.

The results of the simulations referred to in the previous chapter show that, in order to achieve resource adequacy and to comply with the reliability parameter of the operation of the EC CR (LOLE & 15 h), the system will need to be supplemented by new energy sources at certain times. In response to the indicated energy shortage, new resources need to be added to the system. Two options for the MAF CZ 2022 document were implemented.

- A simplified approach based on the coverage of the total EENS by new sources requires the net installed capacity in the system of the following amount (while maintaining the requirement of a maximum import balance of 20 TWh) for each time section.

- In the case of higher energy self-sufficiency requirements under the ASEK (covering at least 90 % of consumption with domestic resources), based on the results of simulations, the following amount of additional power is needed.

Table 68: *Overview of the additional net installed power at a maximum import balance of 20 TWh and at 90 % energy self-sufficiency*

Need for additional power (MW)	2025	2030	2035	2040
Maximum import balance (max 20 TWh)	0	0	76	200
Energy self-sufficiency according to ASEK (90 % of consumption)	0	1 760	2 818	2 740

Source: Analysis by ČEPS, a.s.

By shutting down coal sources, the Czech Republic will lose a significant part of its manageable electricity generation, which will have to be replaced. The compensation will be necessary not only for the generation and sale of electricity for the power electricity market and for the supply to consumers, but also for the balancing services market. Balancing services shall be purchased by the transmission system operator to ensure a balance between generation and consumption at all times and for reliable and high-quality electricity supply. As the exit from coal gradually deteriorates and exceeds the security of supply indicators in 2035, in particular due to the assumption that coal sources will be shut down in 2033, it is clear that the earlier shutdown of coal sources will bring electricity shortages closer to 2030 for the power electricity market, consumers and the market for balancing services. Therefore, like other Member States in the European Union, the Czech Republic also examines measures other than purely market-based measures with a view to failing to comply with national reliability standards and thereby ensuring a gradual, manageable decarbonisation of electricity generation, respecting the objective of the Czech Republic’s State Energy Concept to ensure performance adequacy in relation to the maximum load of the electricity system.

4.4.1.7 Provision of non-frequency transmission system services

Recovery plan after system failures

As the exclusive electricity transmission system operator (the 400 kV and 220 kV electricity lines) in the Czech Republic, ČEPS is required to draw up a Recovery Plan in accordance with Article 23 of Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on the defence and restoration of the electricity system (NCER), after consulting in particular the relevant distribution system operators, significant network users, the national regulatory authority, neighbouring transmission system operators and other system operators in the synchronous area of the Continental Europe. The restoration plan shall include technical and organisational measures to restore the system to normal operational state, in particular measures and procedures for restoring the power supply when the transmission system is in a blackout state, i.e. if at least one of the following conditions is met:

- more than 50 % of abstractions were lost in the Czech Republic;
- or if the voltage is completely absent in the Czech Republic for at least 3 minutes.

According to Article 24 of the NCER, paragraph 1 of the NCER requires the measures to be implemented and maintained in the Recovery Plan.

In addition, pursuant to Article 23(4)(f) of the NCER, the restoration plan shall include the number of energy resources in the TSO’s control area that are necessary to restore its system within the framework of its self-regeneration strategy, with black start capability, fast resynchronisation capabilities (via self-use operation) and island operation capabilities.

The electricity system is designed and operated to meet the reliability criterion ‘N-1’ (the failure of any defined transmission element does not exceed the permissible operating parameters). For the system thus designed, in compliance with that criterion, the probability of a failure accompanied by a disruption of normal operating conditions is very low. However, practical operation shows that, from time to time, the electricity system is exposed to random aggregation of events leading to a widespread failure, which may result in a full loss of user voltage (blackout) in the worst case scenario. Large blackouts in electricity supply mean a critical situation with a societal impact. In these cases, the Recovery Plan and its measures are activated.

The strategy for repowering the Czech Republic’s transmission system is currently based on the rapid and prioritised provision of self-consumption of nuclear power plants for reasons of nuclear safety and on the submission of voltages from available sources to the self-consumption of system power plants (electricity connected to the transmission system and allowing for the regulation of power as required by the system). This procedure shall ensure that sufficient and stable power is available in a relatively short time to restore the power supply of other system users. System power plant operators are also prepared for such procedures in the light of regular joint trainings between ČEPS, distribution system operators and system power plants.

In the event of a complete loss of power, sources with black start capability shall be reserved for the initial supply of voltage to nuclear and other system power plants. These sources are regularly tested and certified. In the transmission system, these are the Orlík hydropower plant and the Dlouhé and Dalešice pumped hydropower plants. Current sources certified for black start provide stable performance for at least two attempts to run one of the restoration blocks (operation for at least 6 hours).

A subsequent key step is the operationalisation of additional system resources for the expansion of the renewed part of the system. The TSO shall perform comprehensive operational testing of voltage administration from sources capable of starting dark to selected system power plants in order to restore their own consumption. In the event of a successful test, these power plants are then included in the so-called ‘renewal blocks’, which will ensure the initial restoration of the system and provide power for the subsequent restoration of power supply to the electricity system users.

For this purpose, the following sources are included in the Recovery Plan and tested:

- Dukovany nuclear power plant (however, with a view to ensuring nuclear safety, the restoration of the system through Dukovan has more restrictive conditions)
- Coal power plant Chvaletice
- Coal power plant Prnéřov 2,
- Coal power plant Tušimice 2
- Coal power plant Councillors.

Therefore, the operation of coal-fired power plants is essential and difficult to replace by the early 1930s in order to meet the requirements of the NCER and to ensure rapid and reliable system recovery after blackout failures.

In the future, in particular future (paro) gas-fired power plants are envisaged as part of the initial renewal strategy. For new sources, the ability to participate in island traffic and rapid re-synchronisation can be applied as part of the connection requirements. However, the expected number of such resources will be lower than the current presence of coal-fired power plants. Therefore, ČEPS is examining procedures with a higher involvement of DSOs. However, these procedures will involve the use of a higher number of smaller resources at the same time, which places increased demands on the management, communication and set-up of the necessary processes. At the same time, in the 2030 horizon, it is not realistic to create new (vapour) gas-fired power plants or to fully replace coal-fired power plants through joint procedures with grids. Shutdown of coal-fired power plants will lead to a slower roll-out of the system to a higher risk normal operating condition.

For the real involvement of RES and in particular energy storage systems in system restoration, further research is needed in the field of power electronics enabling Grid Forming functions, i.e. a function where inverters have advanced system support features including black start for larger grid units. These resources, due to their primary energy source, may not always be available and may not provide stable power for the minimum time needed to deploy additional resources, as well as currently available black-start sources (hydro power plants) or plants classified as restoration units. Again, this entails a risk to the successful restoration of the system to normal operational conditions and increased demands to ensure appropriate technical and organisational measures. Therefore, at this point in time, we do not consider the state of experience and deployment of power electronics sufficient to replace coal sources in the 2030 horizon.

In the context of the projected coal energy downturn, it is therefore necessary to ensure the maintenance of black start capabilities in north-western Bohemia, eastern Bohemia and Moravsko-Silesia in the transition period until the beginning of the 30th year.

Voltage and reactive power control

The regulatory range of reactive power of existing and planned installations, in synergy with the compensation available to ČEPS, constitutes an important tool (whole) in the area of voltage management and reactive power management. The expected development of the transmission system, in particular the duplication of transmission lines, will ensure an increase in transmission capacities, but at the same time lead to an increase in reactive power generated by PS lines. Together with decentralised generation and higher cable rates of lines in the Czech Republic, the electricity system will mainly face at a time of lower loads of the increase in reactive power generated in the DS and the associated increase in voltage at the transmission point PS/110 kV. In case of rapid shutdown of coal resources involved in voltage management, there will be a lack of regulatory means, which will put the system's operational capacity at risk. Therefore, in order to ensure the operational safety limit in terms of voltage and reactive power control, it is necessary to have permanently available/in operation stable sources capable of voltage management (e.g. coal/gas/nuclear power plants) before their compensatory extent is fully replaced by ČEPS's own compensation and DS regulatory capabilities. In the case of a step-down of all coal-fired power plants and the unavailability of new stable sources, full substitution can be expected after 2033. In the light of the development consent processes, it is not possible to wait for a significant acceleration.

In order to ensure operational security and the ability to maintain voltage within the permitted operating limits, verification of the adequacy of the planned compensation and identification of the need for compensation in the PS shall be carried out on a regular basis by specifying system development and operational developments and the availability of other means not only for voltage management. The analysis shall also study other aspects affecting secure and reliable system operation (e.g. dynamic range of reactive power control over both supply and reactive power demand, electricity quality, adequacy of the compensation of the relevant area in view of cost-effective system operation). On the basis of the analyses, a concept is prepared for the development of compensatory resources in the PSC of the Czech Republic until 2032, which defines the locations for the location of new compensatory buffers, including technical implementation and power scale. The U/Q regulatory service, in particular in the North-West Bohemia, Eastern Bohemia and Moravskoslezska hubs, is necessary to ensure that existing resources are in place during the transition period until the new compensation is put into operation, and this is a key condition for ensuring reliable operation of CP within the permitted quality parameters.

Conservation measures

The loss of conventional sources with synchronous generators also leads to a loss of inertia in the system. In general, inertia, which is the natural physical characteristic of rotating masses of synchronous sets, helps to stabilise the frequency of the electricity system. With a loss of inertia, higher deviations in frequency and change rate can be expected, leading to a higher susceptibility of the entire electricity system to fault conditions. The analyses carried out show that the inertia of the Czech Republic's electricity system will indeed decrease with coal sources shut down, but the overall situation is saved by large machines in nuclear power plants, which will provide sufficient natural inertia and ensure that the minimum permitted level is met together with other synchronous machines in the system. However, in view of possible fault conditions, ČEPS is concerned with the area of artificial inertia which could be provided by power-enabled devices (again among the so-called Grid Forming functions). This characteristic is expected to be available on a larger scale in the system only after 2030.

Measures to ensure non-frequency services during coal phase-out by 2032

The three non-frequency services described above in the nodes of north-western Bohemia, eastern Bohemia and Moravskoslezska will not be provided in the event of a sudden shutdown of the existing coal resources that provide these services today. The current service mechanism only one year ahead is based on the steady state of long-term operation of all key system power plants. However, this is very risky for the period of coal energy depression and the progressive development of new resources and services, as long-term plans of operators of current resources, as well as potential investors in new sources, cannot take these services into account and ČEPS has no tools to enforce the provision of key non-frequency services if existing coal resources are completely phased out. For a transitional period from 2026 to around 2032, pending the gradual completion of technical resources in ČEPS networks and the establishment of a new system of coordination of smaller resources in distribution networks, the services will be provided by long-term auctions.

The auction will be auctioned by ČEPS for the three basic non-frequency services in node areas where, once coal resources have been shut down, it would not be possible to ensure reliable operation of the transmission system and its renewal according to the legislation in force. The relevant node, the service parameters (their scope and the required availability) will be defined and the auction will be open to all resources that can provide these services (including potentially new resources) in a given node area. In a node area where the only source of such services is in fact the only source of such services, with the ERO's consent, these services may be provided by direct contract.

The auction procedure shall take into account the planned entry into operation of transmission system facilities as well as any new resources capable of providing such services. The auction for these services must take place at the latest in 2 025 in order to ensure services already from the potentially critical year 2026.

4.4.1.8 Ensuring the long-term supply of nuclear materials and fuel

Nuclear power plants are a source of baseload electricity important for the reliable operation of the electricity system and further contribute to the energy self-sufficiency and independence of the Czech Republic. Ensuring the supply of nuclear fuel and reliable fuel operation is therefore an important key strategic factor.

The operator of nuclear power plants in the Czech Republic, ČEZ, a.s., continuously evaluates the behaviour and operational results of the fuel and carries out fuel modifications to ensure fuel reliability and increase its technical standard. The Dukovany nuclear power plant uses fuel from JSC TVEL from the Russian Federation. Its operation has been smooth in the long term and its technical quality and efficiency are continuously improved as part of the modifications. Fuel is currently used at an increased capacity of 105 % in a fully five-year fuel cycle, thanks to the latest fuel innovation (Gd-2M+) committed since 2014. At the same time, a new modification of the PK3+ unencumbered fuel was implemented to support the upcoming further power increase using the plant's project reserves and fuel cycle extensions. The Temelín nuclear power plant currently also uses fuel from JSC TVEL. In 2018, an advanced fuel type with increased uranium content and increased structural rigidity (TVSA-Tmod2), allowing further fuel efficiency gains, was delivered and brought into block 2. The development of this, with an increased number of remote grids, has been removed from previous modifications of emerging operational problems and allows for a reliable operation at present. TVSA-T fuel has supported the transition to operation at an increased capacity of 104 % over a four-year fuel cycle and provides potential for the safe operation of units in upcoming extended cycles.

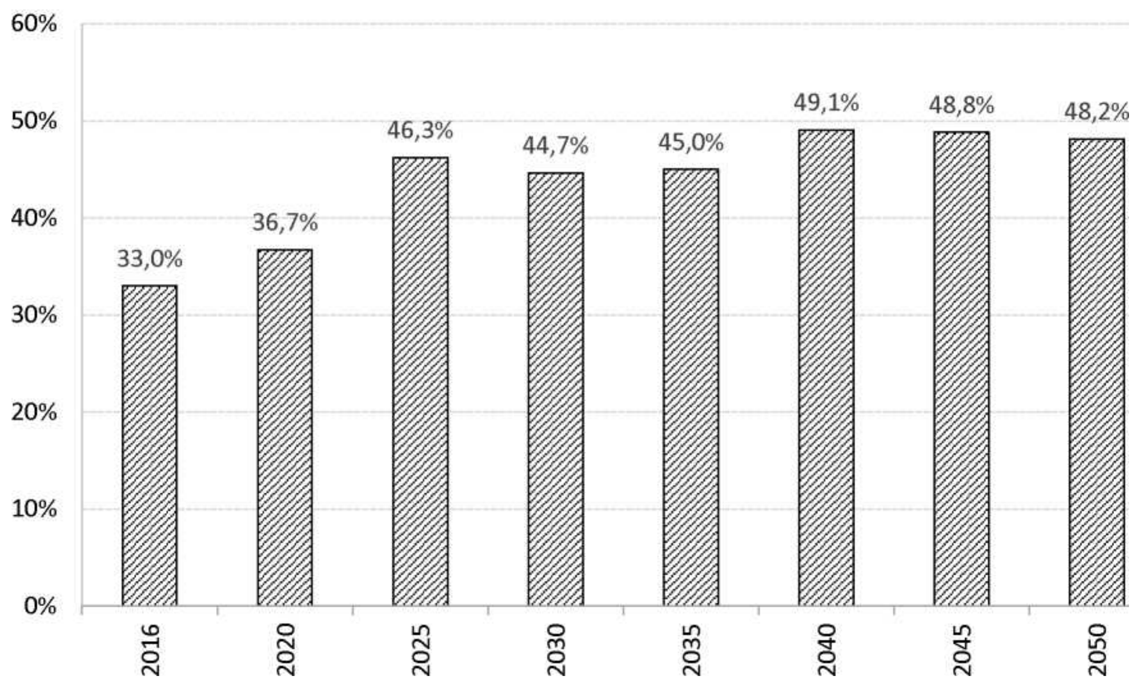
CEZ, a.s. was aware of its dependence on a single fuel supplier a few years ago. It has therefore started activities leading to the provision of an alternative fuel supplier. However, as this is a complex long-term process, it has taken immediate steps to mitigate this risk. A stockpile of fresh nuclear fuel was built up in both nuclear power plants. At the Dukovany nuclear power plant, the maximum storage capacity was filled, allowing all 4 units of the power plant to operate for a minimum of 3 annual fuel cycles. At the same time, an increase in this storage capacity is being prepared. At the Temelín nuclear power plant, a fuel supply of one storage transhipment was created for each unit, but at the same time the process of diversification of supplies has progressed. However, an increase in the storage capacity of fresh fuel is also being prepared at the Temelín nuclear power plant.

The nuclear fuel for the Dukovany Nuclear Power Plant is sourced under a long-term contract of the Russian company TVEL, which provides not only for its production (fabrication), but also for the supply of conversion and enrichment services and partly of uranium feedstock. At the same time, a fuel supply contract was concluded in 2023 with Westinghouse Sweden Electric, which will cover part of the power plant's needs by supplying alternative fuels as of 2024. The development of alternative fuel for VVER type reactors is also ongoing for units in Ukraine, Slovakia, Hungary and Finland. Supplies are thus secured from two different fuel suppliers, but at the same time negotiations are ongoing to provide another alternative fuel supplier outside the Russian Federation. For these supplies of alternative fuel, the operator ČEZ, a.s. arranges for the purchase and processing of nuclear materials on the world market. As recommended by the EURATOM Supply Agency supply Agency, the desired diversification of the supply base is maintained.

For the Temelín nuclear power plant, contracts were signed with alternative suppliers Westinghouse Sweden Elctric AB and Framatome GmbH for the supply of fuel for the next period following a tender in 2022. Therefore, supplies from two different suppliers outside the Russian Federation are contracted. For these supplies of alternative fuel, the operator ČEZ, a.s. arranges for the purchase and processing of nuclear materials on the world market. As recommended by the EURATOM Supply Agency supply Agency, the desired diversification of the supply base is maintained.

Following the escalation of the international political situation following the Russian Federation's aggression against Ukraine in 2021, the importance of increasing the competences of ČEZ, a.s. and its supporting engineering organisations in the analysis needed for the licensing process and the confirmation of the safe operation of fuel was confirmed. These competences are essential to gain independence from the former fuel producer JSC TVEL from the Russian Federation and other Russian engineering and project organisations. ČEZ, a.s. gained practical experience in implementing the project of 6 fuel test files from the supplier Westinghouse. These fuel assemblies were developed and the relevant analyses were prepared with the active participation of ČEZ, a.s. and its supporting organisations. The experience gained makes it possible to implement the transition to complete alternative fuel loads according to closed contracts, thereby achieving independence from suppliers from the Russian Federation.

Graf č. 75: *Očekávaný vývoj dovozní závislosti*



Source: Actual processing of MITs for the purposes of the National Plan

Dimension 'Internal energy market'

4.5.1 Electricity interconnectivity115

i. Current interconnection level and main interconnectors116

The method for determining the degree of electricity interconnectivity may vary according to what the total available transmission capacity of all the profiles of the system is related to. The so-called '10 % interconnection target' under the Barcelona Agreement is measured as the ratio of net transmission capacity to installed generation capacity – with an emphasis on the integration of the internal electricity market. Furthermore, the Czech Republic's current Static Energy Concept establishes the degree of integration into international networks (the Czech Republic's interconnection rate) as the aggregate available transmission capacity in proportion to the maximum load, which is determined by the proportion of the sum of export or import, the capacity of the transmission system in a given year and the outlook for the maximum net load of PS for the corresponding year.

For the purpose of comparing the two methods mentioned above for determining the degree of electricity interconnectivity, values for the interconnection rate (export or import) for the years

The Czech Republic's115 national plan is not the basis for drawing up territorial planning documents.

116With reference to overviews of existing transmission infrastructure by Transmission System Operators (TSOs).

2024 and 2030 based on ČEPS, a.s. It should be recalled here that the determination of the 'maximum' transmission capability of the system depends on several variables, so that, in order to ensure full comparability of outputs, the calculation would have to take place under fixed and equal conditions, in particular for safety margins which take into account in particular circular flows that evolve over time. Given the uncertainties in the energy environment, especially in the energy mix, these values can be considered indicative.

Table 69: *Projected level of interconnectivity in 2024, 2030*

Year/method of determination of interconnectivity rate/transmission capacity	Under the Barcelona Agreement [relative to installed power]		According to the Czech Republic's Statutory Energy Concept [relating to maximum load]	
	Export capacity [%]	Import capacity [%]	Export capacity [%]	Import capacity [%]
2019	29,6	28,0	55,6	52,6
2024	38,7	35,4	57,9	53,0
2030 (Scenario A)	44,1	38,0	58,0	50,0
2030 (Scenario B)	44,1	38,0	60,2	51,8

Source: Information from the transmission operator ČEPS, a.s.

The figures in the above table (as per the Barcelona Agreement) differ from the 2017 EU Communication117 because the new calculations made by ČEPS, a.s. include tools for the efficient management of circular flows based on the implemented investment measures in 2017. This concerns, in particular, taking into account the impact of the SEPs on the determination of the safety margin in the calculation.

Table 70: *Information provided in the framework of the NECPs reporting*

Name of the national objective(s)	Year	
	2021	2022
Nominal transmission capacity to installed production capacity	34.4 %	35.7 %
Nominal transmission capacity to peak load	63.1 %	61.3 %
Nominal transmission capacity to installed renewable generation capacity Nominal transmission capacity to installed renewable generation capacity	151.2 %	153.8 %

ii. Estimates of requirements for interconnector expansion (for, inter alia, 2030)118

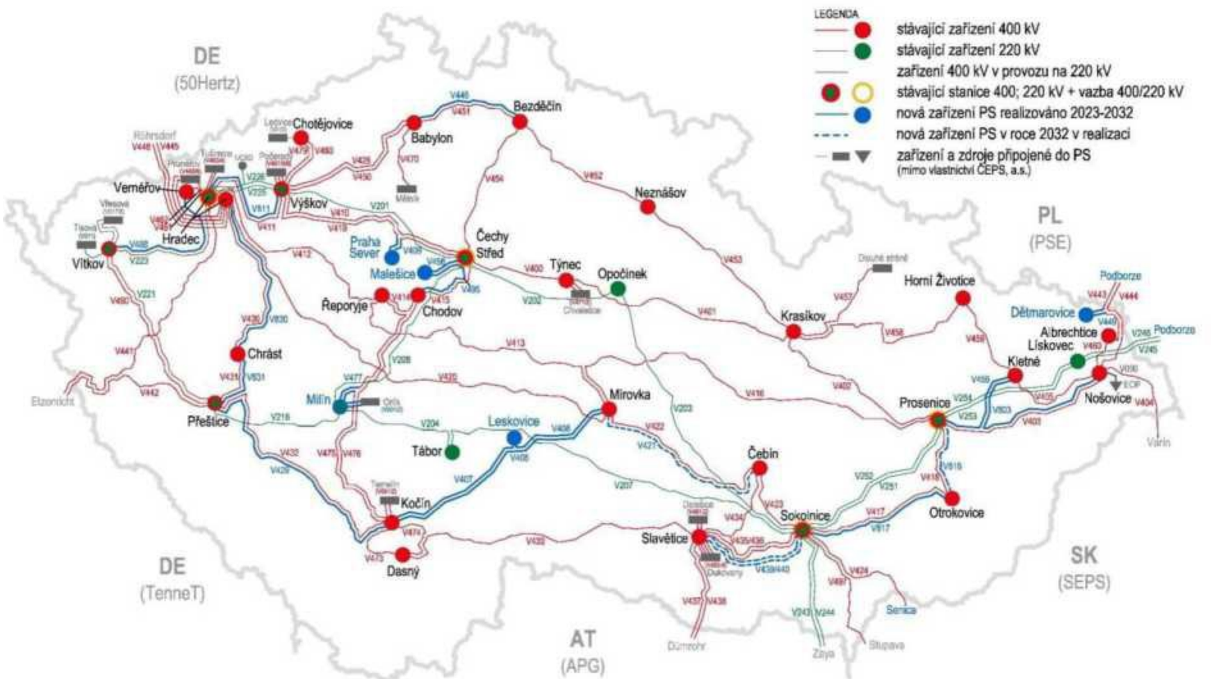
Estimates of the requirements for the expansion of interconnectors are primarily provided in the Transmission System Development Plan of the Czech Republic 2021-2030 and in the updated version 2023-2032,

117Communication on strengthening Europe's energy networks COM(2017) 718, 23.11.2017

118With reference to national network development plans and regional investment plans of TSOs.

which is in the approval phase at the time of drafting this document. Estimates of further expansion of the transmission system are set out in more detail in sub-chapter 4.5.2.3.

Figure 13: *Development chart of the Czech transmission network (situation in 2032)*



Source: Development scheme for the transmission network of the Czech Republic in the framework of the PSD 2023-2032

4.5.2 Energy transmission infrastructure119

1. Key characteristics of the existing transmission infrastructure for electricity and gas120

4.5.2.1 Key features of existing electricity infrastructure

Key features of the existing infrastructure and estimates of network expansion requirements are part of the published Transmission System Development Plan 2023-2032, which is subject to an update at a two-year interval.

The transmission system in the Czech Republic is operated by ČEPS. ČEPS ensures the transmission of electricity in the required volume and with high reliability. The continuous renewal and development of the transmission system, carried out by the operator of the transmission system, leads to an increase in the transmission capacity of the elements when the equipment is refurbished and replaced, so that the transmission system ensures, with high reliability, the connection and depletion of the power of large resources, the supply of distribution and the required inter-state transmission of electricity.

Table 71: *Length of transmission system lines in the Czech Republic*

Description of the device	Length of line (km)
400 kV lines	3 795

The Czech Republic's119 national plan is not the basis for drawing up territorial planning documents.
120With reference to overviews of existing transmission infrastructure by TSOs.

of which double and multiple	1 502
220 kV line	1 824
of which double and multiple	953
110 kV line	84
of which double and multiple	78

Source: Czech Republic's Relay Development Plan 2023-2032

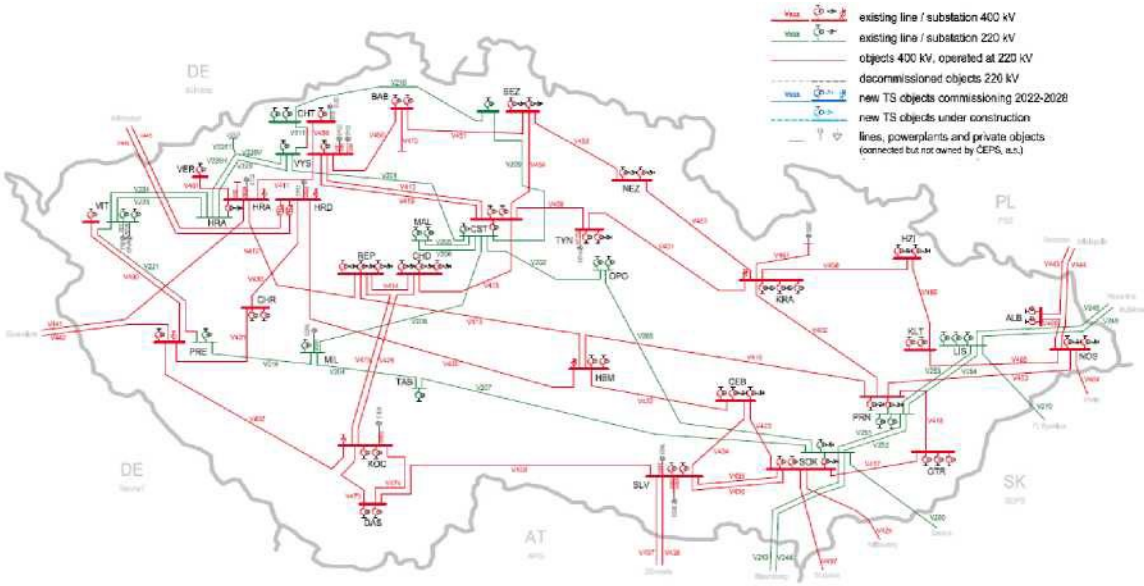
Table 72: *Number of foreign lines, substations and transformers within the transmission system*

Description of the device	Number of facilities
Foreign leadership 400 kV	11
Foreign leadership 220 kV	6
400 kV substations	29
220 kV substations	14
Substations 110 kV	1
Transformers 400/220 kV	4
Transformers 400/110 kV	51
Transformers 220/110 kV	20
Transformers with a phase shift of 400 kV (PST)	4

Source: Czech Republic's Relay Development Plan 2023-2032

Since 2017, Transverse Controlled Transformers (PSTs) located on the cross-border lines Hradec (CZ) – Röhrsdorf (DE) have been operational at the 420 kV Hradec u Kadana substation. Their task is to prevent negative effects on the PSC of the Czech Republic by effectively limiting large fluctuating power flows following the cross-border profile of the transmission system between the Czech Republic and Germany. In 2017 and 2020 respectively, a new 400/110 kV transform plant was put into operation in Vernéřov and Vítkov, respectively, in order to allow for an increase in the reserved power and/or capacity in the area, which is linked, inter alia, to the loss of power supplied to the 110 kV network by the shutdown of Prunéřov I. The construction of the above mentioned substations, together with other projects in the area, contributes to the integration of renewable electricity sources into the electricity system.

Figure 14: *Transmission system – status quo*



Source: ČEPS Company

4.5.2.2 Key features of existing gas infrastructure

General characteristics of the gas system

A gas system is a set of all facilities used for the production, consumption, storage and transport of natural gas. The gas system consists mainly of: (I) pipeline infrastructure with different operating parameters; (II) control action elements – border transfer stations, compression stations, partitioning nodes, closures and measuring fittings, etc.; (III) gas storage facilities used for the storage of natural gas; (IV) conventional and unconventional gas plants that can be injected into the gas system; (v) sampling and transfer points.

In terms of operational role, the system can be divided into two hierarchical units:

- Transmission system – High Pressure Pipeline System (VVTL, VTL), action elements and related objects linked to foreign gas networks. The transmission system is further subdivided into the transit system and the national transmission system.
- Regional and local distribution systems – a system of high-pressure, medium-pressure and low-pressure gas pipelines (VTL, STL, NTL), action members and related technological objects for the distribution of gas to final customers.

Within the Czech Republic, gas is further transferred from the transmission system to distribution systems and directly connected customers. In addition, 8 gas storage facilities are connected to the transmission system. Deliveries are made through 968 delivery stations where commercial measurement of the quantity of gas is installed. Gas quality is measured at 27 nodes of the system.

Transmission system

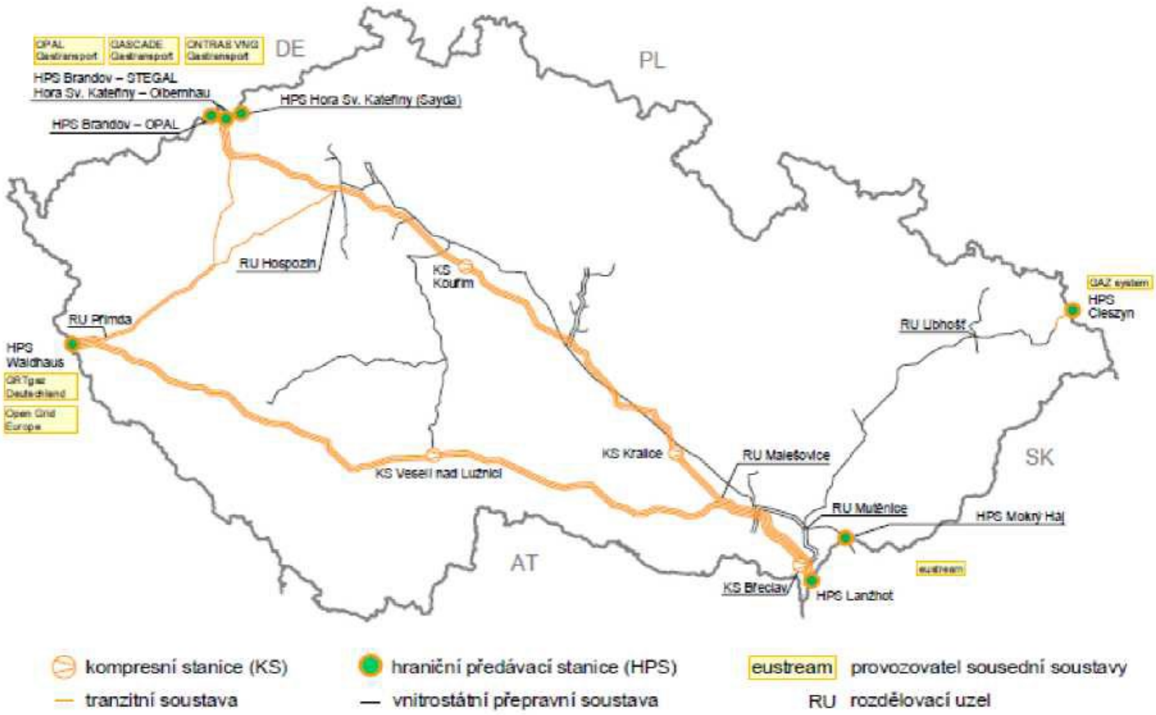
Pipelines for international transit and national transport with a total length of approximately 4 058 km (year 2023), with nominal diameters from DN 80 to DN 1400 and nominal pressures between 4 and 8.4 MPa, i.e. the transmission system is operated by NET4GAS in the Czech Republic. The transmission system shall, in particular, perform the following functions: (I) the transport of natural gas from international gas pipelines to transmission stations or to adjacent transmission systems; (II) delivery to selected purchasers121; (III) transport of gas to storage facilities in the case of injection mode and

121In order to be directly powered from the transit system, the customer shall meet the technical criteria given by the carrier and shall withdraw at least 100 GWh of gas from the VVTL or at least 10 GWh per year from the VTL system.

transport of gas from storage to points of consumption in pumping of stored gas.

The transmission system can be divided into four main branches. The northern branch runs from Lanžhota to Brandova/Hory St. Kateřiny, the southern branch from Lanžhota to Rozvadova, and the western branch connects the northern branch to the southern branch. In the south-eastern part of the country, the Moravian branch supplies gas to the Moravian regions and connects to the Polish transmission network. The northern, southern and western branches are connected in the key partition nodes Jirkov, Rozvadov, Malešovice, Hospozín and Podmda.

Figure 15: *Transmission system of the Czech Republic*



Source: The Ten-Year Transmission System Development Plan in the Czech Republic 2023-2032

The transmission points are connected to the transit and national transport systems, with a total of 100 transmission stations to distribution networks, storages and border transfer stations. The transmission system is connected by seven border transmission stations to the surrounding transmission systems. Eight customers are connected directly to the transmission system. The following table provides information on the pipeline lines of the transmission system.

Table 73: *Pipeline routes of the transmission system*

Specifications	Operating overpressure (MPa)	Pipe brightness (mm)	Length of pipeline routes (km)
Transit system	4,0 to 8.4	800 to 1400	2 471
Gazelle pipeline	4,9 to 8.4	1 400	166
National system	To 6.4	150 to 700	1 181

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Reverse gas flows in the transmission system

In the course of the gas crisis in January 2009, a temporary reverse flow was carried out in the west east direction, which made it possible to supply not only customers in the Czech Republic but also in Slovakia.

The gas was delivered via the border transmission station of Hora Svaté Kateřiny to the Czech Republic. As a result, there was no curtailment of gas supplies to customers in the Czech Republic.

The implementation of the reverse flow in the context of the European Energy Programme for Economic Recovery of the Energy Sector (EEPR) consists of the following structures and modifications:

1. The adjustment at the railway transmission station (hereinafter referred to as HPS) made it possible to increase the amount of gas transported from Germany to the Czech Republic from $18^{\text{million } 3}$/day to $25^{\text{million } 3}$/day.
2. The modification of the pipeline at the Hospozín interconnection point made it possible to increase the amount of gas transported between Olbernhau and Waidhaus up to $15^{\text{million } 3}$/day.
3. The modification of the pipeline at the Kralice compression station in Oslavou allowed the use of compression work to transport gas in the west-east direction.
4. The modification of the pipeline at the Malešovice interconnection point allowed an increase in gas transmission from HPS Hora Svaté Kateřiny to the separation node Rozvadov.
5. The modification of the piping system at the Břeclav compression station made it possible to use compression work for transport to Slovakia.
6. The modification in the Lanžhot HPS made it possible to measure the gas transported from the Czech Republic to Slovakia.
7. The adaptation of the KS Souřim piping system allowing reverse flow was completed already in 2011.

Transit system

The task of the transit system is to ensure the transport of natural gas via very high pressure levels (VVTL) gas pipelines to other countries and to ensure the supply of gas to domestic customers. Thanks to the liberalisation of the gas sector, the use of the transmission system is determined by a market where network users wishing to transport gas via the system compete for transmission capacities. The Gazelle pipeline, which is exempted from third party access (RTPA) to transport capacities until the end of 2034, is an exception. This exemption is granted only for traffic capacities in the direction of Brandov-Waidhaus.

Between 2015 and 2016, projects increasing capacity by 12 $m^{3\text{per day}}$ in the direction of Lanžhot were successfully completed on the transit system, including on the southern branch in the direction of Rozvadov – Veselí nad Lužnice – Břeclav – Lanžhot, which previously served to transport gas from Lanžhot to Bavaria. Currently, in addition to the Tvrdonice gas storage facility, a single direct customer is connected to the transit system, namely a gas source in Počeradech.

National transmission system

The national transmission system (NTS) is responsible for transporting gas from the transit system to distribution stations. The VPS consists of pipelines of lower lights in the range of 150 to 700 mm, with operational overpressures of 2,5 to 6.4 MPa. The total length of routes of the national transmission system is 1 181 km. The connection to the transit system is in six transmission hubs. Due to the current pressure conditions, compression stations are not installed on the national transmission system, then all gas storage facilities operating within the Czech gas system are connected to the system. The NPS also has connections to the Slovak gas system (Mokrý Háj). This connection is currently not used.

Border transfer station

At the border of the Czech Republic, where NET4GAS's transmission system is connected to the transmission systems of the transmission system operators of neighbouring countries, both the volume and the quality of the gas are measured at border transfer stations (HPS). These locations are at the Czech-Slovak border Lanžhot and Mokrý Háj (HPS on the Slovak side), Brandov and Hora Sv. Kateřiny at the Czech-Saxony border, Waidhaus (HPS on the German side) and the Czech-Polish border Cieszyn (HPS on the Polish side).

Table 74: *Capacity of border transfer stations (billion m^3/year)*

Profile and Border Transfer Station	Entry capacity to the Czech Republic	Exit capacity from the Czech Republic
SK-CZ	56	49
Lanžhot	56	49
Wet Háj	0	0
PL-CZ (Cieszyn)	0	1
AT-CZ	0	0
DE-CZ	102	54
Waidhaus	4	37
Hora Svaté Kateřiny – Sayda	5	7
Hora Svaté Kateřiny – Olbernhau/Brandov STEGAL	13	10
Brandov OPAL (for Gazelle)	40	0
Barandov EUGAL	40	0
Total capacity	158	103

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Virtualisation of border points

Pursuant to Article 19 of Commission Regulation (EU) 2017/459 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems (NC CAM), transmission system operators are required to establish a virtual interconnection point under the terms and conditions set out

(VIP), wherever two or more interconnection points connect the same two adjacent entry-exit systems.

In the case of the Czech Republic, two virtual interconnection points have been set up:

- VIP Brandov – with the German Gaspool business zone (since 1 November 2018);
- VIP Waidhaus with the German NCG business zone (since 1 March 2019).

Since 1 October 2021, these two existing VIP points serve to reserve capacities and transport gas between the Czech Republic and the newly created German trading zone Trading Hub Europe (THE), which merged the German commercial zones Gaspool and NCG.

All available firm and interruptible capacity shall be offered on the VIP. No capacity is offered anymore at the physical interconnection points that are part of the VIP, beyond the existing contractual relationships.

Compression station

The required pressure in the pipelines is ensured by five compression stations (KS) located on the northern branch of Kralice nad Oslavou, Kouřimi and Otivice, and on the southern branch in Veselí nad Lužnice and Břeclavi. All compression stations except KS Otvice are capable of bidirectional operation. The total installed capacity of compressors is 281 MW of mechanical power.

Table 75: *Total installed compression station capacity (in MW)*

Compression station name	Number and power of combustion turbines	Installed station capacity
Souřim (North branch)	5x 6 MW + 2x 13 MW + 1x 12 MW	68 MW
Kralice nad celebration (North branch)	5x 6 MW + 2x 13 MW + 1x 12 MW	68 MW
Otvice (North branch)	3x 8 MW	24 MW
Břeclav (South branch)	9x 6 MW + 1x 16 MW + 1x 15 MW	85 MW
Veselí nad Lužnice (South branch)	6 x 6 MW	36 MW

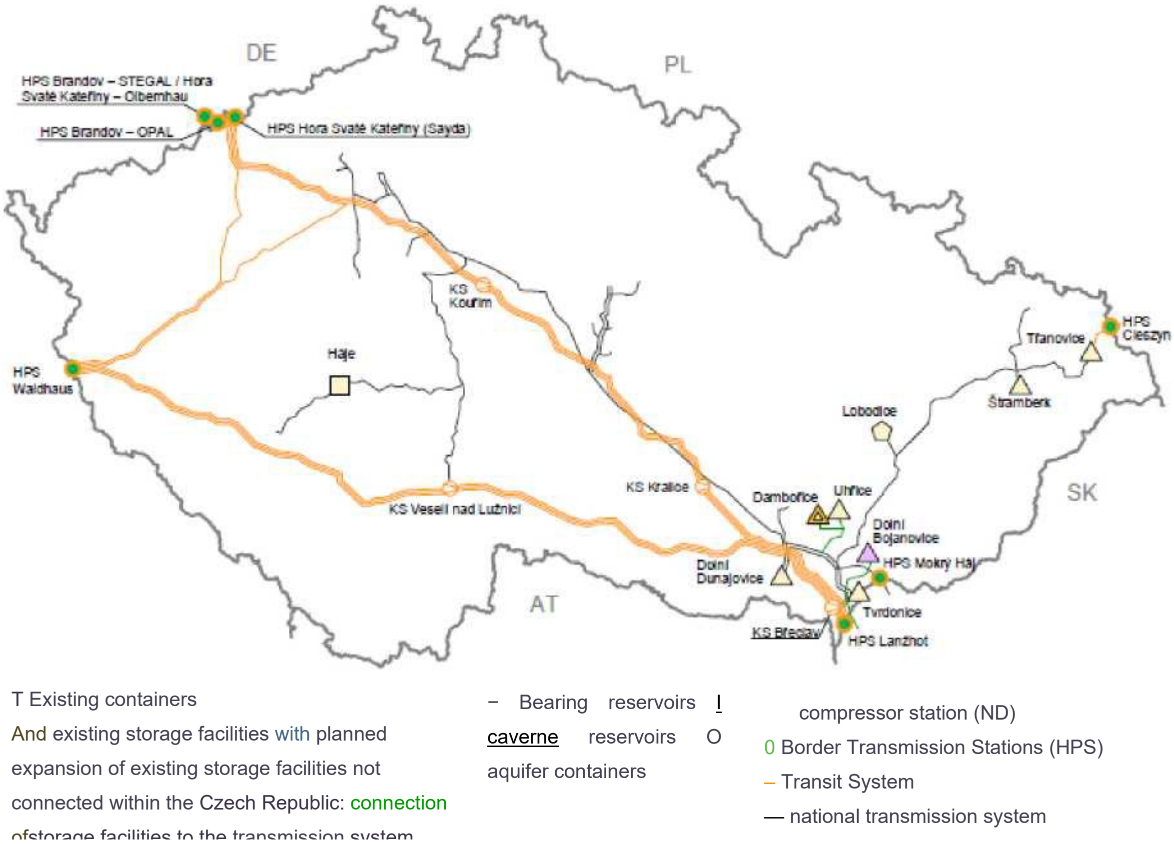
Source: The Ten-Year Transmission System Development Plan in the Czech Republic 2023-2032

Gas storage facilities

A total of 9 reservoirs are currently operated in the Czech Republic, with 7 reservoirs of bearing type, 1 aquifer (Lobodice) and 1 cafern type (Háje). Jedeen from storage facilities (Dolní Bojanovice) is located in the Czech Republic, but is currently connected only to the Slovak transmission system. The main role of storage facilities in the system is the bleeding of demand peaks in the heating season that could not be covered by gas imports. They are used by traders for economic reasons, as in the heating season the price of gas tends to be higher than in the low season. Finally, storage facilities are an important element of the system in terms of security of gas supply in crisis situations.

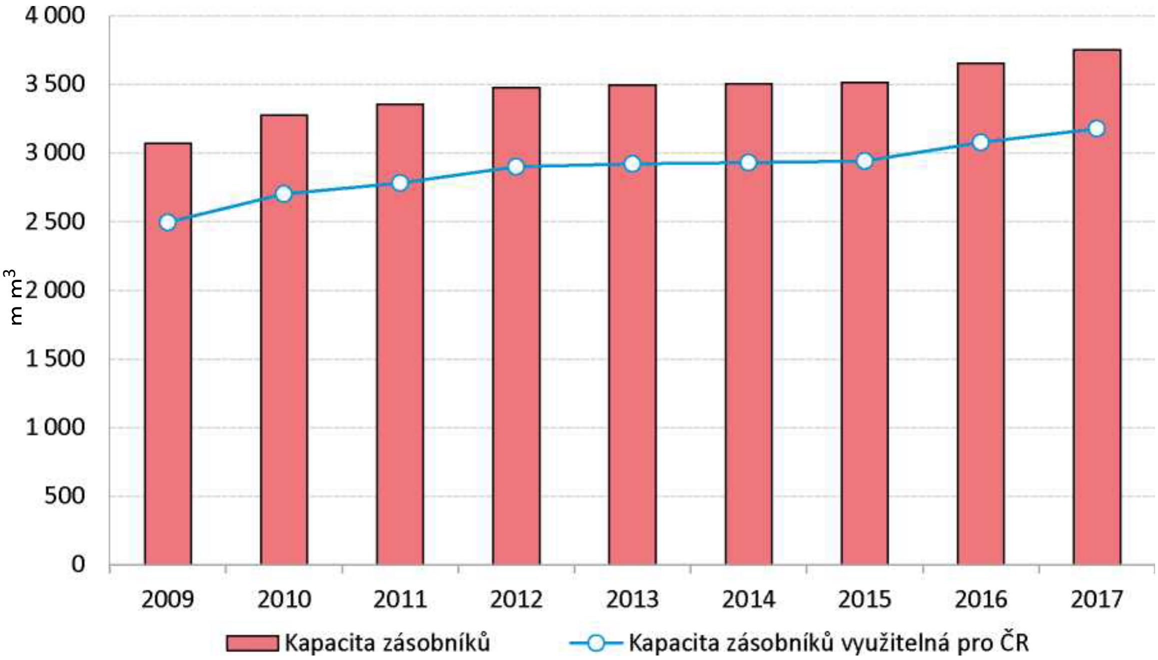
In recent years, the dynamic characteristics of storage facilities in the Czech Republic have improved by increasing their extraction capacity. The total available capacity of storage facilities connected to the Czech system amounts to^{3452} million m^3 and their maximum production capacity of approximately 77 million m^{3per} day. The total capacity of storage facilities located in the Czech Republic amounts to around 4 095 million$^{m^3 \text{ and}}$ the maximum production capacity is almost 85 million m^{3per} day.

Figure 16: *Gas storage facilities – current situation and expansion plans*



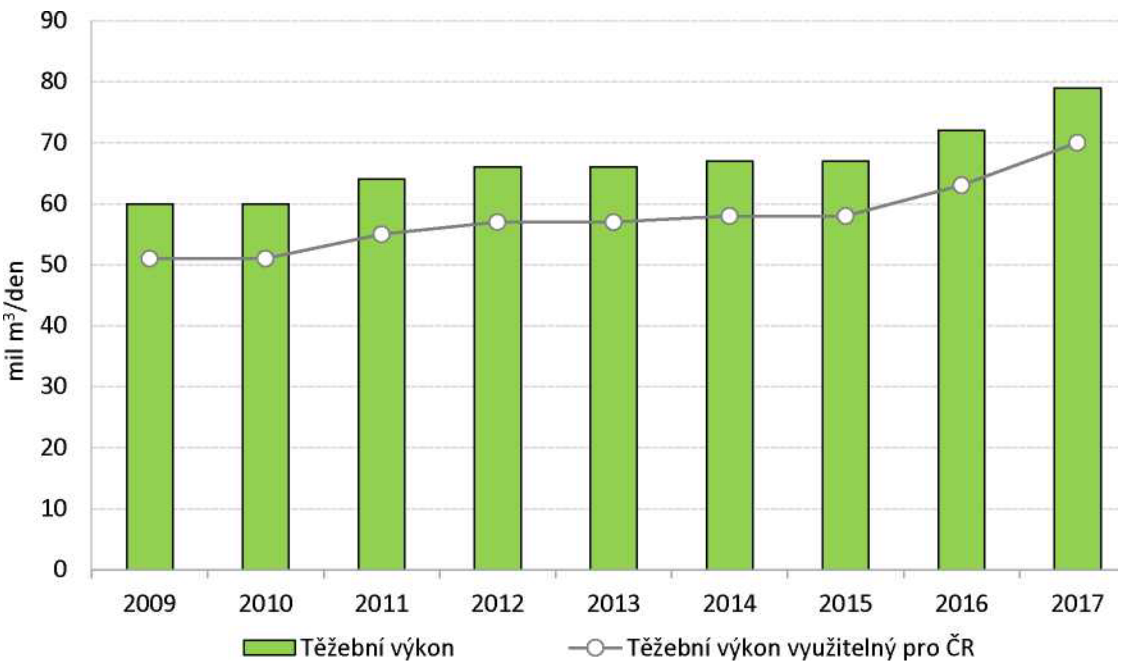
Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Graph 76: *Development of natural gas storage capacity in the Czech Republic*



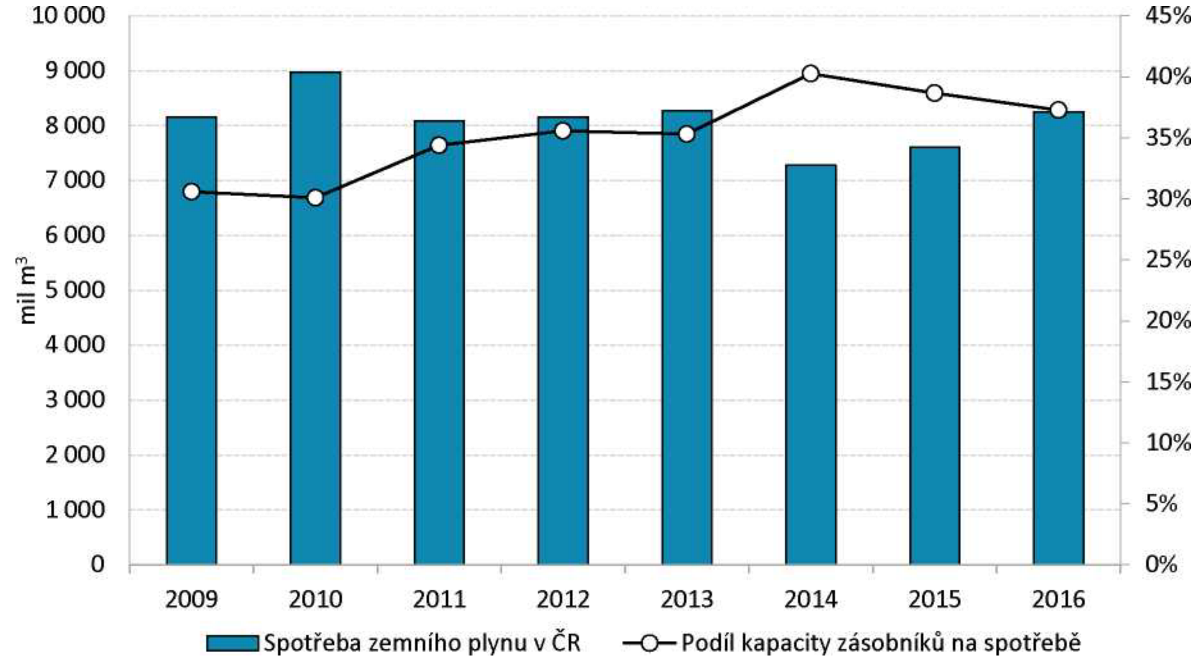
Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Graph 77: *Development of the mining capacity of natural gas storage facilities in the Czech Republic*



Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Graph 78: *Share of natural gas storage capacity in domestic consumption*



Source: Annual report on the operation of the Czech gas system for 2016 (ERÚ)

Figure 17: *Future hydrogen transmission system*

Distribution systems

The task of distribution systems is to transport gas to final customers. Gas is mainly transported from the transmission system via transfer stations to the distribution systems, with a small part of the supply being domestically extracted gas. Pipeline systems of distribution networks are the largest part of the gas system as a whole. Operated at different pressure levels – as high pressure (from 0.4 to 4)

MPa), medium pressure (from 5 kPa to 0.4 MPa) and low pressure (to 5 kPa). For reasons of reliability of supply, the different regional distribution systems (over 90000 customers) operate in a grid configuration and can be interconnected with each other by backup connections. There are no compression stations or gas storage facilities connected to the distribution. In a few cases, distribution networks are connected to foreign networks – supply to island regions or backup cross-border terminals.

Regional distribution networks are currently operated by three entities:

- **GasNet** distributes the territories of northern, central, western and eastern Bohemia, as well as southern and northern Moravia. Internally, it is subdivided into four regional sub-networks.
- **E.GD Distribution** provides distribution in southern Bohemia.
- **Prague Gas Distribution** provides distribution in the territory of the capital city of Prague.

In addition to regional distribution networks, there are local distribution systems, often operated by larger industrial companies. More recently, there has been an increasing number of cases where local system operators take over local distribution from municipalities that have previously invested since their construction but do not want to ensure their operation. There are currently 65 local distribution systems in operation.

11. Projections of network expansion requirements at least until 2040 (including for the year 2030)[122]

12 5.2.3 Estimates of requirements for expansion of electricity infrastructure

Development of the transmission system

In order to ensure the secure and reliable and efficient operation of the transmission system, the transmission network operator shall draw up every second year the 10-year transmission network development plan of the Czech Republic. The plan presents two-style measures which briefly summarise the following list and are described in detail in the text below:

- conceptual solution: strategic investments in the medium and long term leading to the conceptual development of the EC (maintenance, new lines, progress towards the downsizing of the 220 kV network);
- dynamic measures: investment technical sub-measures allowing customer connection (often limited or conditional) within a shorter time period than allowed by design solutions. These include, in particular, the addition of new resources to the CP or the development of transformative PS/DS links.

Conceptual solution

Renewal of station and line facilities

ČEPS, a.s. shall renew the station equipment and the PS management to the extent appropriate to ensure the continuous required security and operational reliability of the PS. The typical lifespan of power installations – especially lines – is usually 40 years and is influenced by the method of maintenance and the conditions of the environment in which the equipment is operated. Interchangeable parts of equipment shall be replaced after their useful life has been exceeded; in the case of mast structures, their useful life may be extended to two times by proper maintenance. After each change of conductors and insulators, the failure of the lines decreases.

122With reference to national network development plans and regional investment plans of TSOs.

Strengthening the transmission capability

ČEPS, a.s. is preparing and implementing systemic measures consisting of strengthening the transmission capacity of PS, modernising and duplicating existing lines, and building new lines, extending and upgrading substations. The construction of new 400 kV lines is aimed at complementing and strengthening the 400 kV system and replacing the 220 kV network. A reinforced 400 kV network will gradually assume the role of the 220 kV network by 2040. The possibilities for building new lines in the new corridors are limited and the preparation is lengthy (10 years or more). Therefore, when renewing the 400 kV line, ČEPS, a.s. applies the concept of building double lines on existing lines. The following table summarises the construction of new lines.

Table 76: *Length of new lines in PS until 2050 (km)*

PS line construction work	Length of new 400 kV lines in 2017-2025	Length of new 400 kV lines in 2026-2050
Construction of PS lines on a new route	189	70
Construction of a double PBS line on the route of the original line	572	629
Total length of new PS lines	761	699

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

International cooperation

Within the ENTSO-E Association of European Connected System Operators, coordination in planning the future design of electricity networks and their further cooperation is important. The list of projects of common interest set out in Commission Delegated Regulation (EU) 2022/564 of 19 November 2021 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of PCIs also includes four projects prepared by ČEPS123. These projects not only meet the requirements to ensure the security and reliability of PBS operations, but also contribute to the achievement of European objectives with regard to the operational security of the entire interconnected system.

Dynamic measures

At the same time as the above-mentioned, often time-consuming, measures are also being sought for short- and medium-term solutions which are acceptable for a transitional period. These solutions include, in particular, the modernisation of PS lines with an increase in the permissible 80 °C wire temperature, dynamic line loading, resource control automation (AOV) and deeper coordination of transmission system operation and distribution networks.

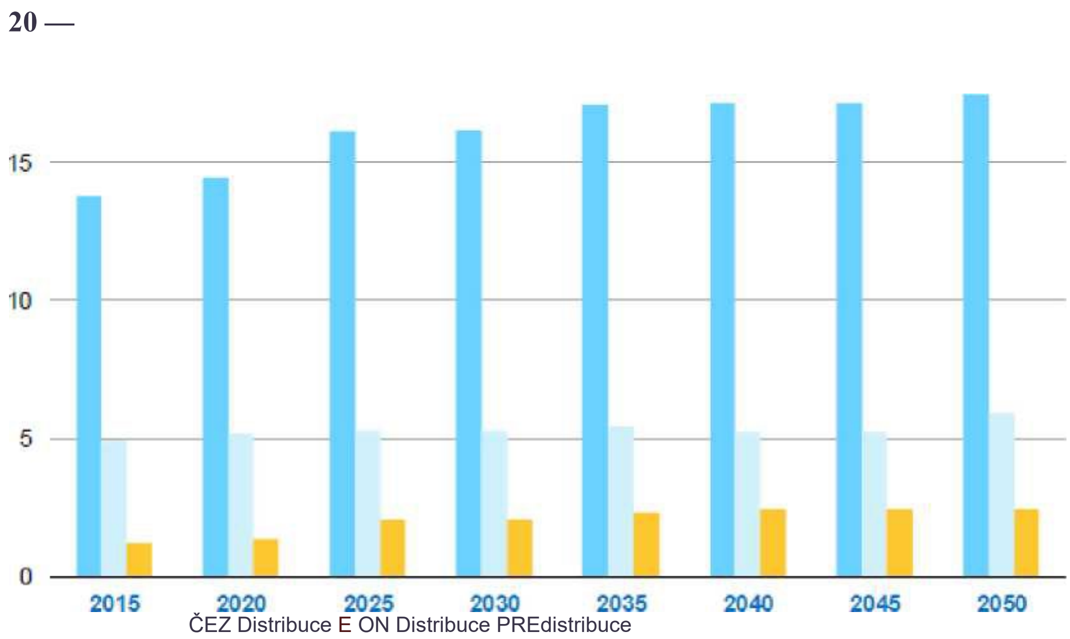
New PS substations and transformation power

The reinforcement of the transformation link PS/110 kV will only be implemented for the 400/110 kV transformation, with 9550 MVA transformation capacity added by 2050. Taking into account the phase-out of 220/110 kV (4200 MVA), the overall increase in transformation power PS/110 kV by 2050 will be 5350 MVA, with an expected increase in sampling at peak load to this period between 600 and 3 400 MW (depending on the variant) compared to the 2017 winter measurements. The evolution of the installed power of the transformers PS/110 kV is shown in the figure below. The construction of new

123Projects of common interest shall be kept up-to-date and the indication of these specific projects in The national plan does not mean that these projects can be considered binding.

PBS substations responds to long-term trends in the territory, such as the shutdown of large resources in 110 kV networks, the development of consumption and the phasing out of the 220 kV system. By 2025, this involves the construction of a new transformation of 400/110 kV in total in 4 sites (new 400 kV substations in Vítkov, Dětmarovice, Prague north, Milín). The construction of 400 kV substations in Opočínek, Lískovec, Malešice, Tábor and Rohatec is planned between 2026 and 2050 and will gradually replace 220 kV shut-down substations. The following figures show the projected development of the PS under the ČEPS for 2025 and 2050.

Graph 79: *Installed power of transformers PS/110 kV (in GVA)*



Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

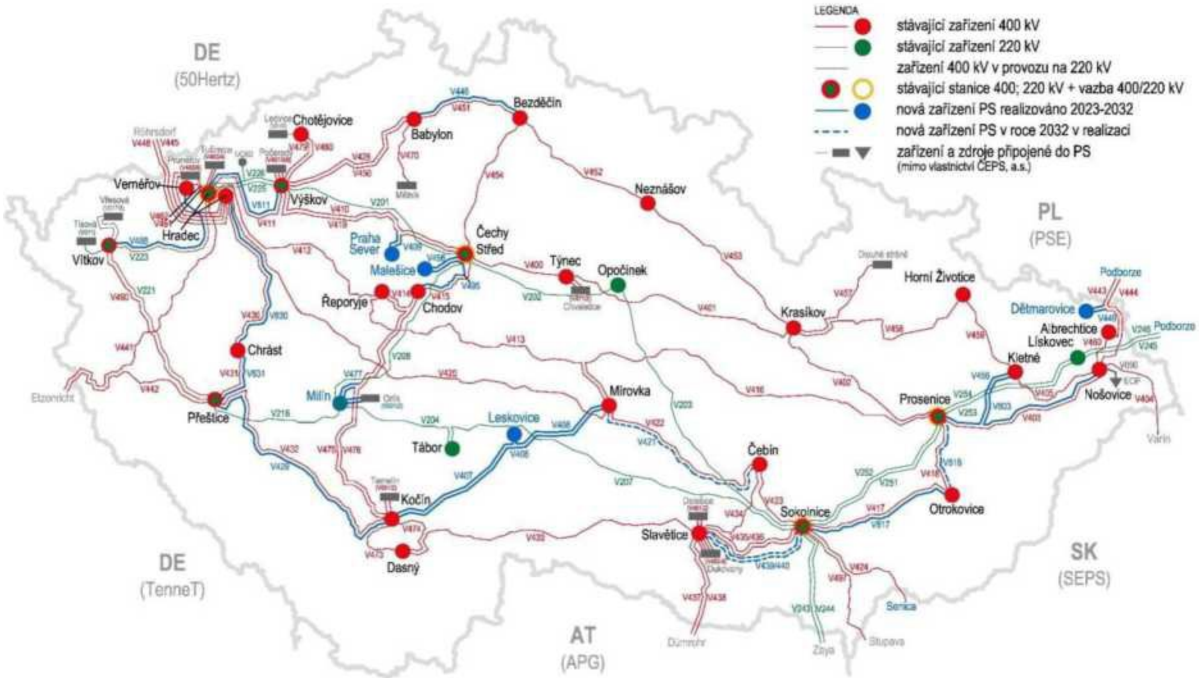
New technologies in the transmission system

The incentive for the implementation of new elements is to maintain the reliability of operations under new conditions. In particular, the increased demand for inter-state electricity transmission and the increasing representation of decentralised resources and their expected further development. With limited possibilities for the construction of liner structures, new technologies are already being introduced in the PC of the Czech Republic in order to increase the transmission capabilities of lines and to increase the reliability and efficiency of the operation of PCs. These are notably:

– construction of transmission, transformation and compensation facilities in CP;
– dynamic loading of PS elements to increase grid transmission capabilities;
– senior dispatch control function (predictment models, traffic optimisation, defence against faults,
– business models);
– remote control of PS substations,
– automated control of generation at sources to prevent and spread faults on the network.

Other potentially usable technologies not yet used in the PSC include the use of high temperature wires or superconductors and devices to regulate active and reactive power flows (FACTS). In case of indication of non-compliant operating parameters, the above-mentioned new technologies may be used to eliminate substandard conditions. The development of the transmission network is shown in the following figures.

Figure 18: *Development chart of the transmission network of the Czech Republic (situation for 2032)*



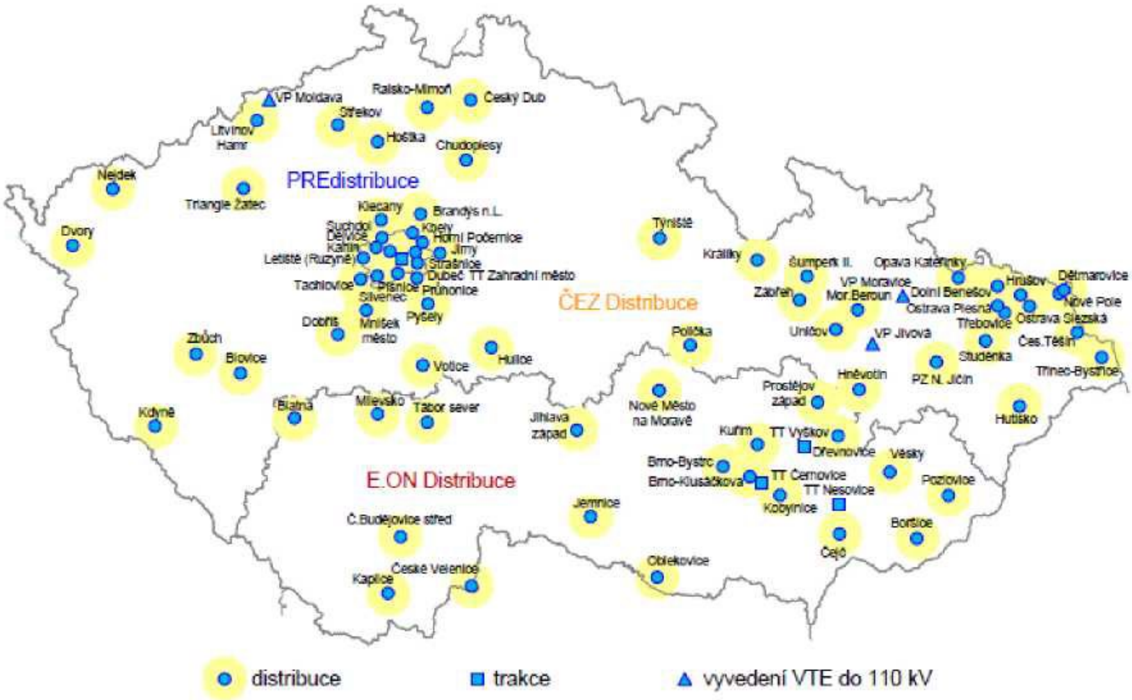
Source: ČEPS, a.s.

Distribution networks

Development of 110 kV networks

The development of 110 kV networks is prepared for a shorter period of time, therefore the operation of these networks is analysed in more detail only for 2025. The development of 110 kV networks is based on the actual needs of the regions and the economic capacity of distributors. Individual distribution companies must prepare their development in such a way as to ensure that the demand for electricity supply by customers and generators is permanently ensured. The development of distribution networks is affected by changes in PS, in particular in the transformation link PS/110 kV, which affect both the development of 110 kV networks in the respective hub areas and their operational involvement. The main focus of development is the strengthening and reconstruction of existing 110 kV lines. The new 110 kV substations are planned in line with the expected load according to customer requirements in the respective regions. The construction of 81 new 110 kV stations is under preparation. Their location is shown in the following figure and their distribution and number in the table below. The next table provides an overview of the lengths of the 110 kV new and reconstructed lines under preparation.

Figure 19: *Planned substations 110 kV*[124]



Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Table 77: *110 kV planned substations (number)*

Substations 110 kV	ČEZ Distribution	E.ON Distribution	PREdistribution	Total
Distribution transformer 110 kV/vn	44	20	10	74
Traction transformer	0	3	1	4
Discharge of power from VTE and FVE	3	0	0	3
Total number of 110 kV stations	47	23	11	81

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Table 78: *Length of new and reconstructed lines under preparation of 110 kV (km)*

110 kV line construction work	ČEZ Distribution	E.ON Distribution	PREdistribution	Total
Construction of the 110 kV line on a new route	616	201	73	890
Refurbishment of the 110 kV line in naked man	523	474	19	1 016
Total length of new and reclining lines	1 139	675	92	1 906

Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

[124] It is rather a long-term perspective to illustrate possible developments. The implementation of the projects will continue to be made more concrete.

Development of networks of vn and nn

The development of distribution networks to the outside and nn and their further construction is subject to administrative and economic complexity. In addition to the construction of new lines and the refurbishment of existing lines, new technologies will increasingly be deployed in the networks, the use of which should lead to maintaining the current relatively comfortable traffic and increasing operational reliability. In addition to strengthening and expanding existing distribution networks, the following elements will be applied in the development of the DS:

- the increasing proportion of cabled distribution networks;
- development and implementation of automation elements at the voltage level of VNs, as well as NN enabling the central and autonomous management of these networks;
- development of automated network management systems at lower voltage levels,
- control of active and reactive power generation of decentralised resources according to network operation needs;
- managing selected parts of the distribution networks according to network operation needs and preparing for the implementation of the needs and requirements of new electricity market players (prosumers, aggregators, smart homes);
- grid-controlled electricity accumulation, including storage by PDS, – development of data and telecommunications infrastructure at VN voltage level for network management options, – smart metering implementation – AMM;
- use of non-frequency ancillary services to optimise the operation of distribution networks.

The increase in the installed capacity of new decentralised resources will have a major impact on the development of the networks, both down and nn. The operational needs of distribution networks, in particular in the area of voltage profile support, will require greater involvement of new decentralised resources in the DS management system. This aspect also determines, according to the DS Operating Rules, the size of the connected power of the decentralised resources to a particular network vn or nn. The networks will gradually be equipped with devices enabling two-way communication between the DS operator and the customers or nodes of the network, respectively. At the same time, a number of autonomous devices will be used to assess the state of the grid and to take appropriate steps to streamline the operation of the system without the intervention of the dispatcher, based on data exchange. This includes, for example, automatic reconfiguration of the connection in the event of a failure, post-fault resynchronisation to the EC, etc. In this context, the use of reclosers, smart section switches, vn/nn transformers with load switch capability (OLTC) and other devices of a similar nature is expected to be more widely used in the operation of networks. These measures, together with the use of the regulatory capabilities of the decentralised resources, will make it easier to integrate more of these resources into the DS.

Through pilot projects, distribution companies verify the safety, operational reliability and clarity of the management of distribution networks with new technologies. The use and, in particular, the way in which new technological elements are managed in distribution networks should enable:

- output closing of the production chain – consumption, including accumulation, to the extent possible, at distribution network level;
- efficient use and coordination of generation, consumption and accumulation in DS, leading to a reduction of transmission losses in networks and minimisation of reserved performances at transformations PS/110 kV;
- more efficient operation and management of networks with maximum levels of automation.

4.5.2.4 Estimates of requirements for expansion of gas infrastructure

The role of the gas sector in general

Reducing greenhouse gas emissions in the Czech and European economies will lead to new systemic solutions. This will make it possible to anticipate in the future the use of the gas conversion potential, which would make it possible to store energy that is not currently needed in a gaseous form. This solution would contribute to reducing overloading of the transmission network, enhance security of supply and reduce emissions. Typically, hydrogen production by electrolysis (Power2Gas technology) and, where appropriate, its methanisation into synthetic methane form can be considered.

The decarbonisation process and the development of new technological solutions will have an impact on the use of the gas system in the Czech Republic. At present, it is not possible to determine precisely the impact of decarbonisation in the European and Czech context on the Czech gas network and the concrete information on how this network will be used with a view to minimising the sunk costs of the transmission system operator. Technological solutions for the decarbonisation of the gas sector on a large scale are not currently being developed in both the EU and the Czech Republic, and it is therefore appropriate to maintain and further develop this infrastructure for future use for both natural gas and new types of gases. A combination of natural gas with CCS or CCU technology for the storage or utilisation of carbon generated by the fission of natural gas may be considered. Thus, the possibility of future use of gas infrastructure can be essential to meet the energy needs of final customers.

Transmission system

The plans for changes in the transmission system are updated annually in the form of the Ten-Year Transmission System Development Plan in the Czech Republic (hereinafter also the Development Plan) prepared by the transmission system operator (NET4GAS). The plan is approved by ERÚ, with the last approved version dating back to 2022, which was prepared for 2023-2032. Development projects are generally divided into six project categories related to the objective of the project (i) reverse flow projects; (II) connection of power plants and heat plants; (III) increasing the exit capacity to the domestic zone; (IV) the connection of new storage capacities; (v) projects increasing cross-border capacity; (VI) hydrogen infrastructure projects and (vii) innovation.

The development of maximum daily consumption and exit capacity to individual regional networks and regions is also analysed in the framework of the Development Plan. In general, TSO capacities in regional distribution systems are higher than the region’s highest historical daily consumption in the last 20 years. The exception is Northern Morava, which is served by only one line of the national transmission system. The current situation can only be described as conditionally satisfactory, but the gas injection capacity required exceeds the technical capacity of the system and, in the heating season, the system would not have been able to meet demand in the region in an imported manner. Such a situation significantly complicates the possibility of connecting new large gas customers in the area. NET4GAS responded to these complications by preparing the Moravia project (Tvrdonice-Libhošt pipeline). This project is divided into two stages. The first phase – the Moravia Capacity Extension project (Tvrdonice – Bezměrov) – was completed at the end of 2022. The second stage – the Moravia Capacity Extension II project – is planned as part of the cross-border project Czech-Polish bidirectional interconnection, which aims to implement a two-way interconnection between Poland and the Czech Republic. However, the project also has a national purpose, with the implementation of the project increasing capacity for the northern Moravia region.

Table 79: *The projects listed in the 10-year Transparation System Development Plan in the Czech Republic;*[124]

Project category	Project code	Title of the project	Status	Interconnection point of the transmission system	Approximate capacity increase (GWh/d)	Expected year of entry into operation	PCI Status
Connection of power plants and heat plants	E-2-001	Connection of the power plant/heat plant	FID	X domestic	18,1	2024	NOT
	E-2-002	Connection of the power plant/heat plant	non-FID	X domestic	15,9	2028	NOT
	E-2-003	Connection of the power plant/heat plant	non-FID	X domestic	35,7	2029	NOT
	E-2-004	Connection of the power plant/heat plant	non-FID	X domestic	42,4	2029	NOT
Increase of exit capacity to the domestic zone	DZ-3-002	Moravia project	MORAVIA CAPACITY EXTENSION stage – see project DZ-3-005 for more information on the project below.				
			MORAVIA CAPACITY EXTENSION II – For more information on the project, see project DZ-3-014 below.				
	DZ-3-005	Moravia Capacity Extension (MCE) Moravia technical sub-project (stage) (DZ-3-002)	FID	X domestic	158$^{(b)}$	2022	NOT
	DZ-3-014	Moravia Capacity Extension II (MCE II) Moravia technical sub-project (stage) (DZ-3-002)	non-FID	X domestic *[E,X CZ/PL (Hať)]*	to 71.1 ($^{b)}$ *[PL>CZ: to 208 CZ>PL: 57,3]*	2026	NOT
	DZ-3-003	Connection of a directly connected customer	FID	X domestic	0,3	2024	NOT
	DZ-3-004	Connection of a directly connected customer	FID	X domestic	2,9	2027	NOT
	DZ-3-007	Connection of a directly connected customer	FID	X domestic	6,1 (proximate capacity increase is subject to the entry into operation of the project TA-3-009)	2024	NOT
	DZ-3-008	Increasing grid connection	FID	X domestic	50.9$^{(c)}$	2024	NOT

124These projects shall be kept up to date in accordance with the update of the 10-year development plans. Their reference here is therefore illustrative and their reference in that context cannot be viewed in a binding manner.

	DZ-3-009	Increasing the capacity of the national transmission system	FID	X domestic	up to 47.7 (implementation of the project will allow the creation of capacity for the project TZ-3-007)	2024	NOT
	DZ-3-010	Increasing grid connection	non-FID	X domestic	18,7[d)] (proximate capacity increase is subject to the entry into operation of the project DZ-3-011)	2027	NOT
	DZ-3-011	Increasing the capacity of the national transmission system	non-FID	X domestic	to 84.9 (implementation of the project will allow the creation of capacity for the project DZ-3-010)	2027	NOT
	DZ-3-012	Increasing grid connection	Corner	X domestic	0,4e)	2022	NOT
Connecting new storage capacities	UGS-4-003	Connection of the gas storage facility	FID	E,X ZP	mining: 94 injection: 73	2024	NOT
Projects increasing cross-border capacity	TRA-N—140	Polish-Czech interconnection MDAR 2021	non-FID	OPTION 1			
				E CZ/PL (Cieszyn)	PL>CZ: 30,5	2030	NOT
				OPTION 2			
				E,X CZ/PL (Haz) *[X domestic]*	PL>CZ: *(Up to 208 GWh/d according to technical solution on PL page, if applicable)* CZ>PL: 57,3 *[to 71.1[(fb)]]*	2026	NOT
	TRA-N—1009	Czech-Polish bidirectional interconnection	non-FID	E,X CZ/PL (Haz) *[X domestic]*	PL>CZ: to 208 *(according to technical solution on PL page)* CZ>PL: 57,3 *[up to 71,1[eb)]*	2026	NOT

Notes to the table:

a) The values provided on the website or in other documents of the transmission system operator may differ slightly from those in the Development Plan. The difference may be due to capacity effects resulting from seasonal consumption in the Czech Republic, due to competing capacities, the use of other GCVs, conversions and/or rounding.

b) This is the planned increase in exit capacity to the domestic zone. The current exit capacity of the existing transmission system (ca. 101-

134 GWh/d) is not included in this value.

c) That value represents an approximate increase in the capacity of the applicant for a connection, which will use it gradually over the years 2024-2027. The approximate capacity increase of the transmission station concerned by this project is around 38.2 GWh/d.

d) That value represents an approximate increase in the capacity of the applicant for connection. The approximate capacity increase of the transmission station concerned by this project is around 20.4 GWh/d.

e) That value represents an approximate increase in the capacity of the applicant for connection. The capacity of the handover station, which is not affected by this project, has been changed, but there has been an overall replacement of the measuring and control system.

Source: Czech Ten-Year Transmission System Development Plan 2023-2032

At the same time, the transmission system operator is preparing two hydrogen infrastructure projects that could not be included in the Ten-Year Transmission System Development Plan in the Czech Republic 2023-2032. These are the Central European Hydrogen Corridor (CEHC) and the Czech-German Hydrogen Interconnector (CGHI) projects. Both projects have an expected year of entry into operation by 2030. The CGHI project received the status of Projects of Common Interest (PCI) in 2024 and the CEHC project aims to achieve it.

Table 80: *Hydrogen infrastructure projects125*

Project category	Project code	Title of the project	Status	Interconnection point of the transmission system	Approximate capacity increase (GWh/d)	Expected year of entry into operation	PCI Status
Hydrogen turkey infrasstructio nprojects	HYD-N—990	Central European Hydrogen Corridor (CEHC)	non-FID	E SK/CZ (Lanžhot) X CZ/DE (Waidhaus)	144	2029	No (can-didate)
	HYD-N—1034	Czech-German Hydrogen Interconnector (CGHI)	non-FID	E DE/CZ (Brandov) X CZ/DE (Waidhaus)	144	2029	No (can-didate)

Source: NET4GAS

Gas storage facilities

There is currently some development of the Dambořice storage site, which will take place gradually. The capacity will increase from the current 190 m³to 250 m³in 2018, the year thereafter to 298 m³ -3,in 2020 an estimated 315 m³, then the final 448 m³ m, the production capacity will gradually increase from 4.5 m to 7.5 m³/day and the injection capacity from the current 3.5 m to 4.5 m³m/ day.

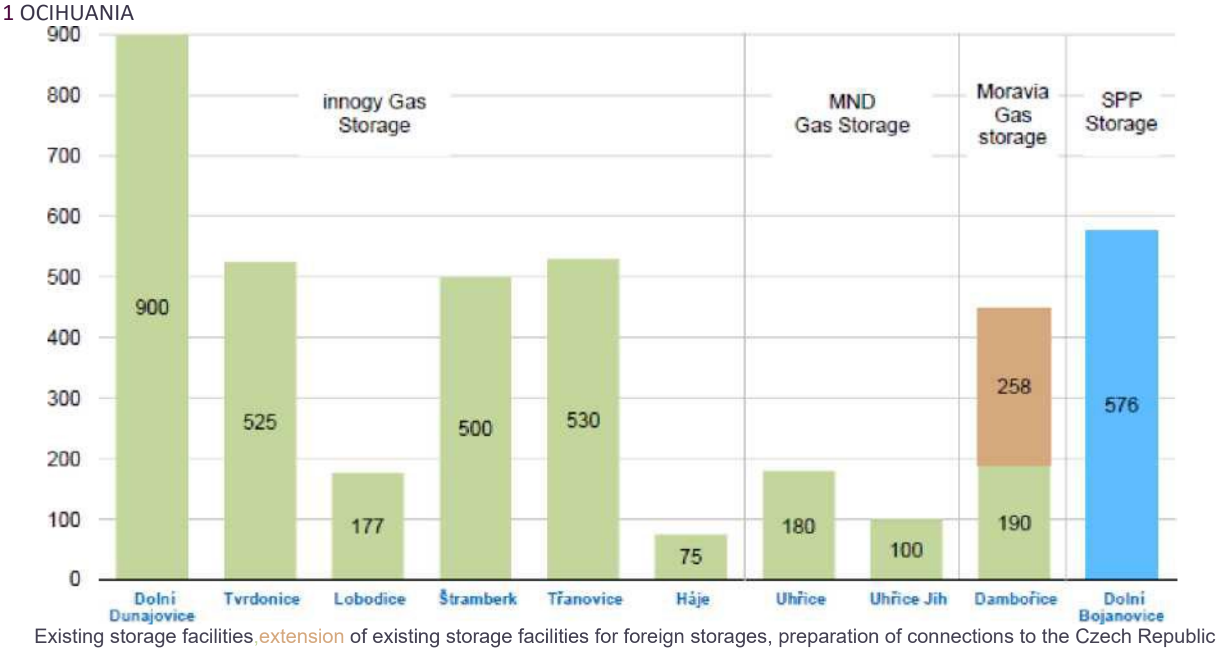
Increasing the parameters of the Dambořice storage site is the only storage development project in the Czech Republic. Furthermore, only the Dolní Bojanovice storage facility is expected to be connected (576million m³) to the Czech system. The implementation of other projects previously declared is not, seen in the 2017 viewpoint, realistic: This includes, for example, the Lower Rožnce caverne storage (200m³), the caverne reservoir in a rounded Council (200to400 m³), the Břeclavi reservoir (200m³).

Figure 80 shows the current state and expected development of natural gas storage facilities. Graph 81 shows the maximum quantity of gas stored between 2019 and 2028 for the Czech Republic, in accordance

125These projects are kept up to date. Their reference here is therefore illustrative and their reference in that context cannot be viewed in a binding manner.

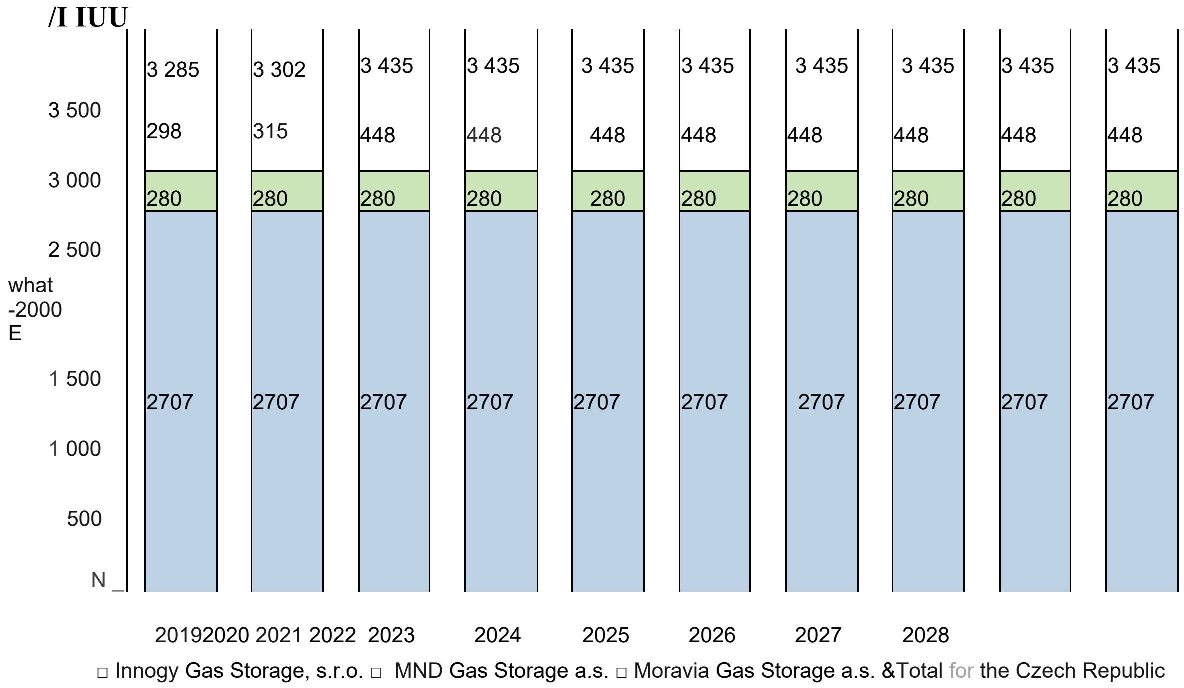
with the intentions of the operators of underground storage facilities. Graph 82 shows the expected maximum daily gas production output from 2019 to 2028 for the Czech Republic. Graph 83 then shows the expected share of natural gas storage capacity in domestic consumption on the basis of the Ten-Year Transmission System Development Plan.

Graph 80: *Gas storage – state of play and development*



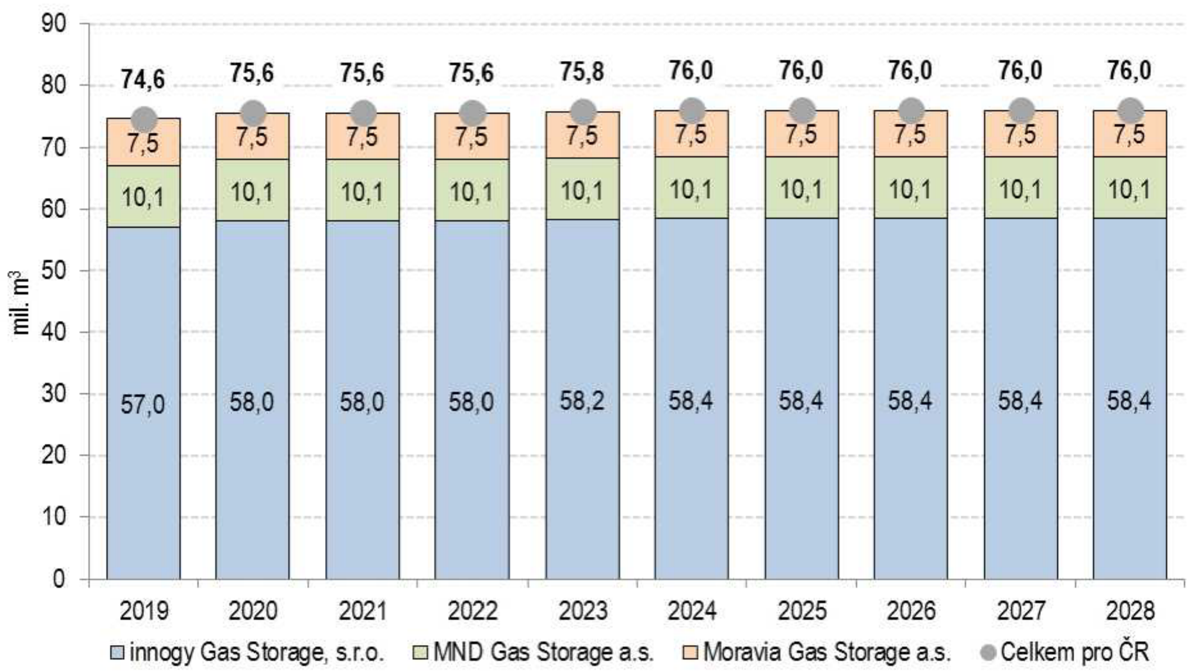
Source: Expected long-term balance between gas supply and demand (OTE, a.s., 2017)

Graph 81: *Maximum quantity of gas stored between 2019 and 2028 for the Czech Republic*



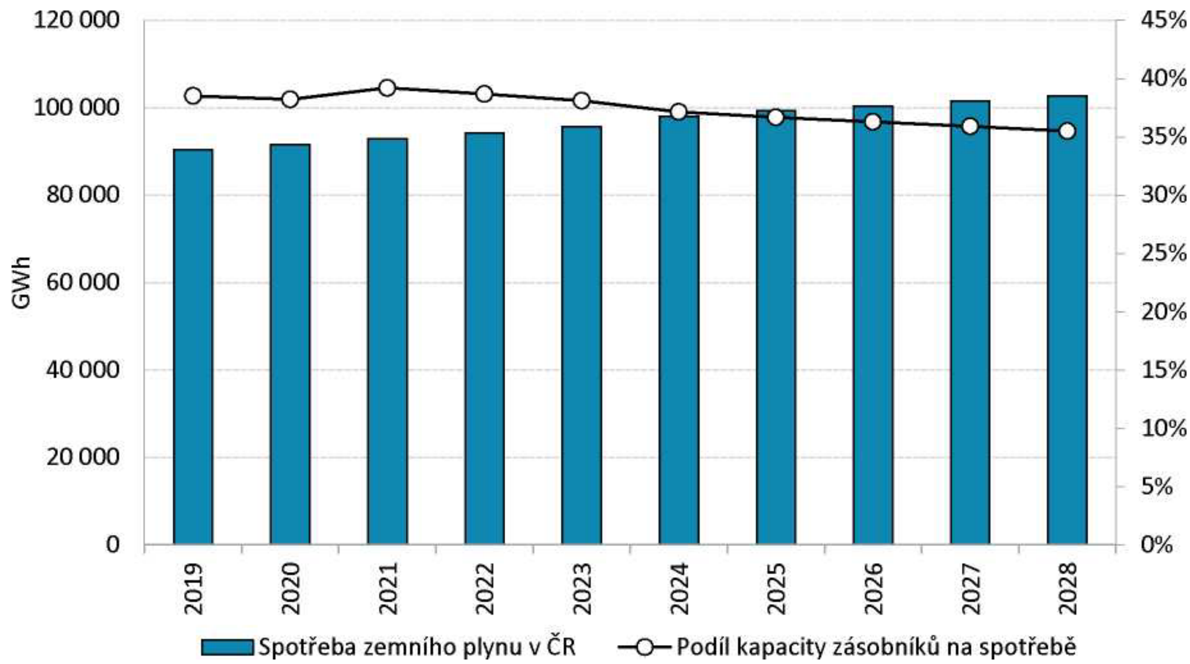
Source: Energy Regulatory Office

Graph 82: *Maximum daily gas production capacity between 2019 and 2028 for the Czech Republic*



Source: Energy Regulatory Office

Graph 83: *Expected share of natural gas storage capacity in domestic consumption*



Source: The Ten-Year Transmission System Development Plan in the Czech Republic 2019-2028

Distribution systems

While a number of large-scale development projects are envisaged for the transmission system, distribution networks are considered to be completed from the point of view of the distribution of natural gas. Almost all towns above 5000 inhabitants are analysed and 78 % of municipalities are gashed in total. The development of distribution is minimal in the VTL area – only units of km per year. Increases are rather expected for local STL and NTL networks, where the length of new routes increases by around 100 km per year.

Natural gas and subsequently renewable gases (biomethane and hydrogen) will allow for a gradual transition away from the use of solid fuels in final consumption and small heat supply systems in the period up to 2050, in line with the decarbonisation targets, to partially compensate for the shortage of supply from using coal energy and a partial exit from liquid fuels in transport. Distribution networks will play an essential role in fulfilling this premise. It is therefore necessary to ensure high operational reliability and safety in line with European standards and their necessary development in line with the growth of final consumption of gas or renewable gases or their blends.

In order to ensure operational reliability, the ditsdistiller is currently focusing mainly on the renewal of existing networks and other facilities, in which they invest significant funds. In particular, the high level of safe operation will be maintained by the continued elimination of technical risks, which is an integral part of the planned restoration of the network.

From the point of view of grid development, this will involve connecting existing coal sources in their gas transition, increasing the capacity of existing central gas sources and connecting new energy-saving cogeneration and micro-cogeneration units, especially in the case of inefficient heat supply systems. It should be stressed that in many cases this will only be the cost of constructing the connection, as there is sufficient network capacity within the reach of the above mentioned sites.

Another important aspect in the development of the network will be the connection of biomethane stations enabling the injection of renewable biomethane into the distribution network. Support for biomethane by distribution system operators will mainly consist of buy-outs of upstream pipelines and, where appropriate, related technological installations. In the medium term, support is also envisaged for the development of the distribution network in the context of renewable hydrogen projects that will be injected into the distribution network in a blended with natural gas, or local islands may be created with the distribution of clean renewable hydrogen.

A separate theme is the transformation of the gas network into the distribution of clean hydrogen. It appears that the vast majority of the underground part of the distribution system will be usable without modifications, but will need to be transformed into hydrogen use by parts of above-ground distribution system facilities, gas demand facilities and final facilities. We expect a physical transition to clean hydrogen to start in the 30s, a complete transformation to entire networks between 2040 and 2050.

Both the renewal and development of distribution networks are hampered by the high administrative burden, especially in the investor preparation phase. Here, by amending legislation, the state should create the conditions for significantly speeding up the preparation and implementation of regular energy infrastructure structures. Similarly, territorial protection of areas and corridors for the restoration and development of distribution networks will need to be ensured through spatial planning tools.

The economic aspect of the operation of distribution systems, which consists of increasing the efficiency of distribution, thereby optimising the costs incurred in operating the network in relation to the quantities of gas distributed, thereby improving the efficiency of the network, is also a necessary point of view when planning investment projects. Where efficient, new modern excavation-free technologies are applied in the construction of networks, reducing the already high implementation costs.

4.5.3 Electricity and gas markets, energy prices126

I. Current situation of electricity and gas markets, including energy prices

4.5.3.1 Legislative context

The implementation of European directives and regulations on market liberalisation and ensuring the principle of regulated access to networks, namely Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, are implemented through a functioning electricity market. In a liberalised gas market, it is the implementation of Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas.

The EU's energy strategy is continuously steered and corrected through the adoption of 'liberalisation packages'.

4.5.3.2 Market model

Short and long-term market balance should be effectively ensured by market mechanisms within the set market framework. In practice, this means that responsibilities are shared between market participants, market operators and system operators, i.e. between State-regulated and regulated entities. From an administrative point of view, it can be said that a significant part of the planning of the balance of the system preceding the hour of supply is left to market participants, while ensuring a balance between

During the finalisation of the national non-paper plans, the126 European Commission published information on what information is considered relevant in this regard. This is a wide range of information on market concentration, liquidity, etc. A number of such information is already provided in this section, much of which is already being monitored and reported by the relevant organisations, in particular ACER and CEER. The Czech Republic will attempt to complete this information in a coherent manner as part of the relevant progress report.

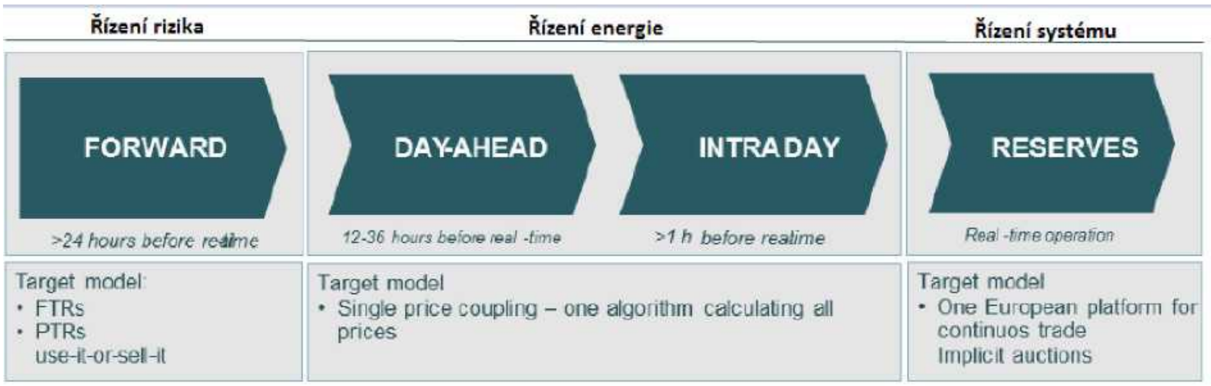
electricity supply and demand at each time of operation is entrusted to the transmission system operator. Markets are organised in consecutive time bands and their results are binding on individual participants.

Physical energy exchange shall take place in real time, where equal electricity supply and demand must apply at all times. System operation planning shall be carried out by the transmission system operator on the basis of commercial results in the electricity markets. On the basis of this data, the TSO plans the system load and the necessary reserve power size to ensure the safe operation of the EC.

The deviation of the entity from the contractual values, i.e. the off-take/supply from/to the EC in quantities other than that resulting from the entity's commercial position, triggers the need for EC regulation by TSOs and is therefore financially penalised.

Figure 20 then shows the temporal continuity of the markets.

Figure 20: *Target model of the EU electricity market*



Source: European Comission: Electricity Market Functioning: Current Distortions, and How to Model Their Removal

The functional and trans-astant day-ahead electricity market with the downstream intraday market is the cornerstone of the European electricity market model. The gas sector is dominated by the intraday gas market in this respect. Day-ahead or intraday offers represent day-ahead market participants' expectations. Changes in weather forecasts, unexpected outages in the production base or in industry indicate that a deviation from planned consumption/production is unavoidable. The deviation from the planned consumption or production values is then charged for billing, depending on the size and direction of the deviation compared to the system deviation.

These deviations must be counterbalanced by the TSOs in real time in order for the European synchronous EC to be balanced at any point in time, this balance being shown by a stable value of 50 Hz. The balancing energy needed to secure the balance of the system is procured by the TSOs by activating support services, by purchasing on the European platform for the exchange of balancing energy from replacement reserves and, in emergency cases, from abroad. The cost of balancing the system is then spread among market participants on the basis of the size of their imbalance.

Compared to the electricity market, where all imbalances are settled financially at a price determined according to the direction and size of the system deviation, it is possible to use the so-called "linepack flexibility service" flexibility in the gas sector. This is due to the natural storage capacity and robustness of the gas system. It allows the trading position of balance responsible parties to be oscillated within the limits of the flexibility provided, so that, unless these limits are exceeded, additional imbalance balancing costs are not generated. Deviations to these limits shall not affect the smooth and safe operation of the gas system.

4.5.3.3 Overview of the state of the market in the Czech Republic

The rights and obligations of individual electricity and gas market participants are laid down in Act No 458/2000 on business conditions and the performance of state administration in the energy sectors and amending certain acts, as amended (the Energy Act), and its implementing decrees.

Electro-energy

The electricity sector is also governed by ERÚ Decree No 408/2015 on Electricity Market Rules (‘Electricity Market Rules’), as amended.

The electricity market model in the Czech Republic is based on the principle of ensuring balancing responsibility for individual balancing bodies.

Electricity market participants have balancing responsibilities and are imbalance settlement agents and may delegate balancing responsibilities to another imbalance settlement agent under contract.

According to Section 22 of the Law on Energy, electricity market participants are defined as:

a) electricity generators;
b) transmission system operator;
c) distribution system operators;
d) market operator;
e) electricity dealers;
f) customers.

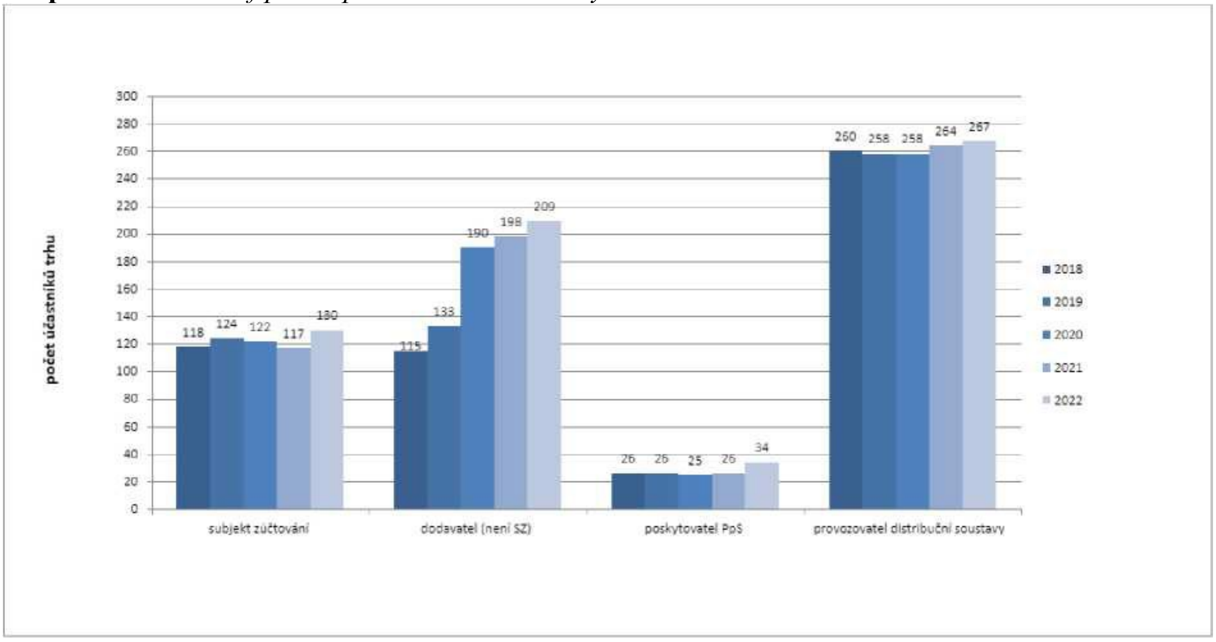
The table and figure below show the number of registered electricity market participants at the Market Operator by type of participant as of 31. 12. 2022 and year-on-year change compared to 31. 12. 2021.

Table 81: *Number of participants in the electricity market*

type of participant	number at 31 12. 2022	y-Y change
balance responsible party	130	+ 13
Supplier	209	+ 11
provider of support services	34	+ 8
distribution System Operator	267	+ 3
a transmission system operator	1	0

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Graph 84: *Number of participants in the electricity market*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Gas

In the field of gas, the Energy Act is mainly a follow-up to ERU Decree No 349/2015 on Gas Market Rules ('Gas Market Rules'), as amended.

In the case of gas, gas market participants are (see Section 56 of the Energy Act):

a) gas producers;
b) transmission system operator,
c) operators distribution systems;
d) operators gas storage facilities,
e) gas dealers;
f) customers,
g) market operator.

The gas market model shall be based on the same principle as in the electricity market, where a gas market participant with regulated access rights to the transmission system or distribution system is responsible for balancing and is the imbalance settlement agent, or may delegate balancing responsibility to another balancing party under a contract.

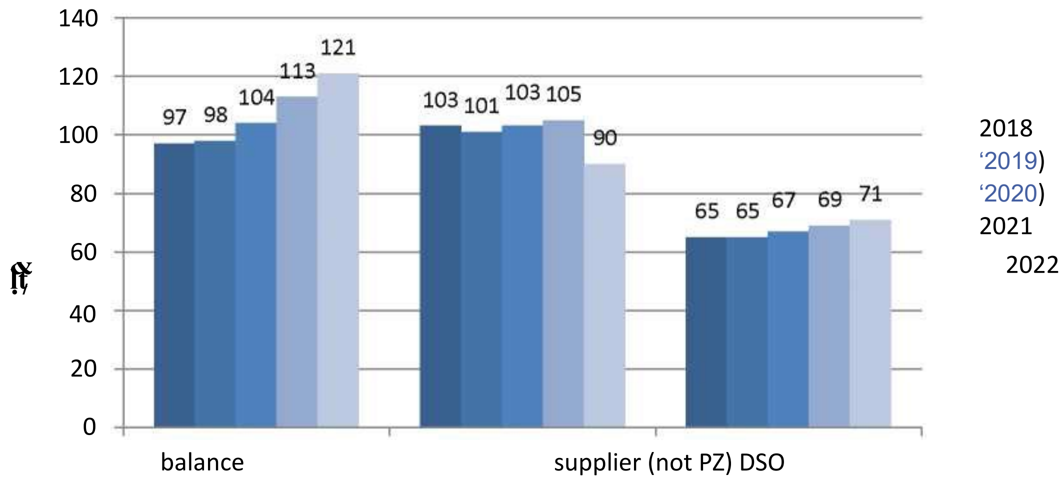
The table and figure below show the number of registered gas market participants at the Market Operator by type of participant as of 31. 12. 2022 and year-on-year changes compared to 31. 12. 2021.

Table 82: *Number of participants in the gas market*

type of participant	number at 31 12. 2022	y-Y change
balance responsible party	121	+ 8
supplier	90	—15
distribution System Operator	71	+ 2
transmission System Operator	1	0
gas storage operator	4	0

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Graph 85: *Number of participants in the gas market*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Change of supplier – electricity market

From 1. 1. 2006 the electricity market in the Czech Republic is open to all customers, each of which can choose the electricity supplier according to its decision. In the Central System of the Market Operator (CS OTE), any change of supplier is related to a specific demand point (OPM), i.e. the measured point where electricity is delivered and taken over between two market participants, or electricity taken. At the end of 2022, almost 6.24 million OPMs of electricity connected to the Czech electricity system were registered in the market operator's central system. This is the secure recording of individual suppliers' metered electricity supplies and off-takes to the system of the Czech Republic and their allocation to the relevant balance responsible parties. The following table shows the evolution of the number of production and consumption OPMs by type of measurement and their registration in the CS OTE.

Table 83: *Number of changes of electricity supplier in a given year and month*

	number of changes made to the electricity supplier			
	Year			
Month	2003-2019	2020	2021	2022
January	972 851	124 110	106 510	182 020
February	260 633	29 338	27 722	60 169
March	265 571	31 806	30 671	37 375
April	274 923	32 198	30 401	32 809

may	269 466	30 066	30 345	28 447
June	282 475	31 000	36 745	23 543
July	264 794	29 875	33 513	22 246
August	266 698	25 306	30 310	22 606
September	392 752	27 305	37 248	30 556
October	282 936	27 785	55 402	32 617
November	297 602	29 366	362 274	26 865
December	282 322	27 926	228 336	20 045
total	**4 113 023**	**446 081**	**1 009 477**	**519 298**
total 2003-2022	**6 087 879**			

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

In 2022, 519298 changes of electricity supplier per OPM were registered in the market operator's system, leaving the interest in switching electricity suppliers at high levels.

In particular, the electricity market situation in 2022, in particular the rising commodity prices in organised short-term markets, which is documented inter alia, made it impossible for several electricity suppliers to continue to supply their customers and the service provided ceased supply activities. Among the most important trading companies that ceased their activities on the electricity market during 2022 were: Lumius, s.r.o., Manta Commodities SE or CONTE spol. s.r.o. This was due either to the loss of the ability of these traders to supply their customers or to the inability to ensure that the financial conditions for the settlement of imbalances are met. Customers whose electricity suppliers were no longer able to secure the supply of electricity were transferred to a supplier of last resort or chose another supplier under a fast-track switching scheme. The supplier of last resort is a tool that protects consumers in the event of bankruptcy of any energy supplier and has a legal obligation to supply electricity to the customer for no longer than the period laid down in the Energy Act. This period was initially set at up to 6 months, but the amendment to the Energy Act No 176/2022 Coll. took effect from 27. 6. 2022 The delivery obligation of last resort pursuant to Section 12a(2) and better find the optimal product among them for their needs. This in turn translates into increased customer motivation. The amendment to the Energy Act has been amended in such a way that last resort deliveries expire 3 months after their creation if the customer does not change the electricity supplier before the end of that period and customers switch to standard products. At any time during that period, the customers concerned must choose a new regular supplier and enter into a new standard electricity supply contract with that customer. A total of 10909 electricity demand points were transferred to the supplier of last resort in 2022.

Switching supplier – gas market

From 1 January 2007, all final gas customers have the right to switch supplier free of charge and thus also have the possibility to influence part of their total gas supply costs. As a result, 2022 was the 16th year of operation of the open gas market, where each gas customer was able to choose its supplier according to its choice. All customer demand points (OPMs) for which a trader belonging to the network has been replaced by a switch supplier are individually registered in the market operator's system or have been fully registered by the distribution system operator. The remaining OPMs (i.e. the merchant's demand points belonging to the network), if any, are registered in the market operator's system in sum. This ensures that all measured gas deliveries and off-takes of individual suppliers are recorded and at the same time assigned to balance responsible parties. The following table shows the number of gas supplier switching for OPM by consumption category in each month of 2022.

Table 84: *Number of gas supplier switching for OPM per off-take category in 2022*

month	Total	categories of sampling			
		VO	SO	MO	DOM
January 2022	73 927	327	1 024	18 433	54 143
February 2022	26 488	6	50	3 830	22 602
March 2022	17 982	1	18	2 061	15 902
April 2022	15 887	16	27	1 807	14 037
may 2022	12 410	7	22	1 455	10 926
June 2022	12 680	3	13	2 088	10 576
July 2022	12 049	17	80	1 083	10 869
August 2022	8 471	17	76	1 032	7 346
September 2022	16 892	7	23	1 187	15 675
October 2022	22 523	27	51	1 422	21 023
November 2022	13 652	12	29	1 501	12 110
December 2022	10 662	1	15	1 086	9 560
Total 2022	**243 623**	**441**	**1 428**	**36 985**	**204 769**

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

The table shows the number of OPMs by category of off-take for which there has been a change of supplier in each month of 2022. A total of 243623 changes took place during the year, about half of the changes than in 2021 (488933 changes). Transfers of customer demand points from the supplier of last resort scheme to the standard delivery scheme are also included in the 2022 number of switching suppliers.

Table 85: *Gas supplier switching 2017-2022*

	2017	2018	2019	2020	2021	2022
End-User	305	395	314	280	331	441
Medium Purchaser	1 357	1 620	1 123	1 073	1 248	1 428
Malo-Consumer	26 205	34 436	22 545	23 256	37 081	36 985
Household	199 678	226 974	190 446	176 716	450 273	204 769
Total	**227 545**	**263 425**	**214 428**	**201 325**	**488 933**	**243 623**

Source: Annual Electricity and Gas Market Report 2017 (OTE, a.s.)

The unprecedented increase in gas prices, linked to its short-term shortages and related supply chain disruptions in 2022, led to problems in securing gas supply for 14 gas traders. In January, the gas market left Czech Energy s.r.o. and Lumius spol. s r.o., due to the loss of the ability of those traders to supply gas to their customers and the inability to ensure compliance with the financial conditions for the settlement of imbalances. For the same reason, První Moravská gas s.r.o. and Manta Commodities SE ceased their activities in March 2022. Also in March, Independent Energy s.r.o. lost its authorisation (licence) to supply gas. In December 2022, this was followed by Energy For Future, a.s., which was no longer able to meet the financial terms of the imbalance settlement. The customers to whom the above-mentioned companies supplied gas were transferred to a supplier of last resort or chose another supplier under an accelerated procedure. In the course of 2022, the Competent Settlement Body prematurely terminated the assumption of balancing responsibilities for either part or the entire portfolio of demand points of an additional 8 gas suppliers. These customer off-points were automatically transferred to the supplier of last resort.

The supplier of last resort is a tool that protects consumers in the event of bankruptcy of any energy supplier and has a legal obligation to supply gas to the customer for a maximum period of 3 months. During that period, the customers concerned must again choose the standard gas supply on the basis of a new contract. A total of 3063 customer outlets were transferred to the supplier of last resort in 2022.

4.5.3.4 Trading on the electricity market in the Czech Republic

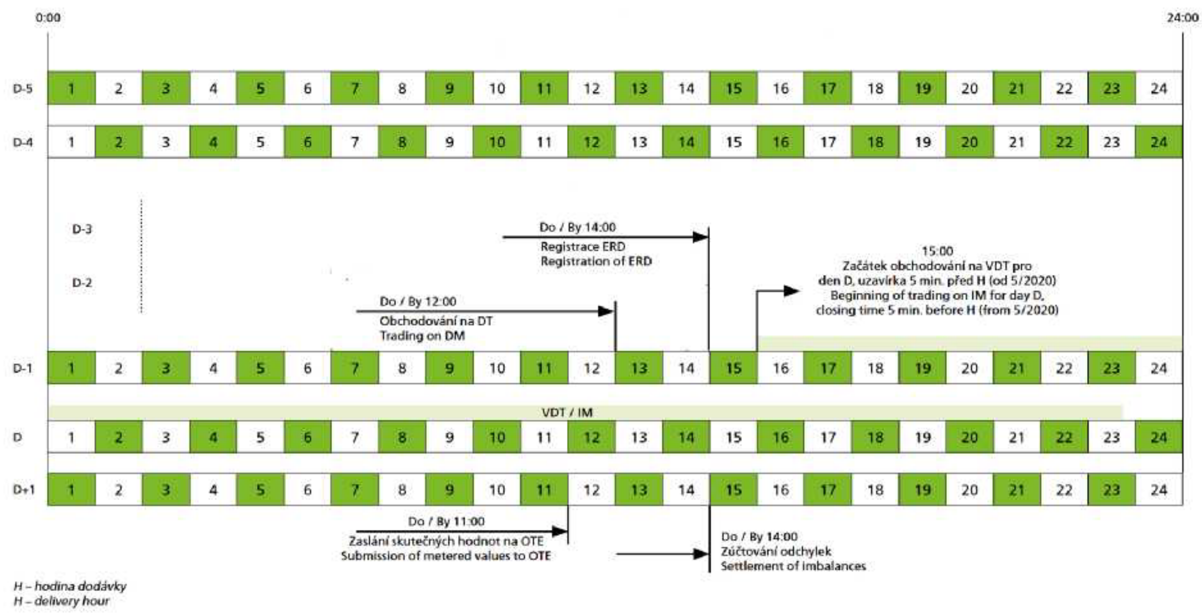
Electricity trading in the Czech Republic takes place through:

- bilateral trade;
- organised short-term market:
  - day-ahead spot market (DT);
  - intraday (VDT) market.

Imbalance settlement (including trading in regulatory energy) is also part of electricity trading in the Czech Republic.

Energy legislation requires market participants – balance responsible parties – to register their bilateral transactions in the OTE system through execution charts (ERDs). Electricity trading in the Czech Republic also includes imbalance settlement (including trading in regulatory energy). The time periods of each activity are shown in the figure below.

Figure 21: *Electricity market design*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Bilateral trades

As mentioned above, where market participants sell or buy electricity through bilateral transactions, they are required to register those transactions in the OTE system.

Bilateral domestic transactions for the supply of electricity were submitted to the market operator for registration by each Settlement Body in the form of execution charts (ERDs) no later than 14.00 on the day preceding the day on which the delivery was to take place, which was also the closing point for bilateral trade. Only the quantity of bilaterally traded electricity is registered in the OTE system without indicating its price. The financial settlement of these transactions is carried out directly between the parties to the transaction, outside the OTE system, and OTE is not the central counterparty of those transactions. A necessary condition for registration of these execution charts is, inter alia, compliance with the condition of financial collateral of the PZ from the point of view of the emergence of possible deviations in the PZs that such transactions might cause.

The following shall be included in these bilateral transactions:

- bilateral domestic treaties (DVS classical, stock exchange[127]);
- bilateral contracts for the supply of electricity abroad (export) and for the import of electricity[128].

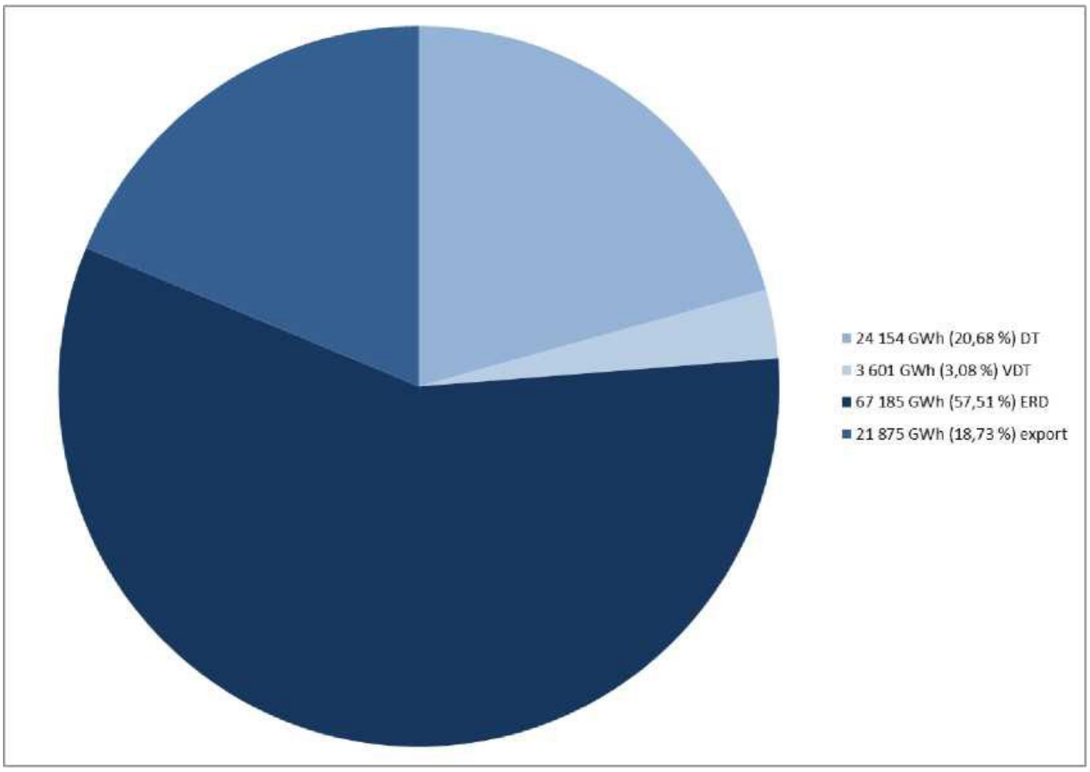
In 2022, 58 % of the electricity sold and 75 % of purchased electricity were registered in OTE in the form of domestic (national) execution charts, as illustrated in Figures 98 and 99. The total volume of domestic bilateral trades through execution charts reached 67.19 TWh in 2022.

In addition to the above, electricity transactions with financial settlement are also taking place on commodity exchanges, which serve to ensure long-term risks against increases/decreases in the electricity price.

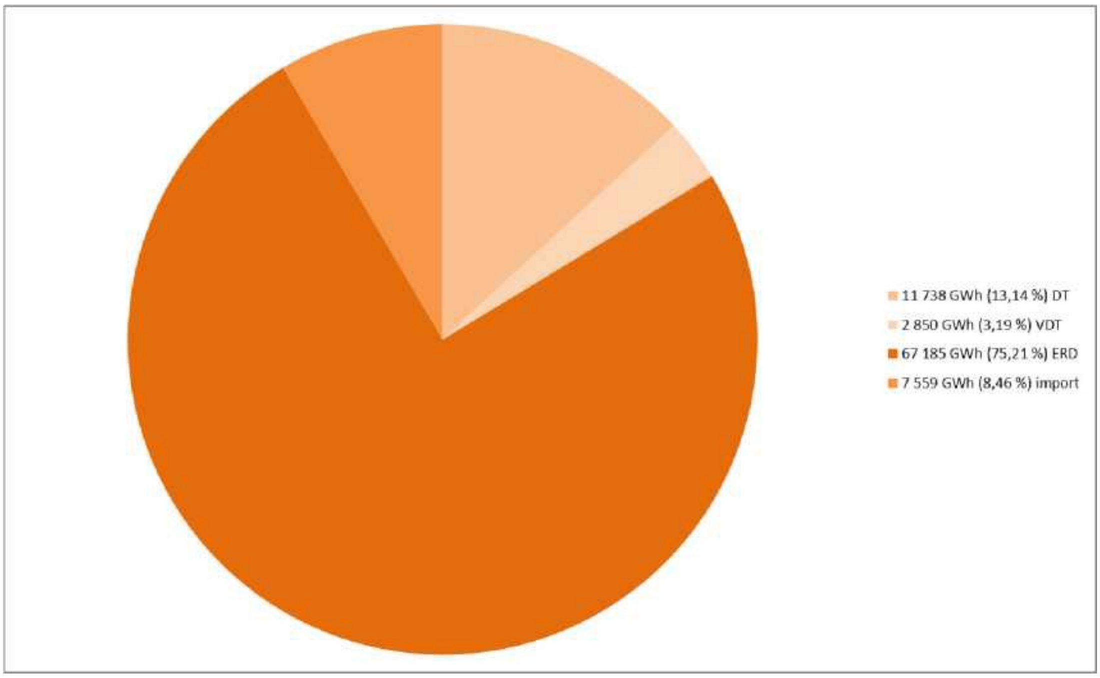
127The term SVA refers here to transactions traded on Power Exchange Central Europe, a.s. (PXE) and submitted by PXE to the OTE system for individual trading participants for imbalance settlement.

128Exports and imports resulting from the interconnected day-ahead and intraday electricity market, the so-called Market Coupling (MC) – SDAC (Single Day Ahead Coupling) and SIDC (Single Intraday Coupling) are also included in this case.

Graph 86: *Quantity of electricity traded – sales (GWh; %) – processed in OTE in 2022*



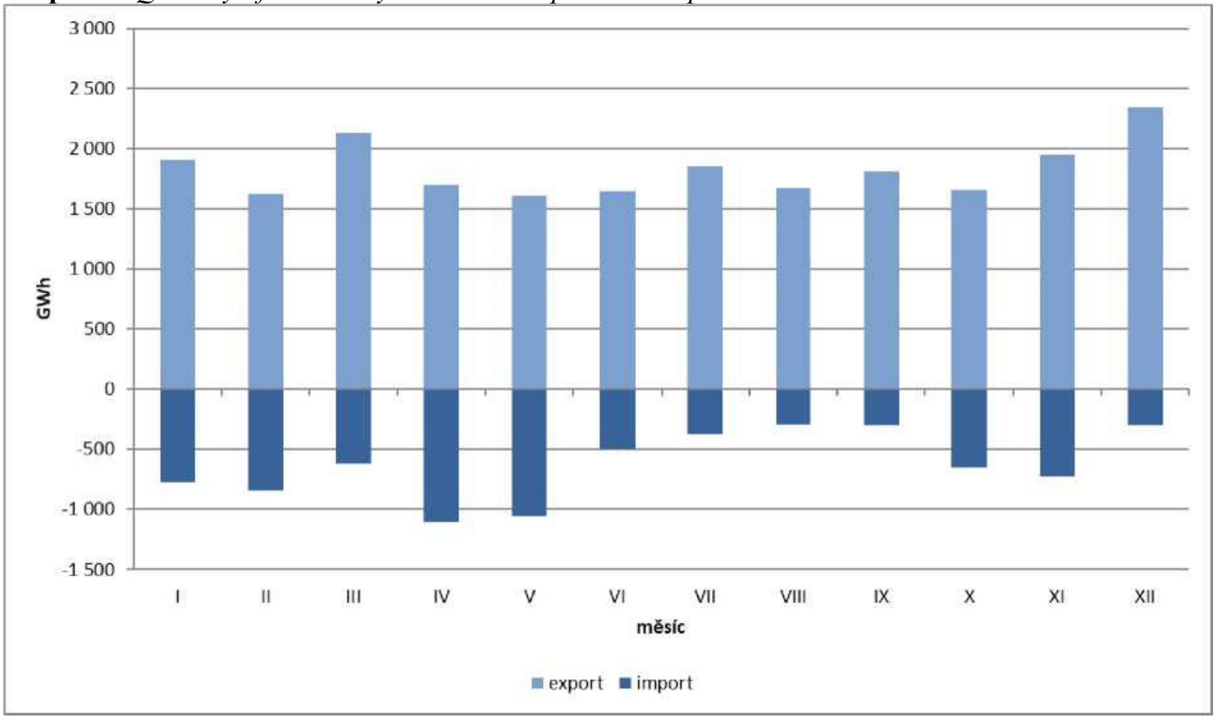
Graph 87: *Quantity of electricity traded – Purchase (GWh; %) – processed in OTE in 2022*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

The values of export-side cross-border contracts totalled 21 875 GWh for 2022, while import volumes in 2022 were 7 559 GWh. The following figure shows the amount of electricity exported and imported in each month of 2022.

Graph 88: *Quantity of electricity traded via export and import in 2022*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Organised short-term electricity market

The organised short-term market in the Czech Republic is an important form of electricity trading. The substantial increase in liquidity in recent years provides energy market participants with a reliable guarantee that they can purchase or sell the relevant commodity even shortly before the delivery date (day, minute) in response to the current situation in the system or in their production or customer portfolio. The objective and purpose of the short-term market is not only to reduce the risk of a deviation, but also to increase security and reliability of supply. Liquid short-term markets are also essential in their price formation, where transaction prices in these markets are used as a basis for the settlement of financial instruments traded on commodity exchanges or to guide the prices of other contracts between the supplier and the customer.

Table 86: *Comparison of the underlying parameters of the different markets*

			gas
	DT	VDT	VDT
market form	daily auctions	continuous pairing	continuous pairing
period traded	1 hour	1 hour	** 24 hours
minimum possible marketable quantity	0.1 MWh	0.1 MWh	0.1 MWh
maximum tradable quantity	99 999 MWh	*999 MWh	99 999.9 MWh
smallest volume increment	0.1 MWh	0.1 MWh	0.1 MWh

currency of the transactions	EUR	EUR	EUR
minimum possible price	EUR 500/MWh	EUR 999/MWh	EUR 0.01/MWh
maximum possible price	***EUR 4 000 /MWh	EUR 9999/MWh	EUR 4000/MWh
smallest possible price incremental	EUR 0.01/MWh	EUR 0.01/MWh	EUR 0.01/MWh
zero price option	YES	YES	NOT
time of market opening	unlimited	3 P.M. D-1	9 A.M. D-1
time for Market Closure	12.00 D-1	H-0:05	5:00 D+ 1

* Within a single tender

** Gas day from 06:00 to 06:00

*** The second auction is launched when the lower price threshold of -EUR 150/MWh or the cap of EUR 1500/MWh is reached or exceeded

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

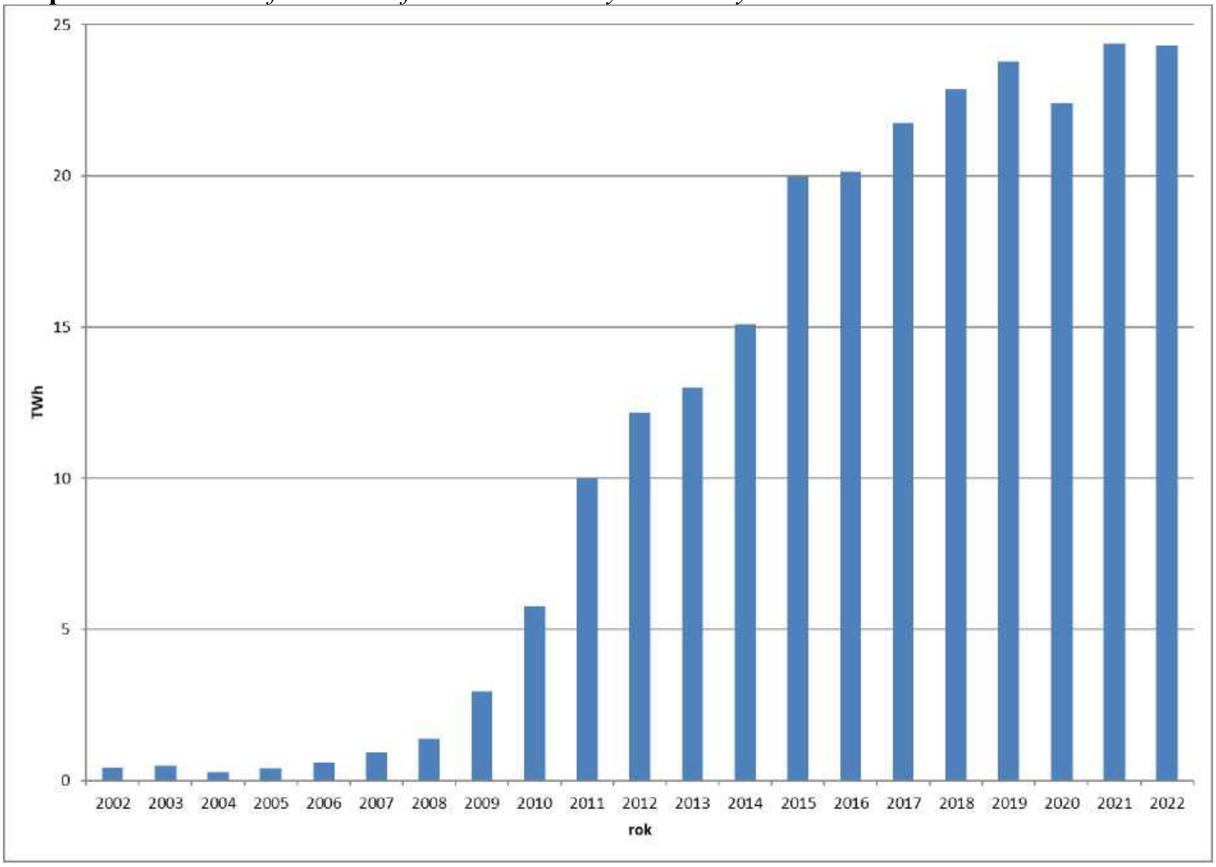
Day-ahead electricity market

The day-ahead electricity market in the Czech Republic is based on the principle of implicit allocation of cross-border capacities (MC) and was operated in conjunction with the Slovak, Hungarian and Romanian markets under the designation 4M MC in June 2021. In June 2021, these four day-ahead markets were linked to the interconnected MRC region, creating a single European day-ahead market (SDAC), and since June 2022, the adaptation of the capacity calculation method was changed by moving to a flow-based method (Flow- Based method), i.e. where the physical limits of the network are based on available capacities on critical network elements and power transmission distribution factors defined for each critical element and each bidding zone within the Core CCR region (see also ACER Decision 06/2016).

On the day-ahead market in the Czech Republic, market participants in the Czech Republic and other EU countries can meet their requirements for buying or selling electricity for the following day in all market areas without the need for explicit acquisition of transmission capacity.

The implementation of PCR solutions allows market participants to benefit from the same offer structure as those known to market participants in the EU. They can therefore create different production and consumption scenarios at different price levels and thus increase the ability to implement their business strategy in the day-ahead market. At the same time, traders can submit an unlimited number of offers.

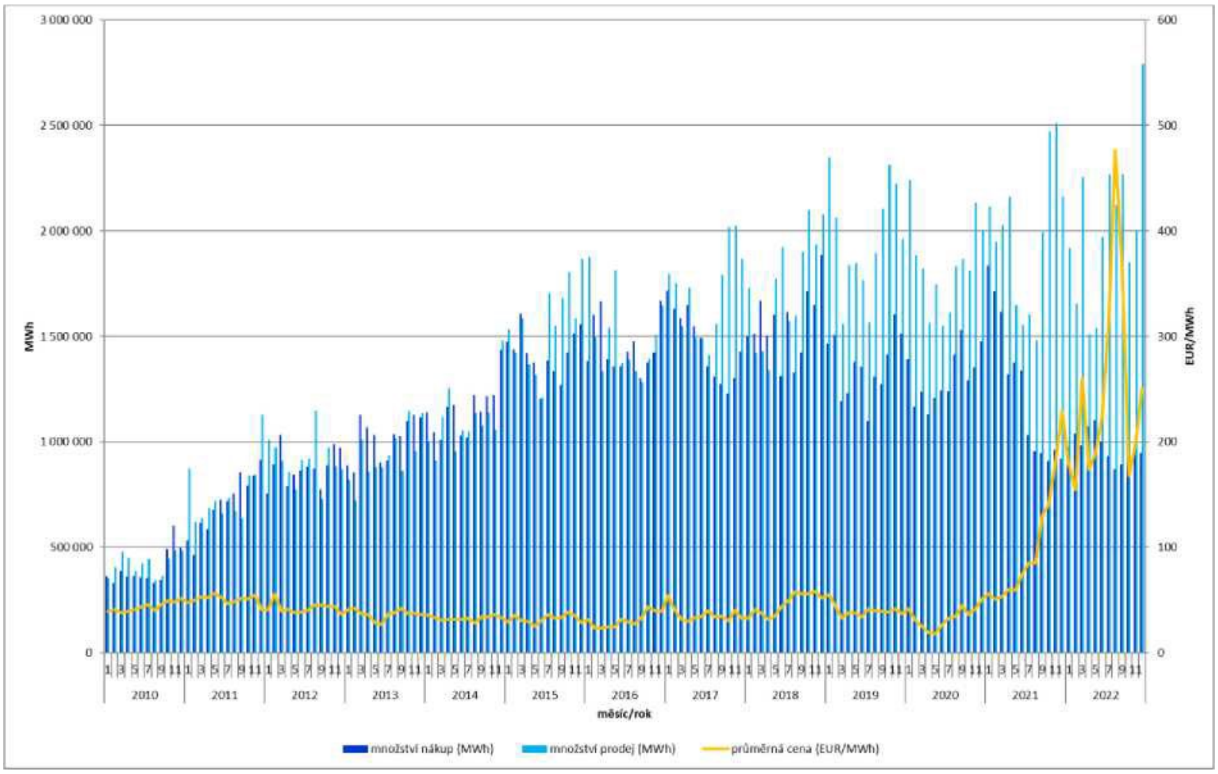
Graph 89: *Evolution of volumes of traded electricity on the day-ahead market 2002-2022*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

The volume of electricity traded on the OTE day-ahead market for 2022 was 24.31 TWh. This is a comparable quantity to 2021, in which market participants entered into transactions with a total volume of 24.36 TWh. In 2022, the total volume traded per DT in the Czech Republic again represented almost 40 % of domestic net consumption.

Graph 90: *Quantity of electricity traded and the evolution of the average price on the day-ahead market in 2022*



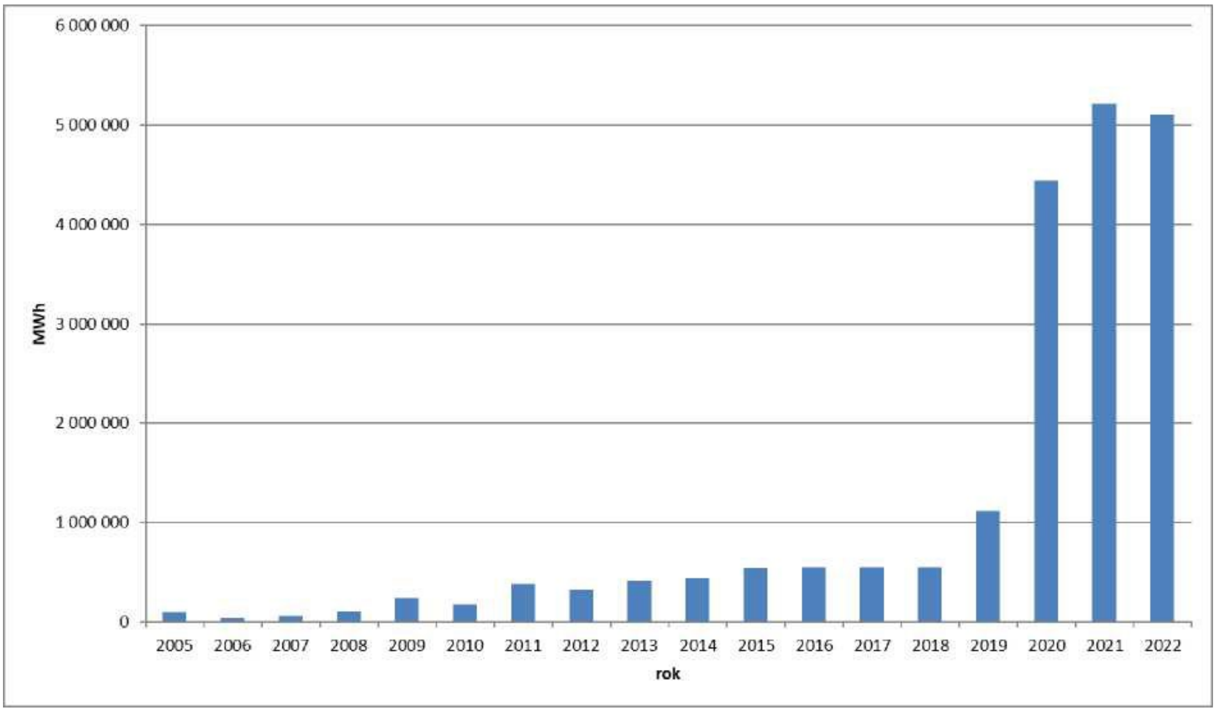
Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Intraday electricity market

Through the organised intraday electricity market, dealers offer or demand electricity anonymously throughout the trading day up to a limit time of 5 minutes before the start of the hour of delivery. Intraday trading shall be opened at 15.00 for all business hours of the following day and the values of cross-border capacities shall be published between 18.00 and 22.00. Minimum bid quantity is 0.1 MWh, maximum 999 MWh, quantity to be entered in MWh with a distinction to one decimal place. Trading takes place on a continuous matched offer basis and the trading currency is EUR. The minimum offer price is EUR 999/MWh and a maximum of + EUR 999/MWh.

In 2022, 5.11 TWh was traded on the intraday electricity market, almost comparable to 2021 (5.21 TWh).

Graph 91: *Quantity of electricity traded on the intraday market in 2005-2022*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Trading on the gas market in the Czech Republic

The gas market model shall be based on the principle of balancing responsibility, where a gas market participant with regulated access rights to the transmission system or distribution system is responsible for balancing and is the balancing party, or may delegate balancing responsibility to another imbalance settlement party under a contract. A business unit shall be, in accordance with European legislation, one gas day, starting at 6.00 a.m. on a given calendar day and ending at 6.00 a.m. on the following calendar day.

Gas trading in the Czech Republic takes place through:

– bilateral trade;
– an organised short-term market in the form of an intraday market (VDT).

Imbalance settlement is also part of gas trading in the Czech Republic.

In addition to the above, gas transactions with financial settlement take place on commodity exchanges, in particular to ensure long-term risks against increases/decreases in gas prices. These transactions are registered with the market operator in the same way as bilateral trading.

Notifications of gas quantities to market participants are made by sending so-called nominations.

Nominations are divided into:

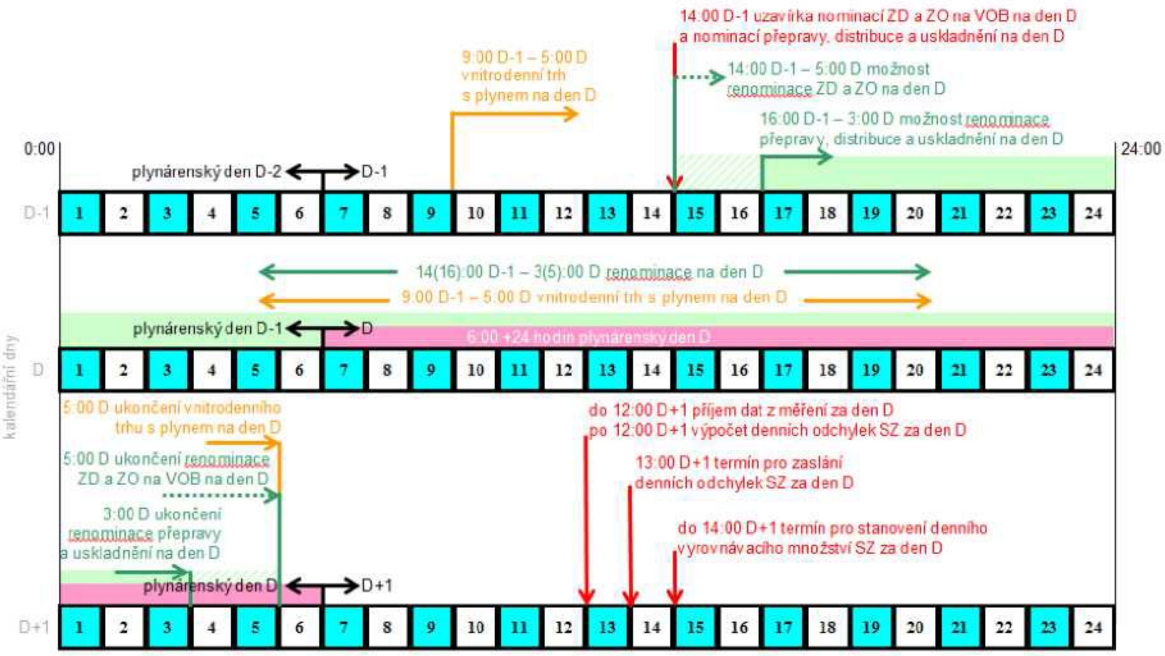
– **transport nomination** – an order to transport gas at entry and exit points at border transfer stations (HPS), i.e. export and import of gas from/to the transmission system in the Czech Republic, an order to transport gas at entry and exit points of virtual gas storage facilities (VZP) or an order to transport gas to a customer's demand point directly connected to the transmission system with a reserved capacity greater than or equal to 5 000 MWh/day;
– **nomination of storage** – command to inject or pump the specified amount of gas into or from the virtual gas storage facility;
– **nomination of distribution** – order to distribute gas at the entry points of gas production facilities

and at the entry and exit points of cross-border pipelines (PPL), i.e. export and import of gas from/to the distribution system in question in the Czech Republic;

– **nomination of a commitment to supply (ZD) and a commitment to withdraw (ZO)** – trades that take place via VOB between traders (transmission of gas to VOB), with the VOB where what is nominated is delivered/withdrawn.

All nominations shall be registered by the Settlement Body with the market operator or with the relevant operators by 14.00 on the day preceding the start of the gas delivery day. After this time, the matching (matching) of transmission nominations with neighbouring TSOs, the nomination of distribution with neighbouring distribution or transmission system operators, the nomination of storage between the TSO and the gas storage operator and the nomination at a virtual trading point between the different balance responsible parties shall be made. This does not put an end to the possibility of adjusting the trading position for market participants. Until almost the end of gas day ‘D’, the Settlement Body can adjust its position by sending a re-nomination or correcting nomination of its liabilities. It is nominated at the same time for a full gas day.The gas market design over time is shown in the following figure.

Figure 22: *Gas market design 2022*



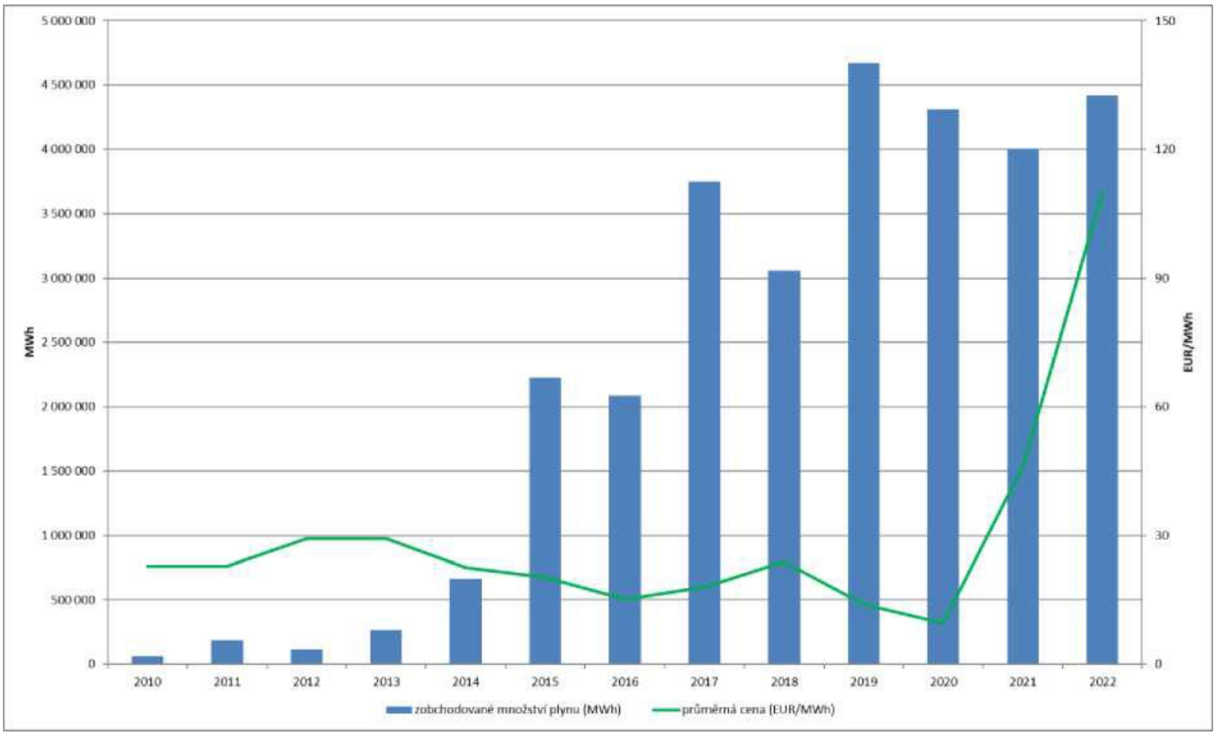
Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

Organised short-term gas market

The organised intraday gas market allows market participants to continue trading throughout the gas day. The intraday gas market for a given delivery day shall be opened at 9.00 a.m. on the day preceding the gas day on which the supply takes place and shall end one hour before the end of the gas day on which the supply takes place.

A total of 4 423 GWh of gas was traded on the intraday gas market in 2022. The weighted average intraday gas prices in 2022 was EUR 109,94/MWh, an increase in the weighted gas price of 138 % compared to 2021.

Graph 92: *Quantity of gas traded and average intraday gas prices in 2010-2022*



Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

On the basis of the prices obtained on the intraday gas market organised by the market operator, the OTE Index is set. The course of the OTE Index and the EEX prices in Germany (Within Day Reference Price for the NCG Zone) 129and THE during130 the period from 2020 to 2022 are illustrated in the figure below.

Graph 93: *Comparison between the OTE Index and the EEX and CEGH prices in 2016 and 2017*

Source: Annual Electricity and Gas Market Report 2022 (OTE, a.s.)

The high correlation of gas prices in the OTE market and EEX shows sufficient cross-border capacities and the maturity of the Czech short-term organised gas market.

II. Projections of developments in the application of existing policies and measures until at least 2040 (as well as for
2030)

The objective and purpose of short-term markets is both to reduce the risk of a deviation and to increase the security and reliability of supply of both commodities. Liquid short-term markets are also essential in their pricing, where transaction prices on these markets are used as a basis for the settlement of financial instruments traded on commodity exchanges or to guide the prices of other contracts between the supplier and the customer. This is reflected to the greatest extent in the integration activities in which OTE is actively involved. The already integrated day-ahead market under 4M Market Coupling also integrated the intraday electricity market in November 2019. In June 2021, the 4M MC region was interconnected to the interconnected MRC region, creating the Single Day-Ahead Market Coupling (SDAC) and implementing the Flow-base method for calculating cross-border capacities in the CORE

129Net Connect Germany, a common trading zone of several transmission system operators in the south of Germany;
from 1. 10. 2021 merged with the GPL (Gaspool) zone into THE Common Commercial Zone (Trading Hub Europe)

130Trading Hub Europe, since 1. 10. 2021 market operator for the whole area of Germany region in June 2022.

The Single Intraday Market Coupling (SIDC) is a joint initiative of nominated electricity market operators (NEMOS) and transmission system operators (TSOs), which allows for continuous cross-border trade across Europe and responds to market needs by creating a transparent and more efficient continuous trading environment that allows market participants to easily market their intraday positions across EU markets and without the need for explicit allocation of transmission capacity. As part of the integration of European intraday markets, the Czech Republic's intraday electricity market has been part of the SIDC since 19 November 2019. In 2021, the intraday electricity market traded across 22 countries across borders. In November 2022, the last expansion took place, with Slovakia and Greece joining. Intraday electricity markets, a total of 25 EU countries, are now interconnected through SIDC. The implementation of intraday auctions is currently underway and is expected to be operational in the first half of 2024.

Another change will be the transition to a 15-minute clearing and trading period in the Czech Republic as of 1. 7. 2024.

In the gas market, as part of the creation of a single gas market within the EU, it is currently far behind the integration of electricity markets. The TRU (Trading Region Upgrade) service provided in 2018 and 2019 by the operators of the Austrian and Czech transmission systems Gas Connect Austria and NET4GAS for the commercial interconnection of the Czech and Austrian transmission systems, even without the existence of direct physical transmission infrastructure[131] between the two countries, was not provided in 2022.

In this context, the Czech Republic is working towards the completion of the internal energy market, namely the internal gas market, in particular by removing narrow infrastructure throats and market barriers between the Czech Republic and its neighbours, namely Poland and Austria.

The aim should be to create an integrated energy system that connects both the electricity and gas sectors. In the context of an integrated energy market, there is scope to exploit synergies between the two systems and to better plan infrastructure development.

4.6.Difference "Research, Innovation and Competitiveness"

1. The state of play of the low-carbon technology sector and its position in the global market, if applicable

(this analysis should be carried out at Union or global level)

In the Czech Republic's view, the current state of the low-carbon technology sector and its position on the global market go beyond the focus of this document, and at the same time it is not appropriate to carry out this assessment in isolation at the level of individual Member States.

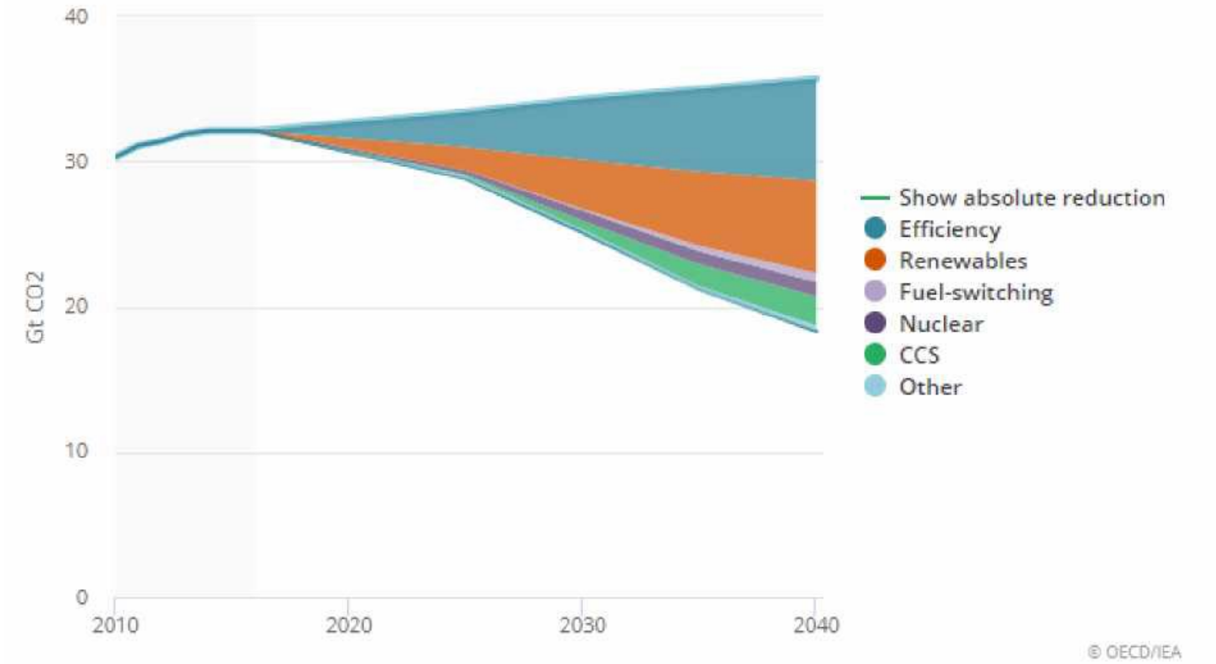
However, the Czech Republic is closely monitoring the state of low-carbon technologies in order to be able to respond to these developments where appropriate. The Czech Republic has been a member of the International Energy Agency (IEA) since 2001, which is also concerned, among other areas, with the status of low carbon technologies and their monitoring with a view to achieving long-term global greenhouse gas emission reduction targets. That information is included, in particular, in the Energy

The Hevlín (CZ)131 cross-border pipeline – LAA an der Thaya (AT), which is operated by the distribution system operator GasNet, s.r.o., is not a TRU service and is still operational. In September 2022, it distributed gas to Austria for several days.

Technology Perspectives (ETP) and the 'Tracking Clean Energy Progress (TCEP)'.

Under the TCEP, the International Energy Agency monitors the necessary additional CO2 reductions inorder to achieve Sustainable Development Scenario compared to New Policies Scenario, by dividing the reductions needed between the various low-emission technologies and technologies, but also demand-side measures (in this case, in particular, energy efficiency improvements).

Graph 94: *Additional CO2 savings underthe SDS scenario compared to NPS*



Source: Tracking Clean Energy Progress

Under the TCEP, the IEA then assesses the actual contribution of each technology to achieving the objectives defined in the SPS. In total, 30 low-carbon technologies (or processes, not just technologies as such) are listed in a total of five categories, namely (i) sources for electricity generation; (II) buildings; (III) transport; (IV) industry and (v) technologies and processes enabling integration. Renewables are further subdivided into a total of eight subcategories (i.e. 37 in total).

According to the latest available evaluation, in 2017 only four categories were marked as 'on track', namely (i) photovoltaics; (II) electromobility; (III) lighting and (iv) data centres and networks. A total of 22 technologies were identified as 'more efforts needed' and finally 11 technologies were flagged as 'off track'.132

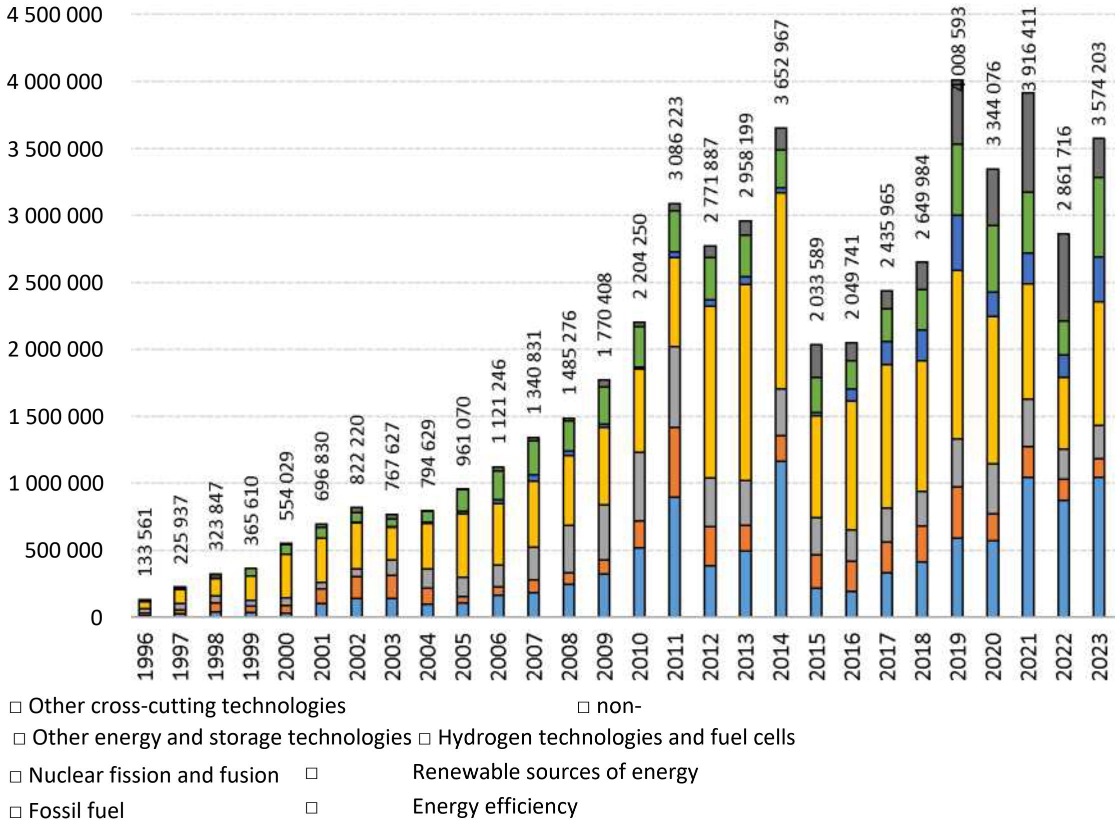
132 More information on the methodology and overall assessment process canbe found at https://www.iea.org/tcep/.

Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

Membership of the International Energy Agency (IEA) obliges the Czech Republic to report selected statistical data in the form of questionnaires. One of these questionnaires is focused on science and research in the energy sector. In order to report these statistical data, an analysis of expenditure on science and research in the energy sector has been carried out.133

The development of R & D resources in the energy sector has shown a gradual increase in the amount spent on energy projects since the 1990s. It is clear that this topic is gaining political and societal importance. For this reason too, some programmes have been set up at the TA CR to support not only technological projects in general but directly R & D & I in the energy sector, in particular the THÉTA programme (or THÉTA II). The evolution of R & D resources in the energy sector and the increasing trend over the last decades can be illustrated by graphs showing the eligible costs of energy projects, the repsective evolution of state aid in 1996-2022.

Graph 95: *Development of eligible costs for science, research and innovation 1996-2023*



133 https://www.mpo.cz/cz/energetika/vyzkum-a-vyvoj-v-energetice/zapojeni-do-mezinarodniho-evropskeho-Experience/statistics-educated-na-survey-a-development-in-energy-pro-ucely-dotaznic-internarodni-energyke-agentur-iea-259363/

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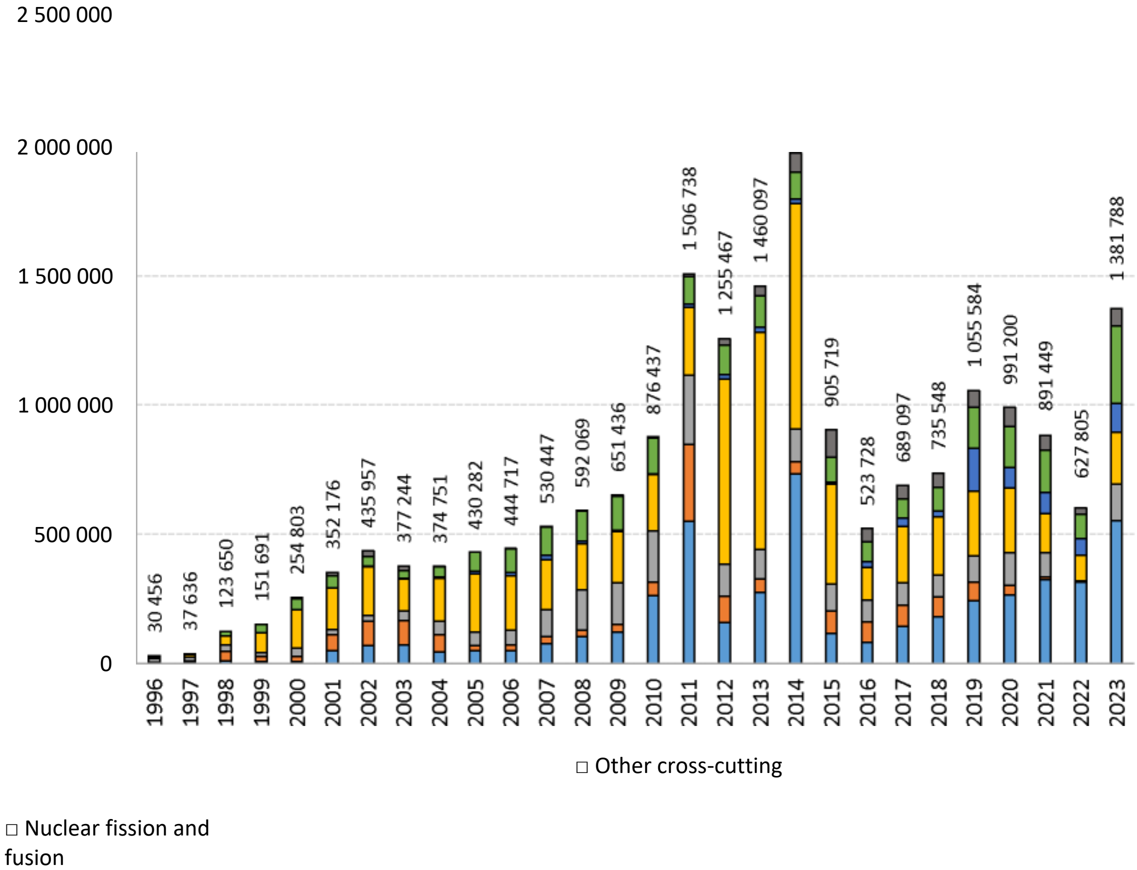
Graph 97: *Evolution of private sector aid 1996-2023*



□ non-attachable
□ Other energy and storage technologies □ Hydrogen technologies and fuel cells
□ Renewable sources of energy
□ Energy efficiency

It is not possible to determine precisely the level of public funding for research and innovation towards low-carbon technologies for the Czech Republic. The category of 'low carbon technologies' is not defined and implemented in the Czech Republic for the purposes of statistical surveys. The situation is further complicated by the fact that the allocation to low-carbon technology may not be clearly identified for basic oriented research. Table 87 shows expenditure from the State budget for R & D and innovation in the period 2016-2019, when 2016 and 2017 correspond to reality and 2018 and 2019 are approved under the State budget. Based on the National Research Priorities, 18 % of total public expenditure should be allocated indicatively to Sustainable energy and material resources (Table 28).

Table 87: *State budget expenditure on R & D & I until 2019 (in CZK)*

	Reality 2016	**Reality 2017**	**State Budget 2018**	**State Budget 2019**
Office of the Government of the Czech Republic	62 486 218	76 370 186	79 403 981	65 506 346
Ministry of Foreign Affairs	0	9 986 613	25 152 000	25 336 000
Ministry of Defence	397 053 604	483 263 504	436 040 000	414 486 150
Ministry of Labour and Social Affairs		9 977 391	60 000 000	80 000 000
Ministry of the Interior	364 055 447	640 874 187	608 321 000	798 822 402
Ministry of the Environment	0	153 231 534	248 379 554	257 600 199

Czech Grant Agency	3 927 443 928	4 107 793 016	4 333 066 000	4 390 784 794
Ministry Industry and Trade	640 374 977	1 927 225 968	2 993 928 152	2 924 604 421
Ministry of Transport	0	15 332 946	50 000 000	50 000 000
Ministry of Agriculture	858 044 769	875 396 428	884 726 000	982 682 952
Ministry of Education, Youth and Sports.	15 296 759 600	16 690 662 807	18 751 885 565	19 734 339 959
Ministry of Culture	375 571 758	388 182 239	521 382 000	487 296 138
Ministry of Health	1 190 098 792	1 588 405 901	1 557 640 512	1 552 100 648
Ministry of Justice	7 890 470	7 050 373	0	0
Institute for the Study of Totalitarian Regimes	2 931 128	4 286 063	0	0
Academy of Sciences of the Czech Republic	4 777 930 160	5 231 659 779	5 684 692 000	6 022 421 793
Czech Technology Agency	2 823 387 117	2 923 837 660	4 335 548 383	4 274 646 444
Total	30 724 027 967	35 133 536 594	40 570 165 147	42 060 628 246

Source: State budget expenditure on R & D & I in 2019

Information on the extent of public funding to the energy sector can be obtained using the research, development and innovation information system classification[135]. For the energy sector, the categories of SOE (non-nuclear energy, energy consumption and use) and JF (nuclear energy) are relevant. Table 88 shows the aid implemented in the fields of SOE and JF. It can be seen that between 2009 and 2015 almost 3.6 billion were allocated in selected tenders to support projects with the main field of JE/JF. The total cost was approximately 5.2 billion. CZK. For projects with a secondary field of JE and JF, public support amounted to approximately 1.1 billion. CZK and a total cost of more than 1.5 billion. CZK. Table 89 shows the approved dedicated support and total costs for the period 2016-2020 (these are projects approved before September 2016).

A minimum of 4 billion should be allocated to the energy sector in industrial research over the 2018-2025 horizon. CZK 5.7 billion of the State budget. CZK total funding, which corresponds to the approved funds under the THÉTA programme (assuming that all funds allocated are exhausted). Of course, energy research spending is not limited to this programme and is therefore very likely to go beyond this scope, but this cannot be specifically quantified.

Table 88: *Implemented dedicated support and total costs in the fields of SOE, JF in thousands. CZK (2009-2015)*

		2009	2010	2011	2012	2013	2014	2015
Main field of the NPP, JF	Subsidies	314 843	428 187	586 492	726 330	606 529	489 885	436 152
	Costs	430 067	584 891	810 218	1 039 751	886 811	729 510	672 983
Secondary field of NPP, JF	Subsidies	86 743	117 971	177 803	195 609	187 285	178 226	153 883
	Costs	114 850	156 195	235 471	265 468	269 272	267 247	237 796

[135]*See* www.rvvi.cz – Overview of code lists – Classification of disciplines

Source: Background study on the THÉTA programme (TA CR, September 2016)

Table 89: *Approved dedicated support and total costs in the fields of SOE, JF in thousands. (2016-2020)*

		2016	2017	2018	2019	2020
Main field of the NPP, JF	Subsidies	348 428	267 920	151 052	114 173	568
	Costs	540 405	407 460	218 280	164 684	887
Secondary field of NPP, JF	Subsidies	90 320	69 258	43 900	27 071	469
	Costs	138 903	107 366	67 016	42 403	629

Source: Background study on the THÉTA programme (TA CR, September 2016)

Table 90 presents key indicators in the field of science and research. This includes the development of staff in the field of science and research, as well as in science and research centres. However, not all of them carry out scientific work. Table 91 shows the number of specialists in science and technology. Table 92 shows the evolution of patents, broken down into national patents and European patents validated for the Czech Republic. However, it should be pointed out that this information is not specific to energy and climate, or 'low carbon technologies', but is aggregated for the whole Czech Republic and all sectors of science and research. Figures specifically related to energy and climate are not available in detail to this extent.

Table 90: *Core indicators of science and research (number; CZK million)*

	2005	2009	2010	2011	2012	2013	2014	2015	2016	2017
R & D workplace (No)	2 017	2 345	2 587	2 720	2 778	2 768	2 840	2 870	2 830	3 113
R & D staff (No)	43 370	50 961	52 290	55 697	60 329	61 976	64 443	66 433	65 783	69 718
R & D expenditure (CZK million)	38 146	50 875	52 974	62 753	72 360	77 853	85 104	88 663	80 109	90 377

Source: Statistical Yearbook of the Czech Republic (2018), Chapter 23. Science, Research and Innovation[136]

Table 91: *Scientific and technical specialists (thousands of persons)*

	2014	2015	2016	2017
Science, mathematics and statistics	8,0	11,9	9,7	9,7
Biological and related disciplines	13,3	12,0	16,1	21,0
Manufacturing, construction and related industries	56,7	64,2	67,5	72,8
Electrical, electronics and electronic communications	12,2	13,1	17,6	20,0
Architecture, spatial planning, design and related disciplines	17,0	16,9	19,1	21,0
Others	4,4	3,1	3,0	0,0
Total	111,6	121,3	133,1	144,5

Source: Statistical Yearbook of the Czech Republic (2018), Chapter 23. Science, research and innovation

[136] Links available: https://www.czso.cz/csu/czso/23-veda-vyzkum-a-inovace

Table 92: *Evolution of patents (number)*

Pointer	2010	2014	2015	2016	2017
National patents	911	688	749	781	669
European patents validated for the Czech Republic	3 693	4 543	4 827	5 961	6 901
Total	**4 604**	**5 231**	**5 575**	**6 742**	**7 570**

Source: Statistical Yearbook of the Czech Republic (2018), Chapter 23. Science, research and innovation

Other information is, inter alia, comprehensively available in the document Analysis of the state of R & D & I in the Czech Republic and its comparison with abroad, which is processed annually. The latest available material is for 2017137.

ii. A breakdown of current prices by element comprising the three main components of the price (energy;
network, taxes/fees)

This chapter builds on the 2020 National Plan and will be updated as part of the finalisation of the update of this document, as appropriate.

Breakdown of current prices by element

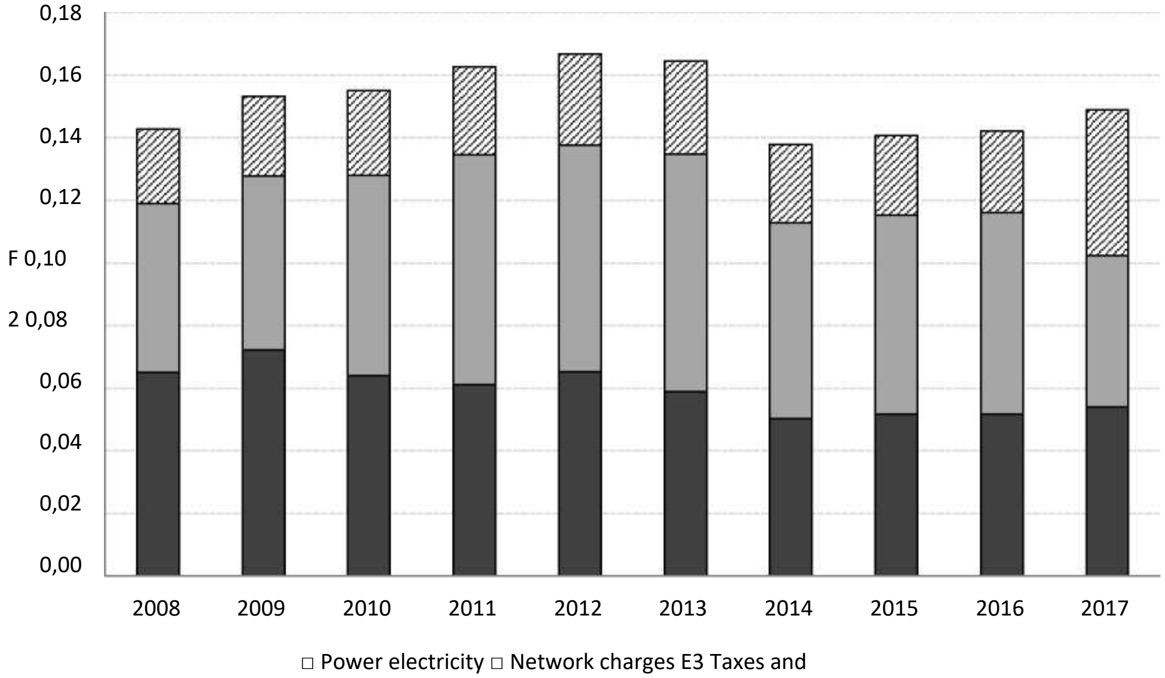
In this respect, it should be noted that the “entering” of this sub-chapter is relatively unclear as it is not indicated which commodities/fuels are to be covered by these cyne. According to the requirement for a breakdown into the main prices of the component, including the network component, it can be inferred that the requirement for so-called network commodities, namely electricity and natural gas, is meant here (the prices of heat are significantly regional). Information on electricity, natural gas and also hard coal prices is therefore provided below. The Czech Republic also monitors statistically the prices of other fuels/commodities such as comfort fuels (automotive gasoline and morote diesel), LPG, light and fuel oils, etc.

Electricity prices

Electricity prices (as well as natural gas prices) are available in publicly available EUROSTAT databases (background data are sent by the Czech Statistical Office). Some information on developments in electricity prices for and outside the household sector is presented below. Detailed information is available in EUROSTAT.138 Prices are also available in different consumption-size bands, the price may vary between bands. Only the selected bands are listed below. Graph 98 shows the evolution of the electricity price for the household sector in the annual consumption band at a level of 2,5-4.9 MWh in EUR/kWh, broken down into the different price components, namely the power electricity component, the network charges component and the tax and charge component. Graph 99 then shows a comparison of Czech prices with neighbouring countries and Hungary in purchasing power parity. Graph 100 shows the electricity price, broken down into individual components for non-household sectors, for a selected consumption band. Graph 101 then presents a price comparison for the non-household sector.

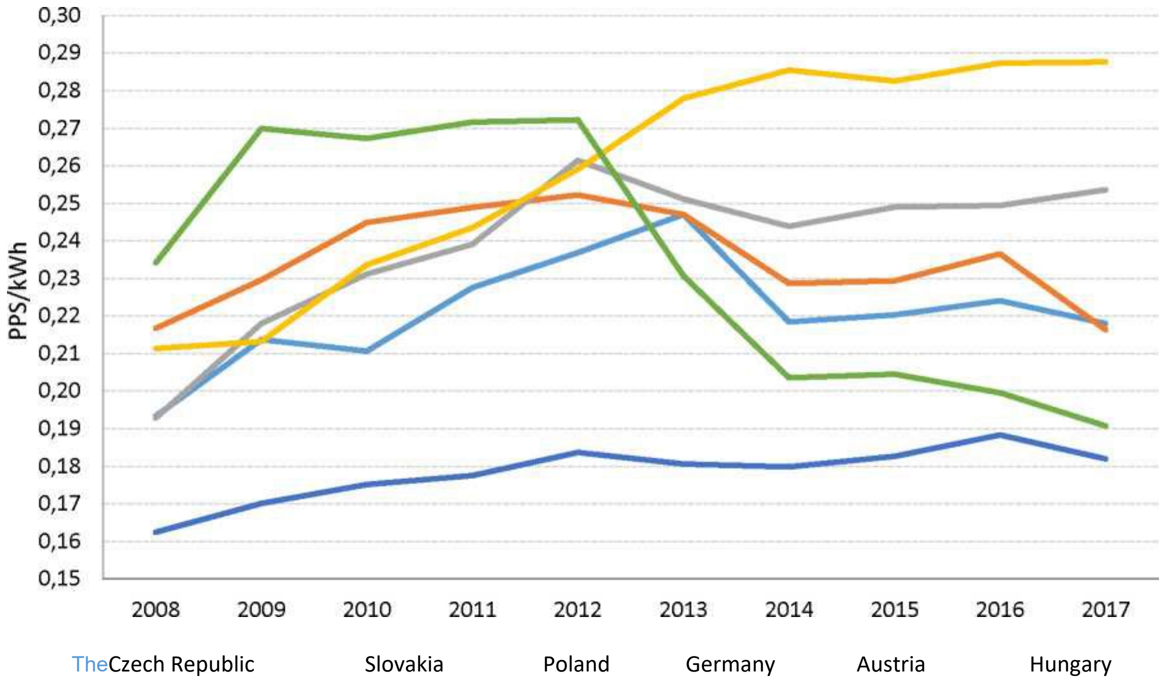
Graph 98: *Household electricity price (annual consumption band 2.5-4.9 MWh)*

137 The material is available at the following link: https://www.vyzkum.cz/FrontClanek.aspx?idsekce=799467
138 This is a database called ‘Energy statistics – price of natural gas and elektricity (NGR_price) available at the following link: https://ec.europa.eu/eurostat/web/energy/data/database



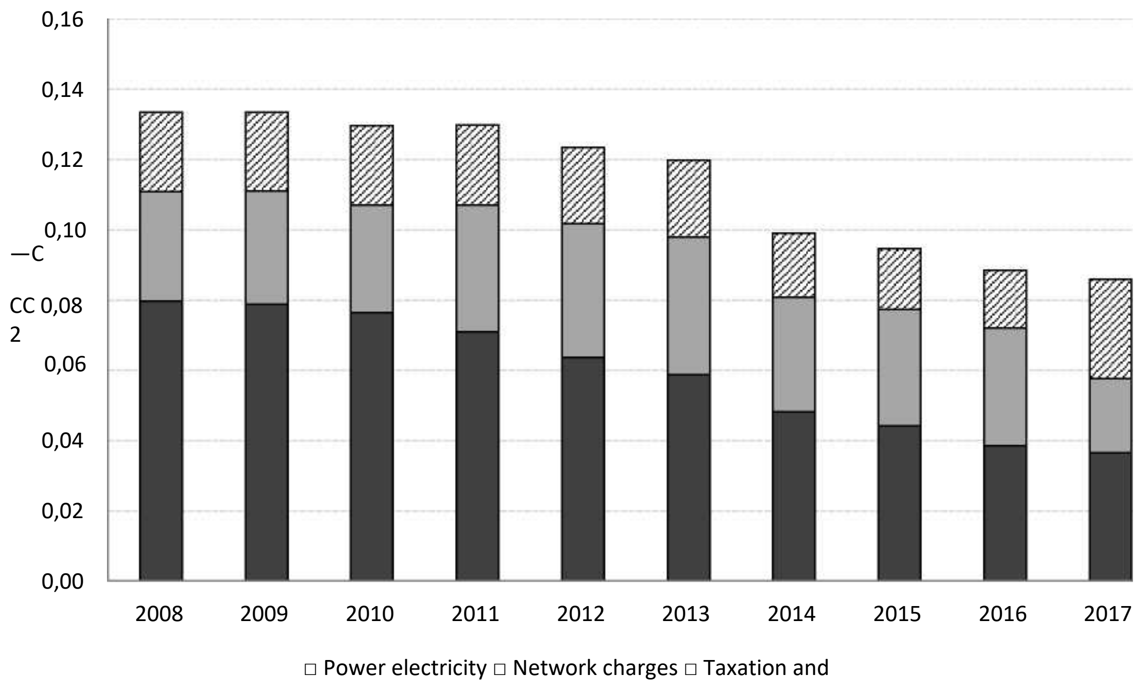
Source: Eurostat (Electricity prices components for household consumers; NRG_pc_204_c)

Graph 99: *Comparison of electricity prices for households (annual consumption band*



Source: Eurostat (Electricity prices for household consumers; NRG_pc_204)

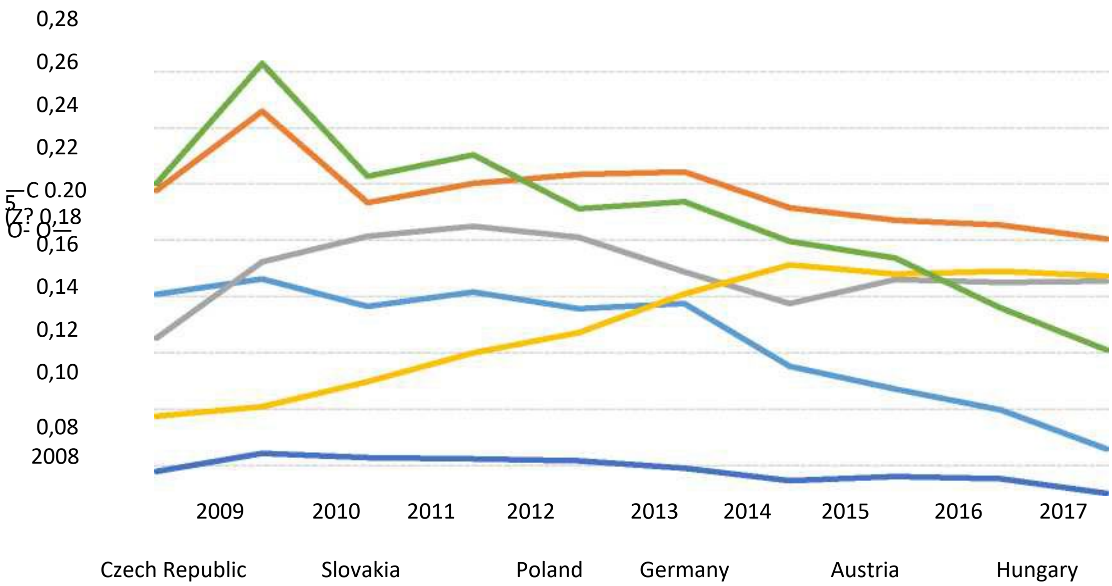
Graph 100: *Non-household electricity price (annual consumption band 500-2 000 MWh)* 139



Source: Eurostat (Electricity prices components for non-household consumers, Electricity prices for non-household consumers; NRG_pc_205_c, nrg_pc_205)

139Following the construction of this graph, two types of databases were used, namely nrg_pc_205_c and nrg_pc_205.

Graph 101: *Comparison of non-household electricity prices (annual consumption band 500-2 000 MWh)*



Source: Eurostat (Electricity prices for non-household consumers; NRG_pc_205)

Table 93 then shows the share of the different components for the supply of electricity in 2018 according to the Energy Regulatory Office's price decision for regulated electricity and gas prices for 2018 to illustrate the split of the different components between the regulated and non-regulated price components. Table 94 shows the quaternal evolution of electricity prices for industry and households, including taxation.

Table 93: *Share of individual components for the supply of electricity in 2018*

	Households	**Small entrepreneurs**	**Large-scale customers (VVN)**	**Large-scale customers (VN)**
Price of power electricity	43.31 %	38.4 %	75.26 %	61.85 %
Price of the provision of distribution	33.57 %	41.2 %	4.49 %	18.89 %
Price of the provision of transmission	4.24 %	4.1 %	6.84 %	5.84 %
Aid APPLICABLE	14.23 %	13.6 %	8.45 %	9.34 %
Price for system services	2.79 %	2.7 %	4.97 %	4.08 %
Price for market operator activities	1.87 %	0.1 %	0.00007 %	0.003 %

Source: ERO price decision for regulated electricity and gas prices for 2018

Table 94: *Electricity price for industry and households including taxation140*

	Industry price in CZK/MWh						Price for households in CZK/MWh					
	C.W.E.	Tax	VAT in %	VAT	Customs duties.	Total	C.W.E.	Tax	VAT in %	VAT	Customs duties.	Total
1Q2016	2 179,1	28,3	0,0	0,0	28,3	2 207,4	3 122,0	28,0	0,21	662,0	690,0	3 812,0
2Q2016	2 151,0	28,3	0,0	0,0	28,3	2 179,3	3 122,0	28,0	0,21	662,0	690,0	3 812,0
3Q2016	2 144,2	28,3	0,0	0,0	28,3	2 172,5	3 122,0	28,0	0,21	662,0	690,0	3 812,0
4Q2016	2 152,0	28,3	0,0	0,0	28,3	2 180,3	3 122,0	28,0	0,21	662,0	690,0	3 812,0
1Q2017	2 054,1	28,3	0,0	0,0	28,3	2 082,4	3 127,0	28,0	0,21	663,0	691,0	3 818,0
2Q2017	2 038,2	28,3	0,0	0,0	28,3	2 066,5	3 127,0	28,0	0,21	663,0	691,0	3 818,0
3Q2017	2 030,7	28,3	0,0	0,0	28,3	2 059,0	3 127,0	28,0	0,21	663,0	691,0	3 818,0
4Q2017	2 040,0	28,3	0,0	0,0	28,3	2 068,3	3 127,0	28,0	0,21	663,0	691,0	3 818,0
1Q2018	2 047,7	28,3	0,0	0,0	28,3	2 076,0	3 205,0	28,0	0,21	679,0	707,0	3 912,0
2Q2018	2 048,5	28,3	0,0	0,0	28,3	2 076,8	3 238,0	28,0	0,21	686,0	714,0	3 952,0
3Q2018	2 077,9	28,3	0,0	0,0	28,3	2 106,2	3 302,0	28,0	0,21	699,0	727,0	4 029,0

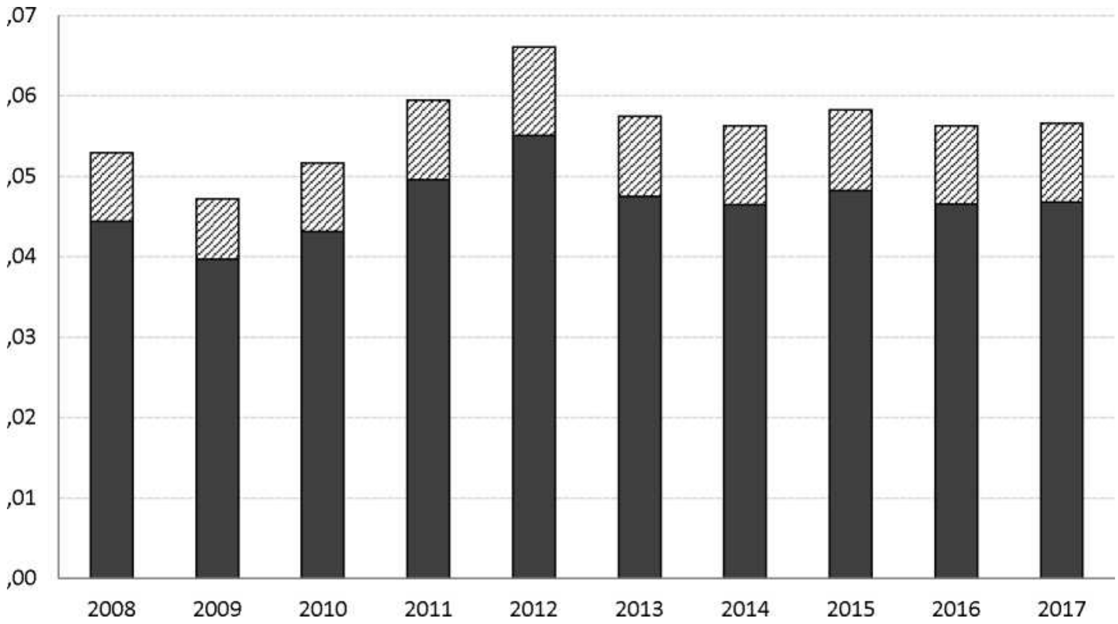
Source: Information for the energy prices & taxes report prepared for the IEA

Natural gas prices

Graph 102 shows the evolution of the price of natural gas for the household sector in the annual consumption band at a level of 20-200 GJ in EUR/kWh, broken down into the different price components (fiscal and non-tax components). Graph 103 then shows a comparison of Czech prices with neighbouring countries and Hungary in purchasing power parity. Graph 104 shows the price of natural gas broken down into individual components for non-household sectors, for a selected consumption band. Graph 105 then presents a price comparison for non-household sectors.

140Based on these statistics, a publication entitled 'Energy prices and taxes' is being prepared on a quarterly basis by the International Energy Agency. The last available edition of this publication is for the third quarter of 2018.

No 102: *Household gas price (annual consumption band 20-200 GJ)*



□ excluding taxes and levies □ Taxes and

1 — **Graph**

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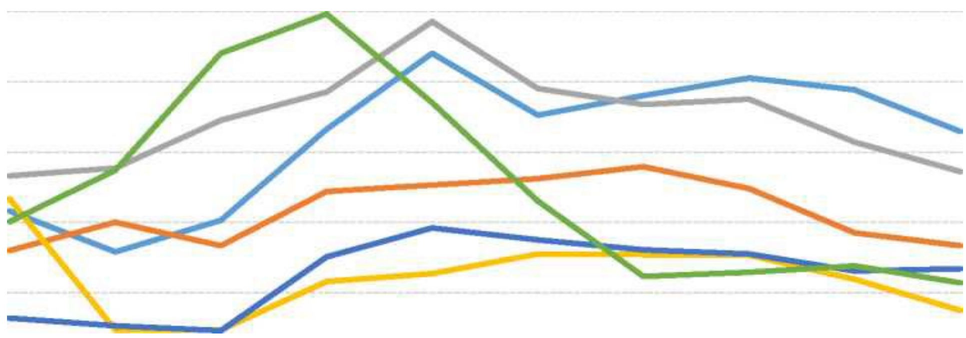

Source: Eurostat (Gas prices for household consumers; NRG_pc_202)

No 103: *Comparison of gas prices for households (annual consumption band 20-200 GJ)*

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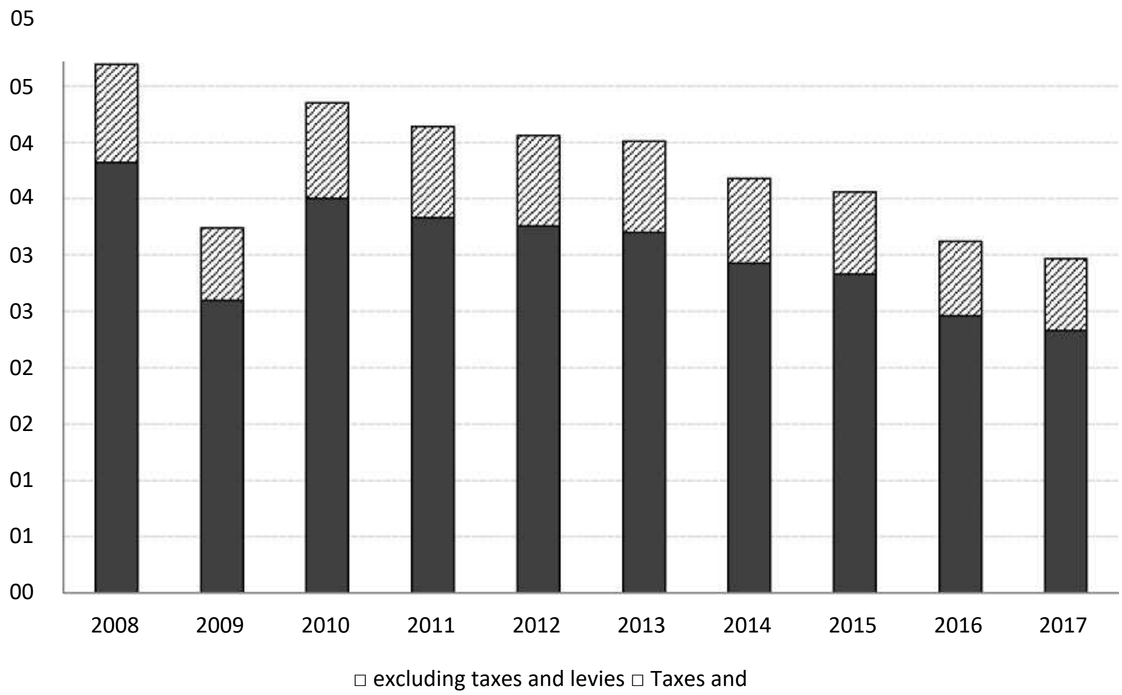
09

Source: Eurostat (Gas prices for household consumers, nrg_pc_202)

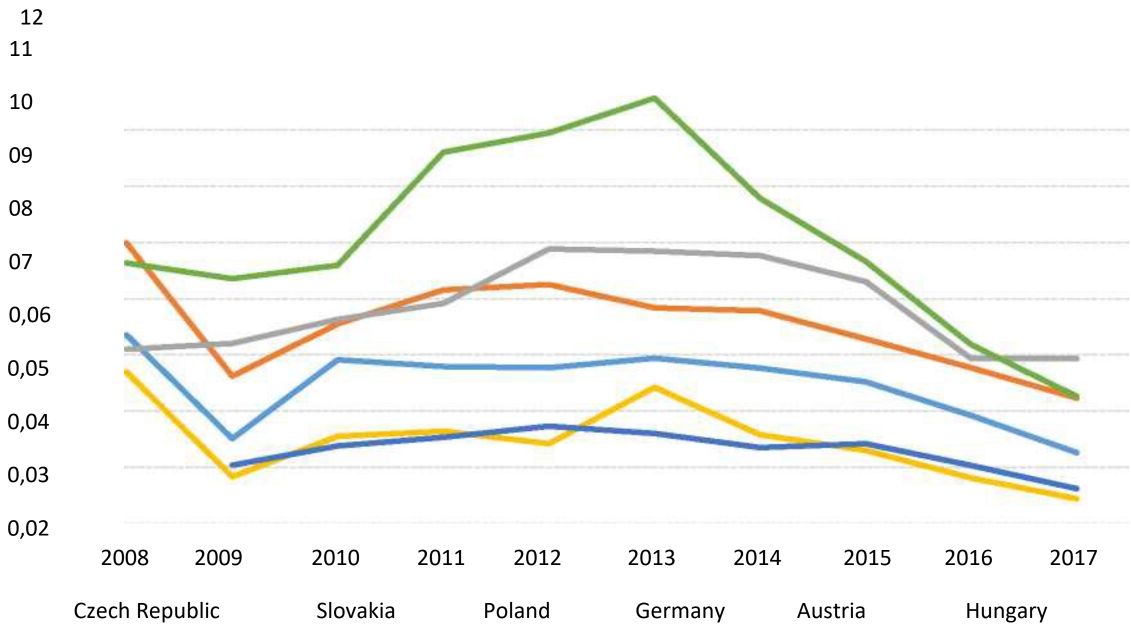
Graph No 104: *Non-household gas*price (annual consumption band 10-100 TJ)**



1 —

Source: Eurostat (Gas prices for non-household consumers; NRG_pc_203)

No 105: *Comparison of non-household gas prices (annual consumption band 10-100 TJ)*



Source: Eurostat (Gas prices for non-household consumers; NRG_pc_202)

Table 95 then shows the share of the different components for the supply of natural gas in 2 018 in accordance with the 2018 price decision of the Energy Regulatory Authority for regulated electricity and gas prices to illustrate the division of the different components between the regulated and non-regulated price components. Table 96 shows the quaternal evolution of electricity prices for industry and households, including taxation.

Table 95: *Share of individual components for the supply of natural gas in 2018*

	All categories of customers
Trade and commodity	75.73 %
Distribution	22.84 %
Transport	1.35 %
OTE services	0.08 %

Source: ERO price decision for regulated electricity and gas prices for 2018

Table 96: *Natural gas prices for industry and households including taxation*[141]

	Industry price in CZK/MWh						Price for households in CZK/MWh					
	C.W.E.	Tax	VAT in %	VAT	Customs duties.	Total	C.W.E.	Tax	VAT in %	VAT	Customs duties.	Total
1Q2016	716,5	30,6	0,0	0,0	30,6	747,1	1 354,5	0,0	0,21	284,4	284,4	1 638,9
2Q2016	703,3	30,6	0,0	0,0	30,6	733,9	1 296,2	0,0	0,21	272,2	272,2	1 568,4
3Q2016	704,0	30,6	0,0	0,0	30,6	734,6	1 267,8	0,0	0,21	266,2	266,2	1 534,0
4Q2016	714,2	30,6	0,0	0,0	30,6	744,8	1 267,8	0,0	0,21	266,2	266,2	1 534,0
1Q2017	655,6	30,6	0,0	0,0	30,6	686,2	1 271,2	0,0	0,21	267,0	267,0	1 538,2
2Q2017	655,8	30,6	0,0	0,0	30,6	686,4	1 262,3	0,0	0,21	265,1	265,1	1 527,4
3Q2017	665,4	30,6	0,0	0,0	30,6	696,0	1 262,3	0,0	0,21	265,1	265,1	1 527,4
4Q2017	666,2	30,6	0,0	0,0	30,6	696,8	1 262,3	0,0	0,21	265,1	265,1	1 527,4
1Q2018	659,3	30,6	0,0	0,0	30,6	689,9	1 258,0	0,0	0,21	264,2	264,2	1 522,2
2Q2018	659,2	30,6	0,0	0,0	30,6	689,8	1 254,6	0,0	0,21	263,5	263,5	1 518,0
3Q2018	670,0	30,6	0,0	0,0	30,6	700,6	1 254,6	0,0	0,21	263,5	263,5	1 518,0

Source: Information for the energy prices & taxes report prepared for the IEA

[141] On the basis of these statistics, a publication entitled ‘Energy prices and taxes’ is being prepared on a quarterly basis by the International Energy Agency. The last available edition of this publication is for the third quarter of 2018.

Hard coal prices

Table 97: *Hard coal prices for industry and households including taxation*

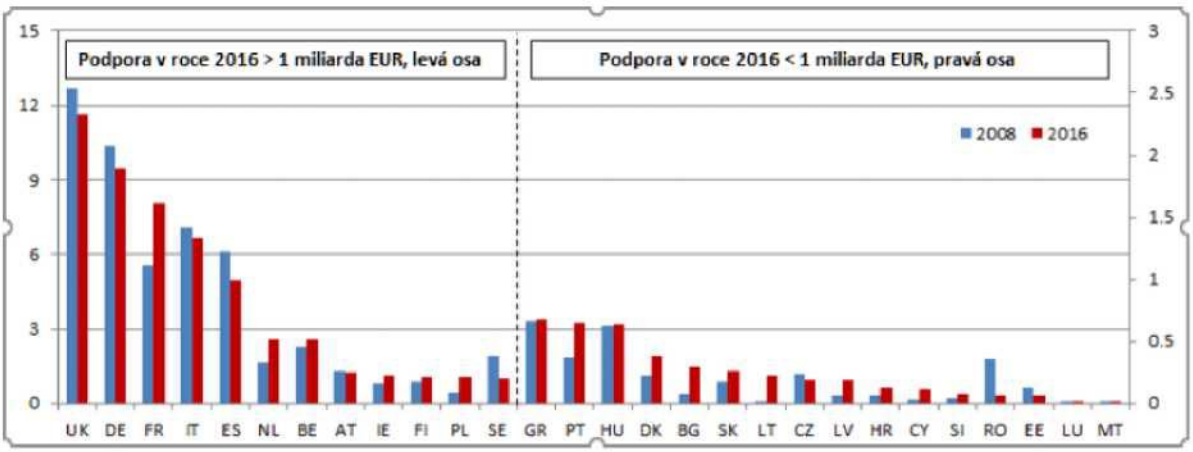
	Industry price in CZK/MWh[141]						Price for households in CZK/MWh					
	C.W.E.	Tax	VAT in %	VAT	Customs duties	Total	C.W.E.	Tax	VAT in %	VAT	Customs duties	Total
1Q2016							2 663,0	133,0	0,21	587,0	720,0	3 383,0
2Q2016							2 710,0	133,0	0,21	597,0	730,0	3 440,0
3Q2016							2 699,0	133,0	0,21	595,0	728,0	3 427,0
4Q2016							2 729,0	133,0	0,21	601,0	734,0	3 463,0
1Q2017							2 788,0	133,0	0,21	614,0	747,0	3 535,0
2Q2017							2 772,0	133,0	0,21	610,0	743,0	3 515,0
3Q2017							2 772,0	133,0	0,21	610,0	743,0	3 515,0
4Q2017							2 853,0	133,0	0,21	627,0	760,0	3 613,0
1Q2018							2 923,0	133,0	0,21	642,0	775,0	3 698,0
2Q2018							2 892,0	133,0	0,21	635,0	768,0	3 660,0
3Q2018							2 910,0	133,0	0,21	639,0	772,0	3 682,0

Source: Information for the energy prices & taxes report prepared for the IEA

iii. Description of energy subsidies, including for fossil fuels

According to the Energy Prices and Costs in Europe paper of 9 January 2019, total European energy subsidies have increased in recent years, from EUR 148 billion in 2008 to EUR 169 billion in 2016. This increase was mainly due to the increase in renewable energy subsidies, which amounted to EUR 76 billion in 2016. Fossil fuel subsidies are estimated at around EUR 55 billion. EUR. Graph 106 shows financial support for fossil fuels in the EU according to the above-mentioned document. Unfortunately, the Czech Republic does not have primary data available in this regard. The Czech Republic also reports information on subsidies to fossil fuels in the OECD membership.

Graph 106: *Financial support for fossil fuels in the EU*



Source: Energy prices and costs in Europe

141This information is not publicly available.

Table 98 shows the identified fossil fuel subsidies. Regulation (EU) 2018/1999 of the European Parliament and of the Council does not contain a definition of the term ‘fossil fuel subsidies’, the International Energy Agency (IEA) definition was used as a basis for identifying ‘fossil fuel subsidies’. Within the meaning of the definition of the IEA, only housing assistance granted under Act No 117/1995 on State social aid, as amended, can be regarded as a grant for fossil fuels in the Czech Republic. More details on this contribution can be found in the table below.

As regards the planned phasing out of that subsidy, it may be noted that, in its Resolution No 502 of 8 July 2019 on the conclusions of the Clean Air Dialogue and the proposed way forward, the Government instructed the Minister for Labour and Social Affairs, in cooperation with the Minister for the Environment, to submit to the Government, by 31 December 2019, an analysis of the setting of the housing allowance, including an assessment of the possibilities for changes to its design in order to increase the incentive for beneficiaries to favour environmentally friendly heating methods. The analysis showed that the share of households using solid fuels for heating while receiving some kind of fuel-related social support is 0.33 % of all households in the Czech Republic. The current design of social benefits encourages the use of environmentally friendly heating methods, as the associated costs are reimbursed and other bonuses are not possible. It is therefore not possible to prejudge the abolition of this contribution, which is also of a significant social nature, but on the basis of a resolution of the Czech Government, it should be modified to take account of environmental impacts. The Czech Republic will report further on developments in this area in the relevant progress report.

In this respect, it should also be noted that fossil fuel combustion is generally linked to external costs (as well as other areas of human activity) and, more generally, not only fossil fuel subsidies but also relevant externalities should be quantified (this approach is already being developed in part by the OECD).

Table 98: *Subsidies to fossil fuels*

Title	Sector	Purpose	Fuel/carrier	Categories	Opening	Amount of subsidy (in CZK)	
						2020	2021
Refund of part of the excise duty on mineral oils (diesel in the agricultural sector)	Agriculture	Boosting energy demand	Diesel	Tax refunds	2000	3 026 412 720	2 742 020 877
Exemption from excise duty on natural gas and certain other gases	Energy (transformation)	Boosting energy demand	Natural gas	Tax exemption	2008	2 202 717 110	2 387 266 735
Exemption from excise duty on solid fuels	Energy (transformation)	Boosting energy demand	Multiple types of fossil fuels	Tax exemption	2008	603 979 611	674 164 477
Refund of part of the excise duty on mineral oils	Energy (transformation)	Boosting energy demand	Petroleum products	Tax refunds	2008	429 558 836	339 316 202
Use of funds from annual payments made by mining organisations for mining premises and dedicated minerals acquired	Extraction of fossil fuels	Promotion of energy supply (production)	Brown coal	Others	1993	83 297 550	83 297 550
Use of funds from annual payments made by mining organisations for mining premises and dedicated minerals acquired	Extraction of fossil fuels	Promotion of energy supply (production)	Brown coal	Others	1993	294 210 800	294 210 800
Use of a subsidy from national resources to reduce mining and to eliminate the consequences of mining activities and compulsory social health costs	Extraction of fossil fuels	Support for the restructuring of the sector	Brown coal	Grants	1992	1 813 250 000	1 813 250 000

Use of a subsidy from national resources to reduce mining and to eliminate the consequences of mining activities and compulsory social health costs	Extraction of fossil fuels	Support for the restructuring of the sector	Brown coal	Grants	1992	173 820 000	173 820 000
Use of a subsidy from national resources to reduce mining and to eliminate the consequences of mining activities and compulsory social health costs	Extraction of fossil fuels	Support for the restructuring of the sector	Brown coal	Grants	1992	289 700 000	289 700 000

5 IMPACT ASSESSMENTS OF PLANNED POLICIES AND MEASURES143

5.1 Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described in section 4).

5.1.1 Overview of analytical evidence

The analytical assessment of the impacts of policies and possible channels of the tranche is carried out, in particular, through the research consortium of the Centre for Socio-Economic Research on the Impact of Environmental Policies (SEEPIA) (SS04030013, Environment for Life Programme, Ministry of the Environment) and the research consortium Integrated Air Quality Research, Assessment and Control (ARAMIS), funded by the Technology Agency of the Czech Republic (SS04030013, Environment for Life Programme, Ministry of the Environment). Other research projects under the Ministry of Industry and Trade, the Ministry of the Environment, the Ministry of Agriculture and the Ministry of Transport, extensive consultation with the State Administration, as well as studies carried out by independent and market operators, in particular:

- NOx2030 – Predicate emissions savings from road transport by 2030 achieved by applications selected tax and tax instruments (SS03010156)
- Model support for clean and sustainable mobility in the Czech Republic (TK04010099) (MOSUMO)
- Assessment of the resource adequacy of the Czech electrification system by 2040 (MAF CZ 2022) (ČEPS)
- Institute for Research on Forest Ecosystems (IFER) – Member of the National Inventory System linked to the emissions balance of the Agriculture and LULUCF sectors
- Evaluation of the impacts of the EU climate and energy package Fit for 55 on the Czech Republic (MoE – SEEPIA, ARAMIS)
- Study on the impact of Fit for 55 on the Czech economy (MIT, Deloitte Advisory)
- Support to REPowerEU – Country Report – Czechia (EC, MIT, Trinomics, EGÚ Brno)

<u>Evaluation of the impacts of the EU climate and energy package Fit for 55 on the Czech Republic (MoE – SEEPIA, ARAMIS)</u>

- The SEEPIA consortium (MŽP – TAČR) is focused on impact assessment and broad research support for the implementation of the European Green Deal policies in the Czech Republic, comprising 12 entities led by the Centre for Environmental Issues of the University of Karlovy University. An up-to-date 'Fit for 55' impact analysis was carried out together with the Thematic Centre ARAMIS (Integrated Air Quality Assessment, Assessment and Control System). The consortium develops several modelling tools linking the Czech Republic's energy system model (including the heating and transport sector) TIMES, two advanced macro-economic models,

143Planned policies and measures are options under discussion and having a realistic chance of being adopted and implemented after the date of submission of the national plan. The resulting estimates under section 5.1 will therefore include not only implemented and adopted policies and measures (estimates with existing policies and measures), but also planned policies and measures.

namely the global post-Kennesian simulation macro-econometric model E3ME and the dynamic general equilibrium computational model (CGE) complemented by the DASMOD static micro simulation model. The E3ME model from Cambridge Econometrics is also used by the European Commission and renowned international institutions. Modelling takes into account increased natural gas prices. This study will be followed by further analyses – an impact assessment of the REPowerEU package and a more detailed analysis of social impacts.

The study points to two possible decarbonisation trajectoriesCZECH REPUBLIC: in

- In the case of modelling with limited RES development under the current network development strategy, the investment preference for carbon capture and storage technology is already at the turn of the 1930s. The limited development of RES leads to lower overall domestic electricity production and the Czech Republic would already become an importer of electricity between 2025 and 2030. At the same time, this trajectory envisages higher energy savings.
- Trajectories without limiting RES development (i.e. assuming grid capacity) lead to an increase in the share of photovoltaics and wind power (with biomass and biofuels) in particular beyond 2030 well above the current network development strategy. Under these assumptions, the Czech Republic remains a moderate net exporter of electricity until 2050.
- However, the scenarios in this study were not defined with the objective of achieving climate neutrality by the end of 2050. Greenhouse gas emissions are reduced by a maximum of 91 % by 2050 at EU level and this reduction is only due to the Fit for 55 policy. The result is strongly influenced by the lack of a detailed model for the development of decarbonisation in the agricultural sector, due to the absence of a technological module for this sector. None of the models leads to an energy tranche based on hydrogen, which is mainly due to conservative assumptions about the import possibilities of (green) hydrogen.

Summary of impacts from the perspective of Fit for 55 objectives

- Reducing greenhouse gas emissions in the Czech Republic by 55 % by 2030 compared to 1990 is achievable. The sectors in the current ETS (energy, industry) may be close to reaching or going beyond the target of reducing greenhouse gas emissions by 61 % in 2030 compared to 2005 (at EU level). In scenarios with a high price of emission allowances, a reduction of up to 76 % is possible in the Czech Republic. The achievement of the 43 % (EU) reduction target in 2030 compared to 2005 is more problematic in the buildings and transport sectors, achieved only in scenarios with a high price of emission allowances, with lower prices reducing emissions by 26-38 %. When limiting the potential of RES, they will reach 21-30 % of the energy mix in the Czech Republic in 2030 (failure to meet the 31 % target for the Czech Republic), with the assumption of an increase in the capacity of the network to integrate RES to 31-47 %. The achievement of energy efficiency targets is problematic in the set conditions of support. The share of battery electric passenger cars in the car fleet is increasing to 8.5-18 % in 2030 and 16.5-25.5 % in 2035.

Financing and investment

- Based on the available knowledge of the expert community and international financial institutions, it can be assumed that the majority of investments, in particular in decarbonisation, should be financed by the private sector, although the ratio between public and private capital may vary between sectors and categories of investments. Chapter 5.3 provides an overview of possible sources.

Economic and social impacts

- In the case of early response and implementation in the Czech Republic, a slight increase in GDP growth can be achieved due to the explosion of investment activity and in the economy; if the need for decarbonisation in the residential sector and transport is underestimated, there may be a slight reduction in growth dynamics due to reduced household consumption. The scenarios used did not include tax measures that could further mitigate the impacts on low-income households. (Energy and fuel expenditure varies significantly according to household income: in 2019, it stood at around 14-19 % for low-income households, but only around 8-10 % for high-income households; this inequality has now been exacerbated by the abolition of the super-gross wage and the gas crisis.)

Key messages for policy-making resulting from impact assessments

- The objectives of the Fit for 55 package are ambitious for domestic policy, but achievable in a timely response and domestic policy setting. It is crucial to set up an appropriate State investment policy and state aid. If only a capped amount of revenue (about 50 % of appropriations) is used to achieve the energy-climate policy objectives, overall worse impacts on GDP and social impacts due to negative effects on household consumption can be expected. Making full use of EU ETS revenues for decarbonisation and increased support for low-income households achieves better results in terms of both climate targets and economic and social impacts.
- Decarbonisation is a matter of economic policy and investment environment and is fundamentally influenced by the design of the tax system. The investment boom will have an impact not only in the energy and industrial sectors (coal decoy, electrification, carbon capture), but also in the construction sector. It is therefore necessary to pay due attention to this sector, both from the point of view of sufficient labour force and from the point of view of permitting processes and public procurement. Whatever it stands by 2030 (including renovations), it will fix and determine the Czech Republic’s ability to meet its climate commitments in the next period and will also have a major impact on the impacts on households.
- Decarbonisation in buildings and transport is relatively more challenging than decarbonisation in industry and energy (taking into account the baseline and target; and the focus hitherto on supporting the decarbonisation of industry and energy). It can be assumed that if significant resources were allocated to cover the investment needs of households, negative impacts could be eliminated. Furthermore, the adjustment of income tax and/or social levies could be an appropriate tool to address the social impacts of low-income households, but also of lower middle classes.

Study on the impact of Fit for 55 on the Czech economy (MIT, Deloitte Advisory)

Computational scenarios for the Fit for 55 impact analysis

- To evaluate these effects, a calculation tool was developed to predict the evolution of CO2 emissions and assess their impacts on the energy balance, and we carried out modelling in two scenarios.

1) Scenario without including Fit for 55 measures (i.e. Business As Usual, BAU)

- This scenario reflects the current commitments and targets in force ahead of the Fit for 55 package. The scenario was defined to meet the following criteria:
- Cumulated savings in gross final energy consumption in 2021-2030 of 462 PJ. This represents an annual decrease in gross final energy consumption of 0.8 % as indicated in the national climate and energy plan1
- Share of renewable energy sources in gross final consumption of energy at least 23 %

2) Scenario including Fit for 55 measures (i.e. with Fit for 55 measures and a reduction in CO2 emissions of at least 55 % compared to 1990)

- This scenario is based on a BAU scenario in which adjustments have been made to meet the following criteria:

- Reduction of CO2 emissions by at least 55 % compared to 1990 by 2030
- (Fit for 55 general objective) and efforts to minimise emissions by 2050
- Cumulated savings in gross final energy consumption in 2021-2030 of 672 PJ. This represents an annual decrease in gross final energy consumption of 1.5 % from 2024 to 2030.
- Share of renewable energy sources in gross final consumption of energy of at least 32 %. This is a national target, with a collective target of at least 40 %.

- Both scenarios were modelled for the Fit for 55 impact assessment on the Czech Republic. For the purposes of providing the necessary inputs and assumptions for modelling using the Deloitte modelling tool, assumptions have been developed about CO2 emission reduction options in energy-intensive industries and the reduction potential of technologies.

Main outputs and conclusions of the Fit for 55 modelling of impacts

- Emission reduction opportunities in the Czech Republic are strongly conditioned by the possibilities of greening the energy mix and electrification of processes across the whole spectrum of activities (electric vehicles, heat pumps, etc.). In industry, most decarbonisation efforts will require significant investments, but electricity consumption will also increase. In the absence of sufficient renewable electricity, some decarbonisation measures may have the opposite effect of increasing emissions when emission-free energy is insufficient and fossil fuels have to be combusted.
- In the Fit for 55 scenario, the Fit for 55 target is met (reduction of CO2 emissions by at least 55 % compared to 1990 by 2030).
- Other objectives are already complicated and unclear. In summary, a significant development of photovoltaic and wind resources is needed to meet the national target for the share of RES in gross final energy consumption of 32 %.
- In order to achieve the objective of reducing final consumption, it is necessary to implement austerity measures. An important aspect in achieving this goal is the development of electro-mobility, with increasing electricity consumption, but more fossil fuel consumption, as electric motors are more energy efficient than internal combustion engines.
- The final energy savings target is achieved mainly through energy savings in buildings. Buildings are seeing a reduction in the consumption of solid fossil fuels and heat, which are replaced by environmental and electricity energy by heat pumps.
- According to the calculation model, the 55 % reduction target compared to 1990 is reached in 2028, but the objective of emission neutrality is not met. In the fit for 55 scenario compared to the BAU scenario, emissions fall from 44.0 Mt CO2 to 25.1 Mt CO2 in 2050. Achieving emission neutrality would require even more electrification, in particular investments in FVEs, VTEs and NPPs. The continuation of heat pump installations, which are currently the most efficient heating mode, is also a key prerequisite.
- On the basis of the calculations made, it appears that the achievement of the 2030 emission reduction target of 55 % compared to 1990 is realistic.
- At the same time, in order to reach zero emissions in 2050, it appears necessary to continue with further measures to reduce the emission intensity and consumption of both industry and energy and households. In the areas of emission-intensive industries, the considered potential of non-fossil resources has proven insufficient to cover industrial decarbonisation needs.
- In particular, the potential for reducing emissions is in the following areas:
  - Impairment of energy performance of buildings and massive installation of RES and heat pump technologies

o harnessing the energy potential of buildings and at the same time modern technologies to provide community-based energy systems and decentralised units

o Reduction of the overall energy intensity of the target group of end-consumers by developing hydrogen infrastructure (and in particular green hydrogen) to make it available in sufficient volumes at an economically affordable price for industrial technologies, with a view to meeting the emission targets for the 2050 horizon.

o Developing nuclear energy so as to ensure a significant part of the energy consumption coverage, allowing for the replacement of existing coal-efficient sources without losing energy self-sufficiency, while allowing the use of hydrogen precisely for the application of substitutes for natural gas in industrial sectors

o Investments in resource adequacy and in the adequacy and adequacy of a stable transmission network ČEPS in order to be able to cover the increased electricity requirements while ensuring stable electricity transmission. Around 3 000 MW in reserve capacity is expected to be needed, part of which should be used by CHP in the heating sector, the second part of the steam gas resource (including new ones).

on Investment in recharging and hydrogen refuelling infrastructure and battery systems for both the electrification of transport and the use of smaller battery systems in the context of decentralised systems and community energy

o Investment in promoting the replacement of gases by biomethane in transport and setting up specific support instruments for its use.

o Development of electro-mobility and necessary infrastructure

Estimate of the total investment generated by the fit for 55 package in the Czech Republic

- With the implementation of the Fit for 55 measures (compared to the BAU scenario), the largest investments are expected in the areas of consumption reduction and installation of FVEs.

Support to REPowerEU – Country Report – Czechia (EC, MIT, Trinomics, EGÚ Brno)

Energy dependency

The Czech Republic has historically been one of the EU countries most dependent on Russian fossil fuel imports. This is particularly true for natural gas, as 97 % of total consumption in 2021 was of Russian origin. While most of the oil flows to Czechia via IKL and TAL pipeline respectively (the IKL pipeline follows the TAL pipeline in Ingolstadt), namely 51 % in 2020, Russia is also a major supplier. The rest of the oil (49 %) was imported via the Družba pipeline.

The Czech Republic is recovering its dependence on Russian gas supplies faster than expected in spring 2022. Russian supplies were replaced by gas from Norway and LNG from terminals in the Netherlands and Belgium. These developments indicate that the fast disconnection path from Russian supplies and the parallel gas consumption reduction process can be successfully completed in full before the target year 2027 under favourable circumstances. As regards oil, the TAL+ project is under preparation, which should be able to end dependence on Russian oil by 2027 at the latest.

Saving energy

Final energy consumption in the Czech Republic is stagnating and reached 998 PJ in 2020 (1 017 PJ in 2010) [1]. The national plan sets the cumulative energy savings target for 2021-30 at 462 PJ, i.e. to achieve 8.4 PJ of new energy savings per year. For 2030, the final energy consumption target is set at 990 PJ. The government has already indicated (in the NECPs) that the actual measures identified are unlikely to be sufficient to achieve the new European targets linked to Fit for 55 or REPowerEU.

The gap analysis revealed a lack of awareness among the population about the potential for energy savings. In order to achieve energy savings successfully, it is necessary to change the general public's perception of energy savings. This should be supported by upcoming awareness-raising campaigns. Further recommendations, linked to the gap analysis, aim to set up subsidy mechanisms. Looking ahead, it seems desirable not to increase the number of subsidy mechanisms, but rather to make them more effective, as long-term stability and policy predictability are most important in construction.

Low-income households are an important issue that should be given special attention. The solution is a specially designed subsidy programme where, in addition to increased financial support, they will be able to receive comprehensive advice. At the end of 2022, the Ministry of Environment introduced a subsidy programme targeting low-income households (New Green Savings Light).

Accelerated deployment of renewable energy

Accelerating the development of renewable energy sources in Czechia is one of the most critical issues, as their development has stagnated in the long term. The stagnation is also linked to photovoltaics, with installed capacity of around 2.2 GW since 2010. For wind power, the situation is similar and the installed capacity is around 340 MW. The NECP sets a target of 22 % share of RES in final energy consumption by 2030. However, it is clear that this target will need to be increased in view of the EU's higher ambition [2].

The main reason for the stagnation in RES development is the setting of the regulatory framework and the lack of subsidy support (investment or operating aid). In both cases, however, the situation is improving significantly. Investment grants from the Modernisation Fund and RPR stimulate the development of new RES. The Ministry of Industry and Trade presented an amendment to the Energy Act by the end of 2022, raising the limit for the installation of unlicensed photovoltaic power plants (previously a maximum of 10 kW, now 50 kW). At the same time, the Czech Government regularly amends Act No 165/2012 on the promotion of energy sources.

However, further reforms are needed to support the development of renewable energy sources (especially solar and wind energy). The GAP analysis identified the lack of legislative anchoring of the concept of community energy in the Czech legal environment (the adoption of Energy Act No. 458/2000 Coll. is expected in the course of 2023). As regards legislation, another loophole is that there is no legal anchoring of a battery storage facility in the Czech legal environment. The introduction of smart metering, which is still lacking in the Czech environment, will also help the development of RES.

Particular attention was paid to the heating sector, which is predominantly based on fossil fuels. Heat pumps have been identified as one of the technologies that can help decarbonise the heating sector. It includes proposals for reforms aimed at: adjustment of RES fee support for sources using waste heat, transfer of support for industrial heat pump technology to priority projects (in the Modernisation Fund) or adjustment of the emission factor of electricity.

Diversification of energy supply

A gap on this issue is its over-reliance on Russian oil and gas. In the context of the REPowerEU or Fit for 55 objectives, the high reliance on fossil fuels in the overall energy supply also appears problematic. However, it was already mentioned above that Czech dependence on Russian fossil fuels decreased significantly during 2022 and exceeded expectations. Since the closure of the Nord Stream 1 pipeline in September 2022, approximately 2.6 billion cubic metres of gas had been imported into the Czech Republic by the end of 2022. Of which, however, a maximum of 3.4 % could come from Russia (according to the Ministry of Industry and Trade). A reinforcement of the TAL pipeline (the TAL+

project) is being prepared for oil supplies to enable independence from Russian supplies.

The Czech government plans to secure emission-free energy through new nuclear power plants in the long term. Hydrogen-based solutions have been identified to support diversification of supply. The gap analysis showed that the potential to switch from fossil hydrogen to RFNBO production based on renewable electricity in the short to medium term is considerably limited and renewable hydrogen production under RFNBO rules is very expensive in the climate conditions of the Czech Republic, so it will be necessary to detect imports of renewable hydrogen from countries where production is cheaper.

The GAP analysis also addressed the legislative environment on hydrogen with the following findings: the definition of hydrogen in Czech legislation as an energy carrier should be enshrined (currently Czech legislation only recognises hydrogen as a chemical raw material and fuel). The Energy Act treats the production of hydrogen using P2G as electricity consumption. This entails costs for operators in the form of an electricity tax or a contribution to RES. It is therefore desirable to consider anchoring the operation of P2G power plants in Czech legislation so that they are not perceived as final consumers of electricity thanks to this classification.

Proposed reforms and investments under REPowerEU

Based on extensive analysis and contacts with stakeholders and authorities in the Czech Republic, the following reforms and investments are proposed (not all proposed reforms are listed in the table):

Table 99: *Proposed reforms and investments under REPowerEU*

	R/I	gap identification	reform proposal description
EE	I	*insufficient promotion of energy efficiency and subsidy progr*	Structured awareness campaign
EE	I	*insufficient financial and technical support of (ow-*	Specific subsidy programme combinating higher subsidy with robust Consulting
EE	R+I	*lack of long-term*	Energy management in municipalities with support in the preparation of
RES	R	term Community energy *is not defined in the Czech legal*	Legislatively anchor the term community energy in the Energy Act
RES	R	*long permitting and administrative processes for wind energy*	Identification of suitable areas for wind energy development
RES	R	*insufficient support*	Electricity emission factor adjustment for heat
RES	R	*insufficient support*	Consideration of Adjusting the promotion of RES fee for sources usřigwaste heat
RES	R	*insufficient support*	Shiftingsupport for industrial heat pump technology to priority projects in Atodernisation fund
DIV	R+I	dominant *dependence*	Tal pipeline capacity increase (TAL+
DIV	R	*significant*	Definition of hydrogen in Czech legislation asan
DIV	R	*significant*	P2G hydrogen production considered as electricity

5.1.2 Analytical basis for updating energy and climate strategies 2023 (SEEPIA, ČEPS)

5.1.2.1 Methodology

5.1.2.1.1 Starting points for modelling

The objective of the analysis is to provide model-based analytical input for the update of the National Energy and Climate Plan (NECP) that EU Member States are required to submit in accordance with Article 14 of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, and for the subsequent discussion on the update of the State Energy Concept and Climate Policy. This modelling, in line with the Commission's guidance to Member States on the update of the National Energy and Climate Plans 2021-2030, puts[144] emphasis on a robust analytical basis, the use of recommended key parameters and comprehensive quantitative analysis using state-of-the-art modelling tools and approaches.

The analysis therefore seeks to deliver as much as possible on the recommended principles for updating the NECP and the objectives set out, inter alia, in the new legislation from the Fit for 55[145] [146] and REPowerEU packages, while taking into account that socially acceptable decarbonisation is a question of combining the price signal of GHG pricing and revenue recycling to support investments and mitigating the negative social impacts of the tranche on households. Specifically, it includes:

1. setting a higher ambition to accelerate the tranche towards climate neutrality:
    a. meeting the objectives of the European Climate Framework Regulation (EU) 2021/1119,

144OJ 2022/C 495/02.
145COM/2021/550.
146COM/2022/230.

namely a 55 % reduction in greenhouse gas emissions by 2030 (compared to 1990) and achieving neutrality by 2050;147

b. meeting the targets of Directive 2023/959, namely a 62 % reduction in emissions in the ETS1 sectors by 2030 (compared to 2005) and a 43 % reduction in non-ETS1 sectors, respectively a 42 % reduction, including additional non-ETS1 sectors1;

c. achieving the target of sinks in the land use and forestry sectors of 310 Mt in the EU and 1.228 Mt in the Czech Republic (Regulation (EU) 2023/839);

d. targets in the energy sector – achieving a 42.5 % share of energy from renewable sources under Directive 2023/2413 amending the Renewable Energy Directive ("RED3", Article 3); achieving a saving of at least -11.7 % of final and primary energy consumption compared to the REF2020 scenario of Directive 2023/1791 ('EED3', Article 4); achieving cumulative final energy consumption savings in the form of an annual reduction of 0.8 % in 2021-2023, 1.3 % in 2024-2025, 1.5 % in 2026-2027 and 1.9 % in 2028-2030 (EED Article 8);

e. targets in the industry sector to achieve a share of renewable fuels of non-biological origin ('RFNBO') in hydrogen consumption in industry of 42 % by 2030 and 60 % by 2035 (Article 22a RED3); reaching an annual growth rate of RES in industry by 1.6 pps (Article 22a; RED3);

f. transport targets – achieving 29 % RES or 14.5 % GHG emissions savings from transport fuels by 2030 (Art. 25 RED3), achieving a minimum share of 5.5 % of advanced biofuels and RFNBO in transport (with multipliers; of which at least 1 % RFNBO) by 2030 (Art. 25 RED3); A 100 % reduction in CO_2 emissions from new light-duty vehicles by 2035 (Regulation (EU) 2023/851);

g. in the buildings sector – reaching a 49 % share of energy from RES in buildings (Article 15a RED3), reaching a 1.9 % annual reduction rate of final energy consumption in the public sector (Article 5 EED) and a minimum of 3 % of the annual rate of renewal of the floor area of public buildings (Article 6 EED); achieving an annual increase in the share of RES in heating and cooling by 0.8 pps (2021-2025) and 1.1 pps (2026-2030); Article 23 RED) and the indicative top-up set by the Member State to reach the EU average of 1.8 pps; achieving an annual growth rate of 2.2 pps for the share of RES and waste heat in heating and cooling in SZTE (Article 24 RED3).

2. quantification of economic, employment and competitiveness impacts and main social and environmental effects;
3. a quantification of the investment volumes needed to achieve the set objectives, planned policies and measures;
4. setting up support for a fair tranche and mitigation of social and environmental impacts – through the use of revenues from the sale of emission allowances through the Modernisation Fund, the Social Climate Fund, other revenues from emissions trading and other support mechanisms.

The modelling took place in several waves, several scenarios were developed in the TIMES-CZ model in spring 2023 to clarify options for the design of the system:

- WEM – a scenario without implementing Fit for 55 policies;
- WAM_10 % – electricity imports of up to 10 % of consumption;
- WAM1, WAM2 – medium scenarios, electricity imports max. 20 TWh (according to MAF CZ,

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[47] The net zero target is set at 233-366 $MtCO_2eq$ in 2050 without LULUCF contribution, corresponding to a92-95 % reduction compared to 1990 levels (91-94 % reduction compared to 2010 levels); see https://climateactiontracker.org/countries/eu/targets/.

2022), WAM1 with fixed development of new (large) nuclear sources, WAM2 scenario with fixed development in particular SMR;
- WAM_CCUS – wide application of CCUS, limited use of hydrogen;
- WAM_nuclear – extensive and fixed development of nuclear energy;
- WAM_opt – a scenario with limited fixed technology limitations, emphasis on cost optimisation by the model;
- WAM_H2 – WAM_H2 scenario with a wide application of hydrogen, CCUS restrictions.

Subsequently, adjustments were made to the parameters of the scenarios (in particular in the field of CCUS usage options, hydrogen imports) resulting in three baseline scenarios: WEM, WAM1_NKEP focused on RES development and WAM2_NKEP focused on the development of nuclear energy (and related sensitivity analysis). Models were fully integrated and the macroeconomic dimension aligned with the E3ME model with the optimisation of the energy balance resource base in TIMES-CZ, resource adequacy was evaluated by the PLEXOS model and more detailed outcomes of social impacts were evaluated by the DASMOD model.

In the next step, the benchmark for GDP growth in the E3ME model was corrected according to the macroeconomic prediction of the MF,[148]followed by adjustments by RES limits and fixed nuclear resources (the so-called WAM1_plus and WAM2_plus), leading to WEM+ and WAM3 scenarios, which were further adjusted following subsequent discussions. In particular, the harmonised values for fuel prices and allowances according to the Commission's recommended GHG projection trajectory in 2025 were updated, the minimum shares of photovoltaics on rooftops and commercial sites were added, the use of biomass was set as a priority for domestic heating, the future development of E3ME industrial production was corrected in consultation with the Czech Confederation of Industry and Transport (cement, chemistry, steel and lime), adding an additional decrease in emissions from the agricultural sector according to an internal research carried out. The assessment of the stability of electricity supply has already been carried out using the PLEXOS model (for the WAM3rev scenario) according to the updated ENTSO-E/ACER methodology with a lower LOLE value. The resulting scenarios, WAM3rev and WEMrev are hereinafter referred to as **WEM and WAM and** take into account the outputs of previous modelling.

5.1.2.1.2 Modelling tools used

Times-CZ (version v03) – a technology-oriented, dynamic model of cost optimisation of the energy system covering the entire energy balance of the Czech Republic, from the extraction or import of energy raw materials to their transformation and the final use of energy services. A key exogenous parameter (input) to the model is aggregate demand for energy services (°C heating, number of appliances, person-km, tonne-km, production of products, etc.). The model allows for substitution between savings and consumption of energy carriers (TWh/GJ), substitution between indigenous energy production (TWh/GJ) and imports (TWh, hydrogen) and substitution between transforming energy technologies. Cost optimisation includes all costs related to energy transformation (CAPEX, OPEX, WACC, taxes/subsidies/EUA) within given technological or resource constraints and is calculated for the whole energy system of the Czech Republic.

Cost optimisation does not include the costs of upgrading and expanding transmission and distribution networks, which are currently unknown for the Czech Republic. Technology mix, energy savings,

148 https://www.mfcr.cz/cs/rozpoctova-politika/makroekonomika/makroekonomicka-predikce/2023/makroekonomicka-predikce-srpen-2023-52667.

electricity imports, hydrogen imports and energy consumption (TWh, GJ) are the result of optimisation in the model.

PLEXOS – a commercial energy system modelling tool developed by Energy Exemplar, used for electricity market simulations. This is a deterministic linear optimisation model that minimises the expected costs of electricity generation, taking into account different parameters on an hourly basis. On the basis of the Memorandum of Cooperation between the UK Environmental Centre and ČEPS, a.s., ČEPS validates the results of the proposed optimal electricity generation mix by the TIMES-CZ model in terms of resource adequacy. The validation uses a methodology based on the Resource Adequacy Assessment (ČEPS, 2023) – updated with new ENTSO-E data, where the technology mix and electricity consumption are model inputs and electricity imports and exports, and the deployment of available resources are the result of the model.

E3ME – a global macro-econometric model developed since the 1990s by Cambridge Econometrics, Ltd. The model is based on post-Kynesian economic theory, allowing for both short-term dynamic changes and convergence towards a long-term trend. The diffusion of innovation and the choice between technologies responds flexibly to price changes and is embedded in separate modules (Future Technology Transformations – Power, Heat, Transport, Steel, Agri) that allow better representation of the development of new technologies and choices between them. The requirement to store electricity is based on modelling the residual load and non-delivery curve of RES electricity and the implied additional costs of RES.

DASMOD – a static DASMOD microsimulation optimisation model – Distributional And Social Impact Model, which we are developing within the COE workplace149. Using this model, it is possible to predict the social impact of policies and measures according to the income deciles of Czech households. The model can predict the effects on income and income distribution, on household expenditure and resulting fiscal effects for different scenarios. The model is based on micro-data for around 3000 households (reference year 2019) and is linked through elasticities and price changes with the E3ME model.

5.1.2.1.3 Linking of models

TIMES model

- Exogenous inputs from other models: the production of energy-intensive industries (non-metallic mineral, iron and steel, chemical) and other industries by 2050 as predicted by the E3ME model; electricity exports and imports for season and day – night – 1h peak from PLEXOS model; weighted price of electricity exported and imported for the season and day – night – 1h peak from the PLEXOS model; an analysis of the need for additional resources not realised on a purely market basis (as envisaged by the model) (so that the LOLE does not exceed 7 hours per year) from PLEXOS;
- Outputs to other models: the electricity consumption of the PLEXOS model; the technology mix for electricity generation into the PLEXOS model; the requirement for electrolysers to the PLEXOS model; volume of net imports of electricity (cap determined according to PLEXOS)

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[4] The previous versions of the model are described in Šearný, M. (2012). Passenger Road Transport During Transition And Post-transition Period: Focused On Residential Fuel Consumption And Fuel Taxation in the Czech Republic. In: Zachariadis, T.I. (ed.). *CARS and Carbon: Automobiles and European Climate Policy in a Global Context*, Chapter 10, Berlin: Springer, 430 pp. ISBN 978-94-007-21122-7 and Šearný, M. (2012). Who pays taxes on fuels and public transport services in the Czech Republic? Ex post and ex ante measurement. In: Sterner, T. (ed.), *Fuel Taxes and The Poor: The Distributional Effects of Gasoline Taxation And Their Implications For Climate Change. Resource For the Future*, Chapter 17, London: Routledge, 320 pp. ISBN 9781617260926.

into the E3ME model; installed capacities of NJZ in the E3ME model.

PLEXOS model

- Exogenous inputs from other models: electricity consumption from TIMES; the technology mix for electricity generation and the requirement for electrolysers from the TIMES model;
- Outputs to other models: exports and imports of electricity and weighted price of electricity exported and imported to the TIMES model; the addition of additional resources not realised on a purely market basis (as envisaged by the model) (LOLE & 7 hours per year) to TIMES;

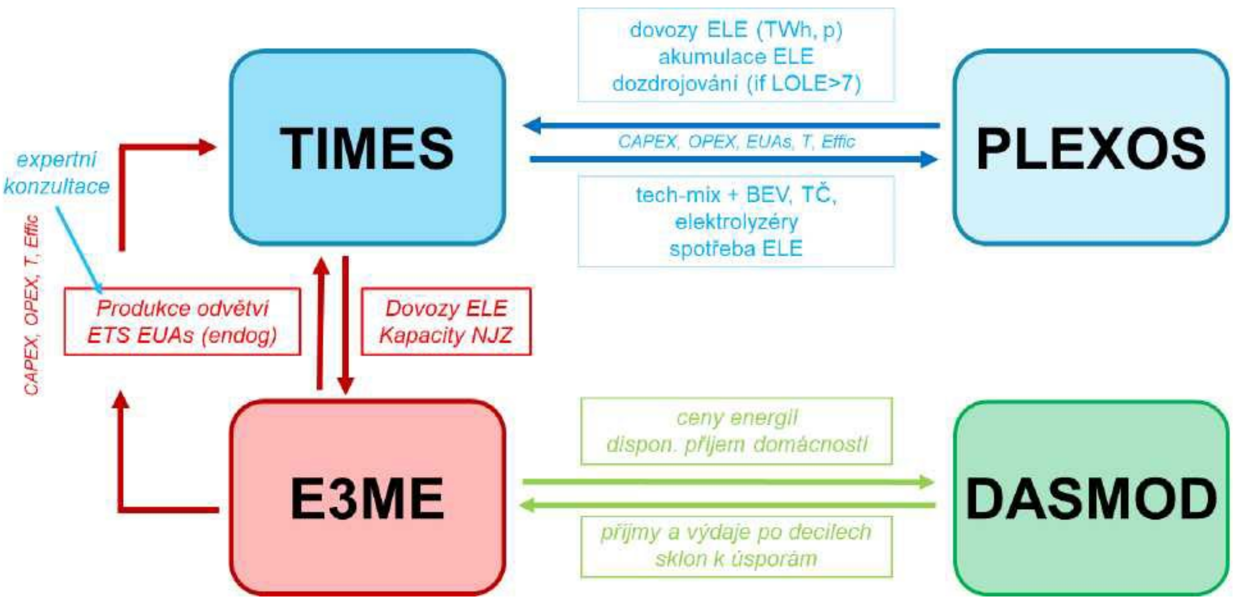
E3ME model

- Exogenous inputs from other models: the volume of net imports of electricity from the TIMES model; installed capacities of NJZ and RES from the TIMES model;
- Outputs to other models: production of energy-intensive industries and other industries into the TIMES model; (potentially: the price of EUA emission allowances when the emission target entered into the TIMES model); change in consumer product prices and disposable household income to the DASMOD model.

DASMOD model

- Exogenous inputs from other models: change in the prices of consumer products and disposable household income from the E3ME model;
- Outputs to other models: none.

Figure 23: *Linking modelling tools in SEEPIA*



5.1.2.1.4 Limits of modelling approaches

<u>Non-modelled sectors</u>

The ***greenhouse gas emissions*** trajectory for 2050 is fully based on the optimisation and simulation of TIMES-CZ (at Czech level) and E3ME (at EU level). When predicting the evolution of GHG emissions, three sectors for which GHG emission volumes are taken from other expert studies are not subject to modelling:

- agriculture: projections from the study “Economic Impact Assessment Fit For 55” (ÚZEI, 2023) and the study "Overview of options reducing greenhouse gas emissions from agriculture in the Czech Republic" developed in cooperation with SEEPIA and ARAMIS projects (UK COŽP, 2023);

- wastes, excluding emissions from municipal waste incineration plants and F-gases: European Commission Reference Scenario 2020 for the Czech Republic (EC, 2021);
- LULUCF – Forestry: IFER Green Scenario projection carried out under TAČR TL02000440, (Cienciala and Melichar, 2022). In previous model scenarios, a more pessimated 'Red scenario' has been used, but according to the current evolution of the forest sector, the 'Green' scenario appears more likely (Cienciala, pers. commm., 2024), the March 2024 update of which is used in this analysis.

Climate neutrality

- With an exogenous price of emission allowances (EUR 410/tonne CO_2 in 2050), WAM will achieve a 90.4 % reduction in emissions by 2050 (compared to 1990), while the endogenous price scenario (WAM1_EUA) achieved a 93 % reduction in greenhouse gas emissions at EU level with an allowance price of over EUR 1 400/tCO 2 at theend of 2050. In the context of the analyses, the emission target was therefore set at a lower value. As a result of simulations, if emissions were to be reduced within the EU by more than 90 % compared to 1990, then, assuming the level of investment aid used in this modelling exercise, the price of emission allowances would have to be extremely high at the end of the period to 2050. In other words, the ETS is not a sufficient instrument to reduce emissions to the level indicated by the European Commission's analyses, i.e. 233-366 Mt CO_2eq without LULUCF or 92-95 % below 1990 levels. The TIMES-CZ model shows similar results. For this reason, the TIMES-CZ model set greenhouse gas emission reductions at a maximum of 8 Mt CO_2eq in 2050 (at Czech level, including LULUCF).

- It appears that in the modelled part of the scheme, carbon pricing revenues are significantly decreasing, i.e. the marginal increase in the price of allowances leads to only a very small effect (reduction in emissions). It is therefore important to analyse the GHG emission reduction potential of non-modelled parts of the economy, including agriculture, whose emission production is projected to be 5.2 Mt in 2050, already including a partial diet change based on the Poore and Nemecek study (2018) and summarised in the UK COŽP sub-analysis (2023).

- Another potential is biomass from agricultural land, which not only represents an additional climate neutral resource in the energy mix that has the potential to lead to negative emissions from CCS (so-called BECCS), but will also lead to a reduction in emissions in the agricultural sector due to agricultural land use change.

- Finally, there is a need to mention the behavioural effect on demand for energy services, especially in households. The proposed modelling is based on a rather conservative (growth) assumption of the evolution of this demand. The size of the fleet is slightly increasing, although car sharing, autonomous vehicles and micro-mobility may lead to a reverse trend; the effect on the demand for mobility (person-kilometres) is not clear in the literature. Similarly, the demand for a service (person-kilometres) due to the use of electric vehicles (BEV, hydrogen) may be affected in both directions due to changes in use and marginal costs of the service (due to different ratios of fixed investment costs to variable operating costs). The demand for heating, the number and frequency of use of electrical appliances are assumed to have no negative effect on consumption. For example, a recent meta-analysis (Khanna et al., 2021) summarising 360 effects from 122 studies from 25 countries indicates the potential to reduce energy consumption in households due to a behavioural response to non-investment interventions (such as providing information on self-consumption, consumption of others or on consumption impacts, monetary incentives) of up to 15 %. Energy savings, especially in the winter months, can contribute to meeting energy demand in sectors where consumption is much more difficult to reduce, for example in industry, and can also contribute to addressing resource adequacy.

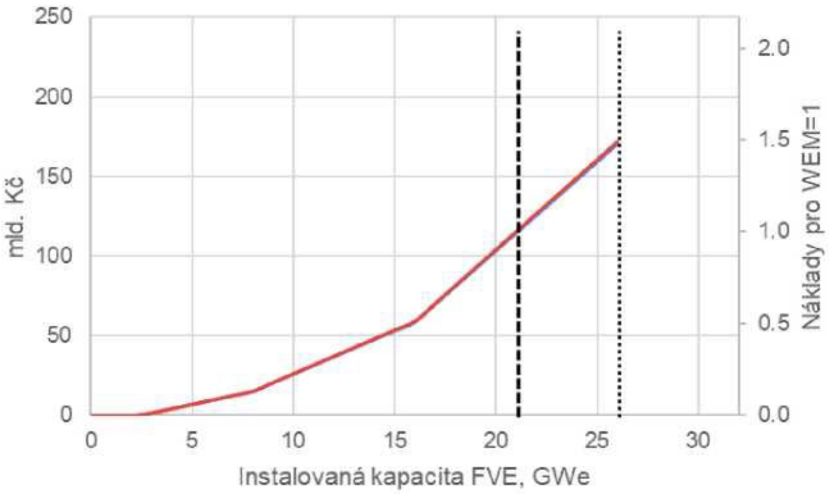
Resource Adequacy and Output – Heat Accumulation and Dynamic Prices

- Securing electricity supply will be an important aspect of decarbonisation. The analysis of this criterion has received great attention in the modelling exercise. Resource adequacy was modelled by ČEPS experts using the PLEXOS model based on data from the European Transmission Network Operators (TSO). Based on this modelling, the inadequacy of the initial WAM scenarios was quantified, which were subsequently supplemented by additional sources so that the LOLE reliability standard would not be exceeded and this adjustment entered the next version of the scenario modelled by the TIMES-CZ model. These additional capacities are gas sources for peak balancing, in particular during the heating season. This is a rather conservative, expensive, solution of delivery. The problem of resource inadequacy can be partially mitigated by the use of energy from biogas plants; this option has not yet been fully reflected in scenario modelling and can contribute to addressing this issue in the next phase of the analysis. However, this problem can also be addressed on the consumption side, namely through heat storage in both heating plants and individual houses, or through a time-limited reduction in the thermal comfort of consumers during the heating season – for example when applying dynamic tariffs. This potential should not be neglected as it can lead to significant cost savings for gas sources that will be used for a very limited period of time during the year, as well as to reduce emissions from these sources (in case of capping of CCS for capturing emissions from gas sources).

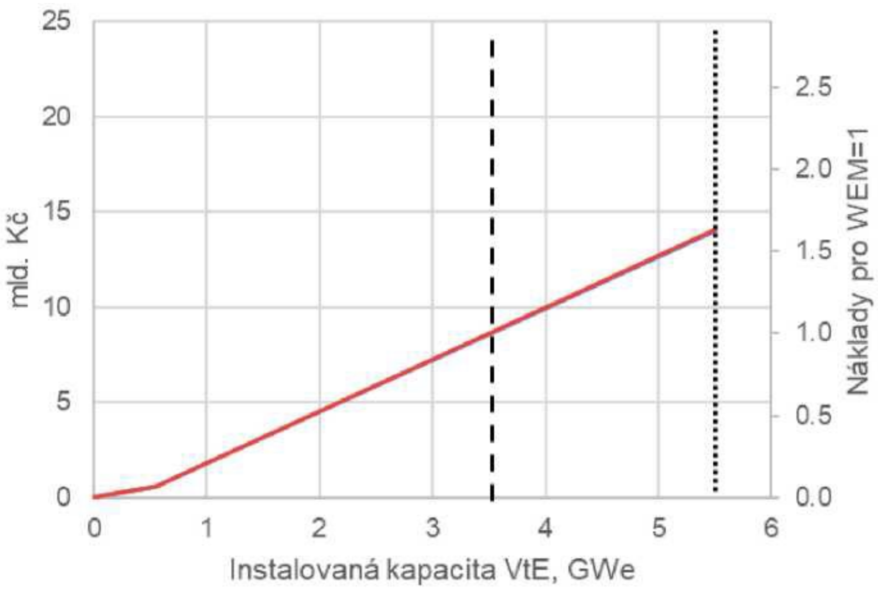
Development of transmission and distribution networks

- Increased installed RES capacities will inevitably lead to the development requirements (expansion, upgrade) of transmission networks and in particular distribution networks.
- The TIMES-CZ model includes these costs in a simplified form, according to the ETSAP modelling manual with the TIMES model. Network costs need to be evaluated in a robust way by more appropriate analytical tools for a given area.

Graph 107: *Projected investment costs for the development of transmission and distribution networks depending on installed PV capacity*



Graph 108: *Projected investment costs for the development of transmission and distribution networks depending on installed wind capacity*



<u>Equalisation of the difference between production and consumption</u>

- The costs associated with balancing the difference between electricity generation and consumption are usually part of the RES system costs. Modelling includes electricity storage in batteries – in the TIMES-CZ model, the installed battery capacity is equal to 15 % of the sum of installed wind and photovoltaic power capacities, similar to the PLEXOS model's resource adequacy modelling, and in line with ENTSO-E methodology (10 % in 2025). Similarly, in the E3ME model, it is part of short- and long-term electricity storage simulations, namely in the FTT:Power module. Thus, in both models, the cost of storing electricity produced from RES already forms part of costs and optimisation.
- The investment costs for additional high-end resources are also included in the TIMES-CZ model

thanks to the PLEXOS validation.

- Due to the lower time resolution, the operational costs of controlling the power of combustion sources are not fully included in the TIMES-CZ model.
- The difference between production and consumption will be affected by the change in consumption that may result from regulation (e.g. tariff policy). The modelling presented is based on the current electricity consumption profile, i.e. without demand side management and the potential effect of dynamic prices, and thus represents a conservative approach leading to higher costs. Battery vehicles will be another source of balancing the gap between production and consumption and should gradually become part of smart grids; the positive effect of battery electric vehicles is not yet reflected in the present study.
- Pumped storage is an alternative to storing the generated electricity in batteries. Their potential was also not included in the available technologies. Biogas plants are another option.

Industrial production and macro-economic developments

- The scenarios are based on the assumption of economic growth and thus industrial production in the long term. This implies the growth of industries in all modelled scenarios, leading to an increase in the production of energy-intensive products. It should be stressed that this is not a macroeconomic prediction which is not possible in such a long period. The modelled scenarios mainly serve to compare the impacts of energy-climate policies, i.e. regulatory and economic incentives for decarbonisation in the context of Fit for 55, REPowerEU policies and efforts to decarbonise the Czech economy compared to a scenario without increased ambition. The growth of the economy will be influenced by a number of factors that were not part of modelling:

    - geopolitical risks in the world and impacts on the world economy;
    - impacts of climate change (not included e.g. live events);
    - the financial and economic crisis;
    - efficiency of public administration and related permitting processes;
    - changes in consumption behaviour;
    - demographic change;
    - changes related to fundamental societal reforms (pension reform, tax reforms, etc.);
    - adjustments to the system of financing the tranche in the EU after 2030;
    - adapting the regulatory environment in the EU after 2030;
    - major breaks in technological progress;
    - the implementation of strategic investments that can represent major changes in energy demand;
    - other highly foreseeable events.

Details of the technological mix – energy efficiency and savings

- Most investments in climate projects concern specific technologies that can be easily identified (e.g. VTE, FVE, TČ or BEV). However, investments in energy savings/energy efficiency are often so-called integrated technologies where the whole investment unit is replaced with the energy saving measure (e.g. replacement of a blast furnace with a hybrid furnace). In these cases, it is difficult to identify the part directly related to energy efficiency improvements, to which public support should be linked. These integrated units may not (due to the limited details of the models) in the scenarios receive public support for all aspects of savings/efficiency, and the impact of policies will then be less than would be the case if integrated technologies were fully supported. Modelling policy impacts in these cases is a conservative estimate.

Realisation and financing of investments

- Model predictions are largely an optimistic outlook that presupposes effective (rational) decision-making by actors, both in the public and private sectors.
- It also implicitly envisages the functional and efficient permitting processes necessary for a significant part of the investment activities required by the climate tranche.
- The models foresee available sources of investment financing for all actors for whom it will be economically rational (according to cost optimisation) to implement the measure.

5.1.2.1.5 Use of modelling tools from an output perspective

In particular, the development of the energy system is analysed by the **TIMES-CZ cost-optimisation model**.

The validation of resource adequacy by the TIMES-CZ model of the proposed optimal electricity generation mix is ensured by the cooperation of ČEPS, a.s., with SEEPIA. The validation shall consist of verifying the ability of the proposed production portfolio of resources (including import and export capacity) to meet the expected electricity demand. The **PLEXOS modelling software** and ENTSO-E modelling data sources used to fulfil obligations under European legislation are used for validation, in particular ERAA (*European Resource Adequacy Assesment*) and TYNDP (*Ten-Year Network Development Plan*). Data used in simulations from 2022-2023

Validations are based on the Resource Adequacy Assessment Methodology (ČEPS, 2023) Other key parameters entering the calculation are: (a) battery capacity of 15 % of the installed capacity of FVE and VTE (10 % in 2025); and (b) the availability of activation of market-based power management (DSR) – up to 330 MW in 2050.

- The outputs of the Unit Commitment simulations are: the deployment of the power of individual production units; accumulation; DSR; trade area balances; non-delivery; marginal price; outages and outages; energy frustrated; emitted CO_2 and others.
- Unfairness is defined by exceeding the*Loss of Load Expectation*(LOLE) reliability standard. The capacity of additional resources not realised on a purely market basis (as assumed by the TIMES model) is then designed to ensure that the LOLE does not exceed 7 hours per year.

The macro-economic impacts are analysed **by the global macro-econometric model** E3ME, which incorporates the results of the TIMES-CZ model (electricity imports, capacities of FVEs, VTE and NJZ). On the contrary, the E3ME results define the evolution of production in energy-intensive industries for the TIMES-CZ model. Both greenhouse gas emissions and revenues from the sale of emission allowances are modelled at EU level. The model also includes several technology-specific modules (*Future Technology Transformations: Power, Heat, Transport, Steel*), where cost-effective technology choices are made.

The E3ME predictions provide the basis for the **DASMOD micro-simulation model**.

Both the TIMES-CZ and E3ME models contain the costs of storing electricity (in batteries) due to the increasing installed capacity of intermittent renewable sources. The TIMES-CZ model also includes network development costs, which increase non-linearly according to the increasing installed capacities of VTE and FVE in the electricity system. These costs feed into the cost optimisation of both models.

5.1.2.2 Scenarios and assumptions

5.1.2.2.1 Scenarios

- the**WEM scenario** describes 'a world without Fit for 55'. The prices of emission allowances (EUA) correspond to the recommended harmonised DG Climate Action central trajectories for WEM (EC, March 2024). The reduction target for greenhouse gases is not enforced, nor is a

Carbon Border Adjustment Mechanism (CBAM) in place. The use of revenues from emissions trading corresponds to the implementation in practice as of 2023, i.e. around 40 % of ETS1 revenues are not explicitly used to support decarbonisation, or only the Modernisation Fund is implemented.

- the**WAM scenario** reflects the objectives and measures of the new regulation – the European Climate Framework, Fit for 55, REPowerEU and others. In 2050, it is assumed to achieve emission neutrality or a maximum meaningful approach to emission neutrality at EU level. The scenario reflects the thesis for the drafting of NECP, SEK and POK. In terms of overall emissions, the analysis focuses on reducing GHG emissions by 2 050 in the modelled sectors; for emissions from other sectors, official or other credible sources are used to recalculate the total emission balance. The greenhouse gas emission target is imposed at a level of 8 Mt CO_2 in 2 050 in the Czech Republic (incl. LULUCF). The prices of emission allowances ('EUA') correspond to the recommended trajectories for WAM (as per Harmonised Common Trajectories; EC, 2024). The power generation capacities in the TIMES-CZ model were added on the basis of the result of the modelling of resource adequacy by the PLEXOS model (cooperation with ČEPS, a.s.). From 2035, the use of carbon capture, utilisation and storage (CCS/CCUS) technology is enabled, with a reduction of available capacity. The scenario, in line with the updated hydrogen strategy, assumes a gradual build-up of hydrogen from imports starting in 2033. Coal can only be used for energy purposes until 2033 and it is not possible to register new conventional combustion engine passenger cars from 2035. The following table summarises the other parameters of both scenarios:

Table 100: *Key Terms of Reference*

	WEM	WAM
GHG 2050 emission target	Not forced	To a level close to carbon neutrality in modelled sectors, taking into account the carbon price in the EU ETS.
FVE 2030 (total) ***2022: 2.09 GWe***	max. 6 GWe	max. 10.1 GWe
FVE 2050 (total)	max. 21 GWe	max. 26.1 GWe
VTE 2030 (total) ***2022: 0,339 GWe***	max. 0.7 GWe	max. 1.5 GWe
VTE 2050 (total)	max. 3.5 GWe	max 5.5 GWe
New nuclear sources, x1100 MW150	NJZ1 EDU5 COD 2040 + next result cost optimisation	NJZ1 EDU5 COD 2036 NJZ2 ETE3 COD 2039 NJZ3 ETE4 COD 2041 + next result cost optimisation
SMR 350 MW small modular reactors	model result	SMR1 COD 2035 + additional model result
hotline of the poison – Brno	Not	yes
Evaluation of stability of electricity supply in the PLEXOS model	Not	yes (LOLE & 7 h/year)
MACRO: production of the sector	E3ME WEM, Union of Industry and transport of the Czech Republic	E3ME WAM, Union of Industry and transport of the Czech Republic
CCS	Not	max. 9 Mt/year (2033-2042) and max. 18 Mt/year (2043-2050)

5.1.2.2.2 Assumptions and marginal conditions specified by the administration

The resulting mix of technologies and fuels, as well as the total cost, are directly conditional on a number of assumptions about the availability and price of these technologies and fuels. The following assumptions correspond to the government's policies and strategies under preparation and have been defined as such by the relevant departments for the scenarios analysed:

- **Hydrogen imports in the WAM scenario**

150*Note: The lifetime of the existing **Dukovany NPP** with installed capacity of 2 040 MW is assumed in both scenarios until the end of 2045 (EDU1 510 MWe), 2046 (EDU2 510 MWe and EDU3 510 MWe) and 2047 (EDU4 510 MWe), the closure of the Temelín NPP is foreseen up to **2060 (** ETE1 1 100 MWe) and 2062 (ETE2 1 100 MWe). **Biomass availability** from forest land is taken from the IFER Green Scenario projected in TAČR LESY TL02000440, updated in March 2024 (Cienciala, pers. comm., 2024); the potential of biomass from agricultural land is not expected in modelling. The **emission allowance price** projections are based on the European Commission's Recommendation 'Recommended parameters for reporting on GHG projections in 2025' (EC, 2024). **The investment cost of new nuclear resources** (CAPEX) is set at EUR 5400/kWe (p. c. 2015) and the **cost of financing the construction of nuclear resources** (WACC) is assumed to be 4 % (NJZ) and 5 % (SMR) p.a.*

The availability of hydrogen from imports is estimated at 36.7 TWh at a price of EUR 60/MWh in 2050. From 2040 onwards, the possibility of direct domestic hydrogen combustion is foreseen, i.e. gas boilers will also be adapted for direct hydrogen combustion. The assumptions as to the quantity of hydrogen available for import into the Czech Republic and its price are based on the documentation of the Ministry of Industry and Trade drawn up in cooperation with the industry to update the hydrogen strategy. These documents foresee a gradual rise in the quantity of hydrogen available for import into the Czech Republic. From 2035, they assume the capacity of all 3 pipeline routes – from West (6 GW), North (6 GW) and South (3 GW), with a gradual build-up of available hydrogen for imports in total from 24 PJ (200 kt) in 2035 to 132 PJ (1 100 kt) in 2050. In addition to hydrogen imported by pipelines, the possibility of importing hydrogen in the form of ammonia is envisaged only for industrial consumption. The price of imported ammonia is lower than in potential pipeline hydrogen and its quantity is limited by the current consumption of hydrogen in industry 11.6 PJ (96 kt).

The WEM scenario does not include hydrogen imports due to their high price due to the absence of decarbonisation policies both in the EU and globally.

- **Use and application of CCUS technology**
    - A necessary condition for the application of CCUS technology is an operational approval/authorisation scheme for the capture, transport and trading or storage of CO2 emissions. The uncertainties currently present lead to a conservative assumption of the total amount of storage carbon in the Czech Republic.
    - The costs of a permanent storage facility or the price of storage in the context of the envisaged internal carbon market in the EU are not included; carbon storage outside the Czech Republic is not foreseen.
- **Effective use of revenues from emissions trading**
    - Making full use of EU ETS revenues, including dedicated funds, for decarbonisation across the economy and mitigating social impacts, in line with the agreed legislation from the Fit for 55 package.
    - Other funds are not modelled, cohesion policy funds are implicitly included in the E3ME inputs; among the major financial incentives, the National Recovery Plan in particular is not taken into account in the modelling.
- **Financing the construction of nuclear units**

Financing of the construction of new nuclear resources is foreseen under Act No 367/2021 on measures for the transition of the Czech Republic to low-carbon energy, in particular in the context of Section 4(2), in the sense of providing repayable financial assistance. On the basis of the Ministry of Finance's comments on the level of interest costs of financing the construction of nuclear resources, it was clarified that if it were a form of issuance of 10-year government bonds, it is possible to work in the model at a starting rate of between 2.8 % and 3.3 %. The estimate of the bond yield is based on the assumption that the cost of financing the investment in the new reactors in the case of financing directly by the State will depend on the market price of government bonds after 2025. Given the long-term nature of the investment in the core, 10-year government bonds are considered for projections.

Since future yields to maturity of sovereign debt depend on many financial and macroeconomic funds, both structural and cyclical, these underlying baselines must be seen in the context of future risks:

- Given the impossibility of reliable prediction of the business cycle for many years ahead, future costs are estimated on a trend basis. The estimate therefore assumes an economy close to potential output and stable inflation rates close to the Czech National Bank's inflation target. In the case of cyclical fluctuations, the actual cost of funding may be higher and lower than projected.

- In the context of a slowdown in long-term growth and, at the same time, a relatively higher propensity to save, most studies identify a gradual decline in the equilibrium real interest rate after 2008. Current real interest rate equilibrium values for both the euro area and the USA most often range between 0 % and 0.5 % per annum151, and between 0.5 % and152 1 % per annum for the Czech Republic's small open economy153.
- The nominal interest rate, consistent with the economy in potential output and with anchored inflation expectations of 2 % for the CPI, is very likely between 2.5 % and 3.0 % in the Czech Republic.
- Therefore, on a relatively flat yield curve, the yield to maturity of 10-year government bonds is estimated to be between 2.8 % and 3.3 %. A slightly growing shape is common, as investors demand a premium for the long-term deposit of funds.

However, the risks of possible deviations from the projection are significant. In addition to the cyclical effects mentioned, the following structural factors in particular play an important role:

- successful completion of fiscal consolidation and a presumption of retention the current low risk mark-ups;
- meeting the inflation target in the medium term – especially in the light of the 'green' tranche – inflationary pressures can be expected in selected sectors due to growing demand for goods, services and labour, which will be affected by limited supply chain capacities and the absorption capacity of the sector and the labour market. Inflationary pressures can also be expected in the short term in the context of increasing and expanding carbon pricing, which should gradually diminish as a result of lower consumption of goods and/or energy savings;
- the cost of ageing – population ageing will create increasing pressures on the management of public finances in the Czech Republic and most other European Union countries after 2030, creating a significant risk of higher interest rates – for example, according to the projections of the European Commission and the Ageing Working Group, interest rates in the Czech Republic could be around 4 % after 2032.154

It should also be noted that the cost of financing would be indisputably higher if another entity had made the investment instead of the State (e.g. ČEZ). The risk premium will also differ in the scenario with the State and without the State guarantee. Finally, the total amount invested and interest expenses are not independent of each other. In particular, if the investment in the order of hundreds of billions of crowns were to be made at a single point in time, which, moreover, would not be timely in terms of the large refinancing of outstanding sovereign debt or the more advanced phase of the unaddressed effects of population ageing on public budgets, interest rates in the economy

151Brand, C., M. Bielecki, and A. PENALVER, 2018. The Natural Rate of Interest. Estimates, Drivers, and Challenges for Monetary Policy. 31 December 2018, ECB Occassional Paper. No. 217.
Holston K., T. Laubach, and J.C. Williams, 2017. Measuring the Natural Rate of Interest: International Trends and Determinants. Journal of International Economics, Vol 108(S1), pp. 59-75.
Fries, S., J.S. Mesonnier, S. Mouabbi and J.P. Renne, 2016. 'National natural rates of interest and the single monetary policy in the Euro Area.' Banque de France Working Paper 611, Banque de France.

152Pikhart, Z. and Froňková, P., 2019. Stimating natural rate of interest and equilibrium exchange rate: A case of the Czech Republic. Review of Economic Perspectives, Vol 19(4), pp. 231-248.

153Hlédick, T. and J. Vlček, 2018. Quantifying the Natural Rate of Interest in a Small Open Economy – The Czech Case, Working Papers 2018/7, Czech National Bank.

154 European Commission: The 2021 Ageing Report: Underlying Assumptions and Projection Methodologies. November 2020, Brussels, European Commission, Directorate-General for Economic and Financial Affairs, Institutional Paper, No. 142. see page 78.

are generally expected to increase.

Those factors are not exhaustive and may, or certainly, arise, where the interest rate is decoupled from the optima in the medium term.

5.1.2.3 Results

5.1.2.3.1 Reduction of greenhouse gas emissions

- **2030 emission targets achieved by**:

In all scenarios (a reduction of more than 55 % compared to 1990; in WAM by 68.4 % and in WEM by 65.6 %);

The sub-targets for ETS1 (-62 % compared to 2005, reached -72 % in WAM and -71 % in WEM) and for ESR in WAM (-26 % vs 2005, -35.4 % in WAM, but only -24.6 % in WEM) are also met.

- The**2050 emission target is not met**:

The WAM achieved a reduction in emissions to about **7.98 Mt CO2ek in 2050**.

Neither the ETS nor the modelled amount of State aid is sufficient to achieve the objective of neutrality/decarbonisation. The resulting reduction in the sectors that are modelled in the TIMES-CZ model is **3.8 Mt** in WAM towards the end of 2050. This reduction already includes a CCS contribution to biomass (“BECCS”) of 2.2 Mt in 2050.

Emissions in LULUCF, agriculture, waste and F-gases are not modelled but included as an exogenous assumption in the TIMES-CZ model. In 2050, their contribution is **4.1 Mt CO2ek**. eEmission trajectories of non-modelled sectors are taken from other studies, namely:

- agriculture: reduction of emissions from 8 Mt to 5.2 Mt according to a search carried out in the TAČR ARAMIS SS02030031 project;
- waste and F-gas sectors: the reduction in emissions from 9 Mt to 1.3 Mt is based on trends in these emissions in the REF2020 scenario for the Czech Republic.
- LULUCF sinks: the emission balance is, according to the updated Green Scenario IFER (Cienciala, pers. comm., 2024), which results in -3.8 Mt in 2030 and -2.4 Mt in 2050 (NB: in the previous modelling exercise in 2023, the Red scenario was used with + 2.2 Mt in 2030 and -3.0 Mt in 2050).

Carbon neutrality scenario modelling approach

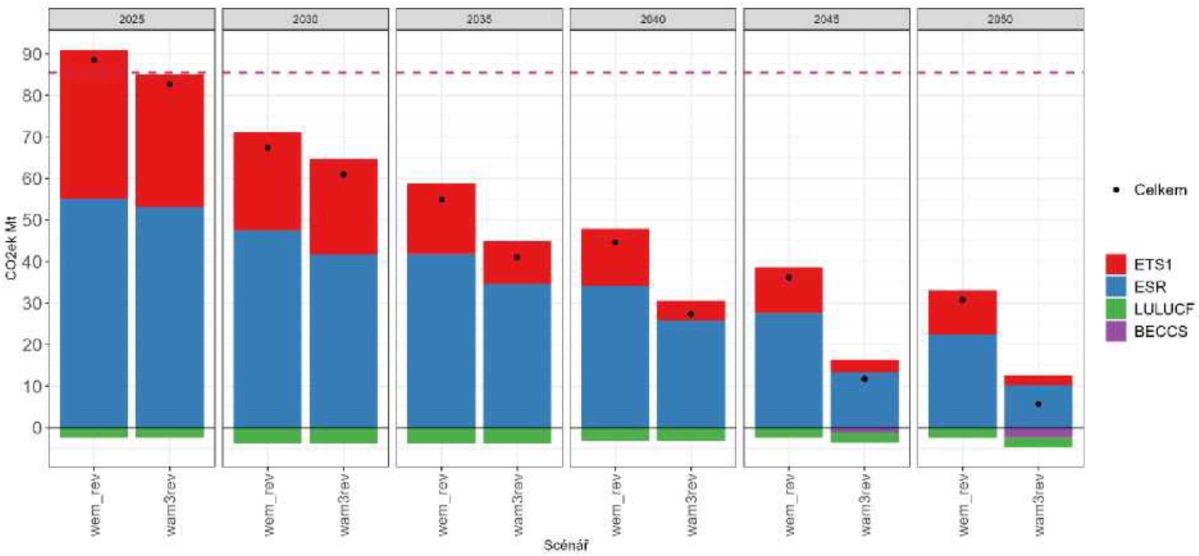
- Carbon neutrality is not achieved in modelling – the resultant emissions in the Czech Republic in 2050 are 8 Mt (TIMES-CZ). The first is the contribution of emissions from sectors that are not explicitly included in the models and for which there is currently no more detailed knowledge of measures to further reduce emissions (agriculture, waste). The second reason is the high price of emission allowances, where decarbonisation is dominant in scenarios based on the EU ETS and the sectors covered by it. Thus, the E3ME scenario, based on the (exogenous) defined EU-level emission target for the end of 2050, led to an extremely high EUA price already with a reduction target of 92-93 %. As a result of the simulations carried out in the context of the sensitivity analysis by the E3ME model, at the expected level of investment aid, emission reductions above 91 % (at EU level without LULUCF) lead to an extremely high EUA price at the end of the period (in the order of EUR thousand per t CO2). Similar results are achieved by the TIMES-

CZ model when simulating scenarios with exogenously set emission targets of 1 Mt, 2 Mt and 3 Mt by the end of 2050. In other words, the ETS is not a sufficient instrument to reduce emissions to the level indicated by the European Commission's previous analyses, i.e. 92-95 % below the 1990 base year (233-366 Mt CO2ek without LULUCF).

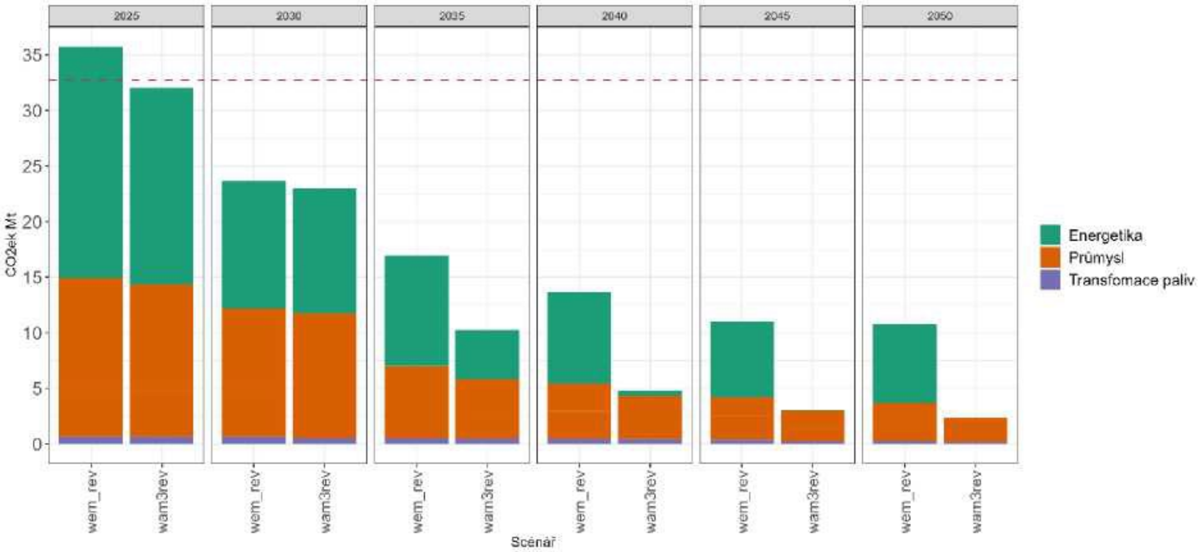
Table 101: GHG emission reduction*targets and their achievement according to modelling results*

Regulation	Goals	Inclusion in models	Model result
GHG 2030 (Order) 2021/1119)	—55 % (EU)	implicitly EUA V E3ME price, emission ceilings can be set in TIMES	CZECH REPUBLIC (2030): —68.4 % (WAM)/65 % (WEM)
GHG neutrality in 2050 2021/1119)	net zero	EU to the extent possible/impact of the EUA trajectory Czech Republic's model result	CZECH REPUBLIC (2050): 8 Mt (WAM)/31 Mt (WEM).
Sector v ETS1 (Directive 2023/959)	—62 % (EU 2030)	EU to the extent possible/impact of the EUA trajectory Czech Republic's model result	CZECH REPUBLIC (2030): —72 % (WAM)/ —71 % (WEM)
Non-ETS1 sectors (Directive 2023/959)	—43 % (EU 2030; road transport and buildings) —42 % (EU 2030; incl. additional sectors)	EU to the extent possible/impact of the EUA trajectory Czech Republic's model result	CZECH REPUBLIC (2030): —35.4 % (WAM)/-22.4 % (WEM)
ESR 2030 (Order) 2023/857)	—40 % (EU 2030) —26 % (CZECH REPUBLIC 2030)	model result	CZECH REPUBLIC (2030): —33.8 % (WAM)/-24.6 % (WEM)
LULUCF (Order) 2023/839)	—310 (EU) —1.228 Mt (CZ)	External assumption in the Earth Scenario (IFER)	CZECH REPUBLIC (2030): —3.8 MT

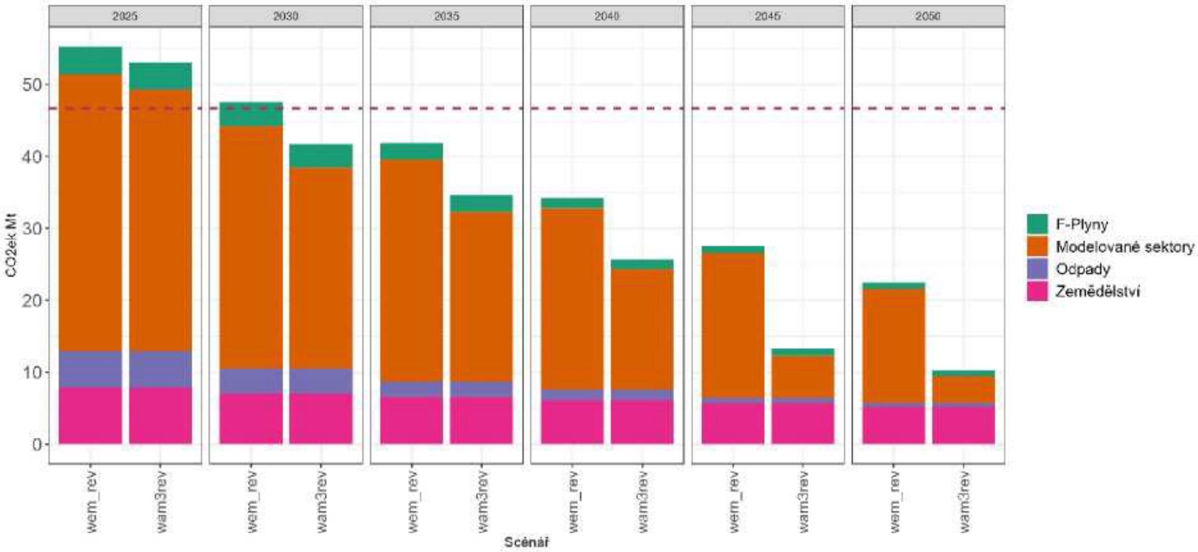
Graph 109: *Total GHG emissions (with a 55 % reduction target for 2030), TIMES-CZ*



Graph 110: *GHG emissions from ETS1 (with a 62 % reduction target for 2030 indicated), TIMES-CZ*[155]



Graph 111: *GHG emissions from ESR sectors (with an indicated target of 26 % emission reduction by 2030), TIMES-CZ*



5.1.2.3.2 Energy and efficiency

Primary energy sources

- in WEM i scenarios, primary resource consumption (Pez) decreases by 26 % in WAM and 21 % in WEM by 2030 compared to 2005;
- compared to the EC reference scenario REF2020, the consumption of Pez in the WAM scenario is 6.6 % lower and 0.3 % higher in WEM;
- the position of the Czech Republic from a net electricity exporter to a net importer (fully in WEM, partly in WAM) has changed since 2025;

155 *In the graph, negative emissions from the combustion of biomass with carbon storage (BECCS) in the Energetice WAM scenario are not accounted for.*

- by 2025, gross electricity production is falling in scenarios, rising again from 2030 to the end of the period. Net electricity imports are higher in the WEM scenario and peak at 13.1 TWh in 2045. In WAM, the time sections 2038-2042 and 2043-2047 are positive, with exports at 0.8 and 2.8 TWh;
- there is a significant decrease in the use of lignite, driven by the EUA price, the import and export price of electricity, reduced electricity exports and the deployment of more efficient/saving technologies;
- the residual use of hard coal shall be maintained for industrial and non-energy use;
- in all scenarios, there is a significant increase in renewables and environmental energy (heat pumps);
- consumption and imports of hydrogen are enforced by the industry and transport targets up to 2035.

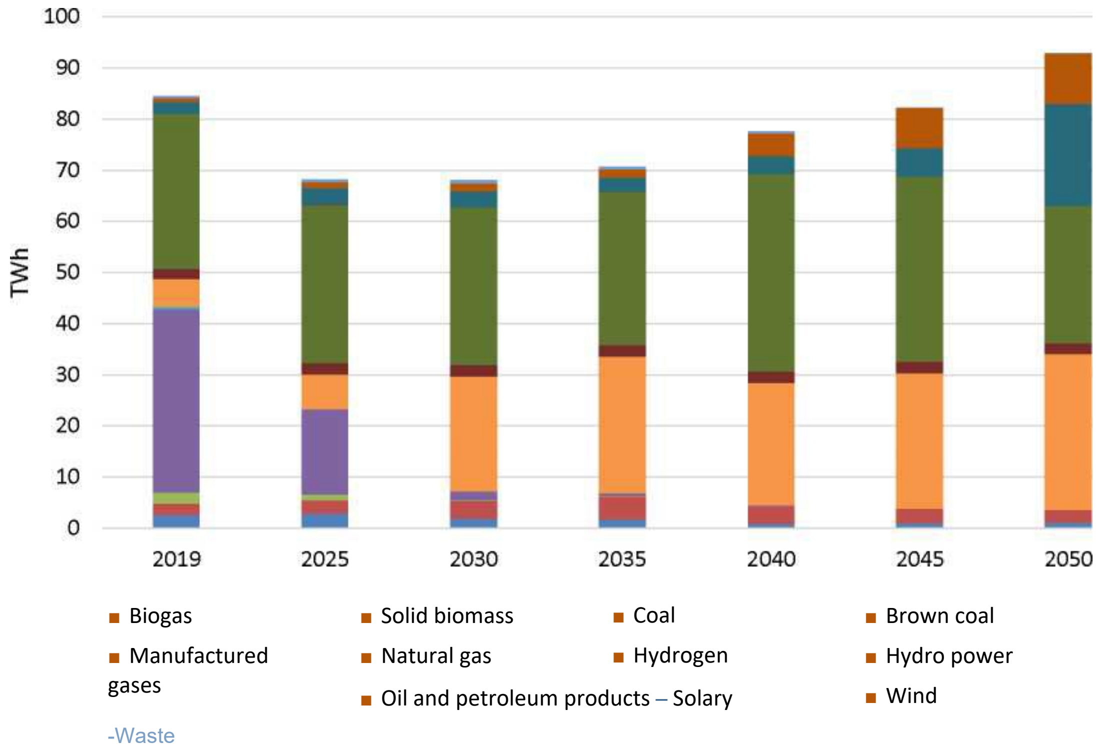
Total final energy consumption

- in both WEM and WAM scenarios, final energy consumption (KSE) falls by 17 % (WAM) or 15 % (WEM) by 2030 compared to 2005, by 38 % in WAM and by 21 % in the WEM scenario by 2050;
- the reduction compared to 2020 is lower in both scenarios than the target for cumulative end-use savings in the tightening rates set for 2021-2030;
- compared to the EC Reference Scenario REF2020, there is a reduction in final consumption (without environmental energy) of 0.1 % (WAM) or an increase of 4 % (WEM);
- the share of electricity in total final consumption (excluding environmental energy) is rising to 23 % (WAM) and 22 % (WEM) in 2030 and 41 % (WAM) or 32 % (WEM) in 2050;
- domestic hydrogen production takes place in a limited amount in the WEM scenario using electricity from RES (no possibility of importing hydrogen is not foreseen in WEM), in the WAM scenario the hydrogen needed is imported in absolute majority;
- the consumption of green and low-emission hydrogen is highest in both scenarios in transport, 64 PJ in WAM in 2050 and 18 PJ in WEM.

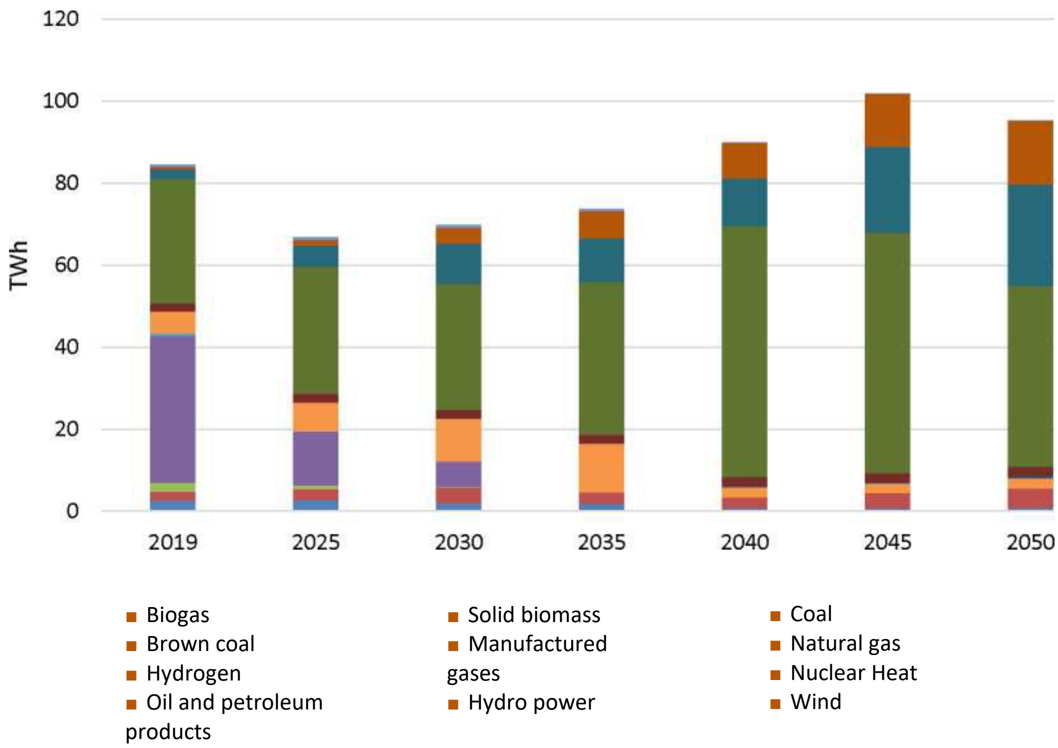
Electricity generation

The graphs below show the expected evolution of gross electricity generation in the scenario without additional measures (WEM) and the scenario with additional measures (WAM).

Graph 112: *Evolution of gross electricity generation in a scenario without additional measures (WEM)*



Graph 113: *Evolution of gross electricity generation in the additional measures scenario (WAM)*



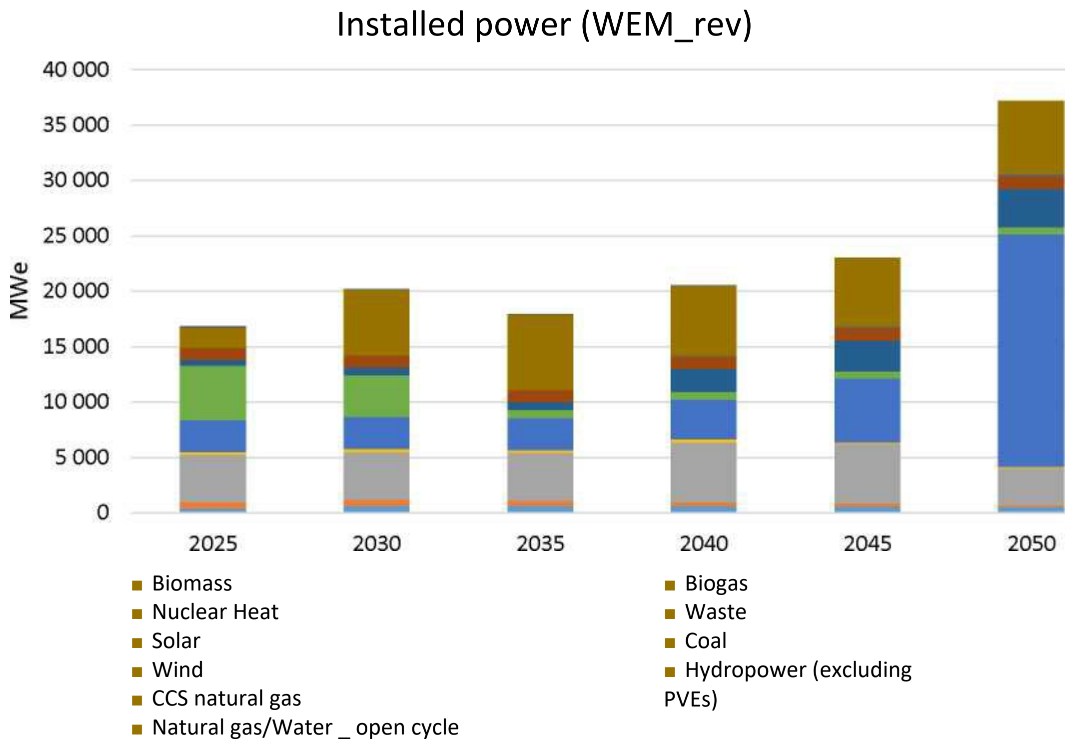
New electricity generation capacities

• Table 1 summarises the newly installed electricity generation resources since 2022, including the re-installation of end-of-life sources (mainly FVEs). For all new natural gas sources, Taxonomy-aligned preparedness for the transition to hydrogen combustion is foreseen. The WAM scenario was complemented by additional generation capacities (not realised on a purely market basis) after 2035, based on feedback from the PLEXOS model, high-end natural gas/hydrogen sources for balancing mainly winter peaks of 0.5 GWe in total.

Table 102: *Installed electricity generation capacities of new sources*

Screenplay	Main energy source	Unit	2030	2050
WEM	Biomass	GWe	0,4	0,3
	Biogas	GWe	0,2	0,2
	Nuclear	GWe		1,1
	Waste	GWe	0,1	0,0
	Solar	GWe	0,8	21,0
	Wind	GWe	0,4	3,5
	CCS natural gas	GWe		0,2
	Natural gas/Water	GWe	4,3	6,6
WAM	Biomass	GWe	0,4	0,3
	CCS biomass	GWe		0,4
	Biogas	GWe	0,1	0,1
	Nuclear	GWe		3,7
	Waste	GWe	0,1	0,0
	Solar	GWe	8,0	26,1
	Wind	GWe	1,2	5,5
	CCS natural gas	GWe		0,5
	Natural gas/Water	GWe	2,4	4,7

Graph 114: *Evolution of installed capacity in a scenario without additional measures (WEM)*



Graph 115: *Evolution of installed capacity in the Additional Measures scenario (WAM)*

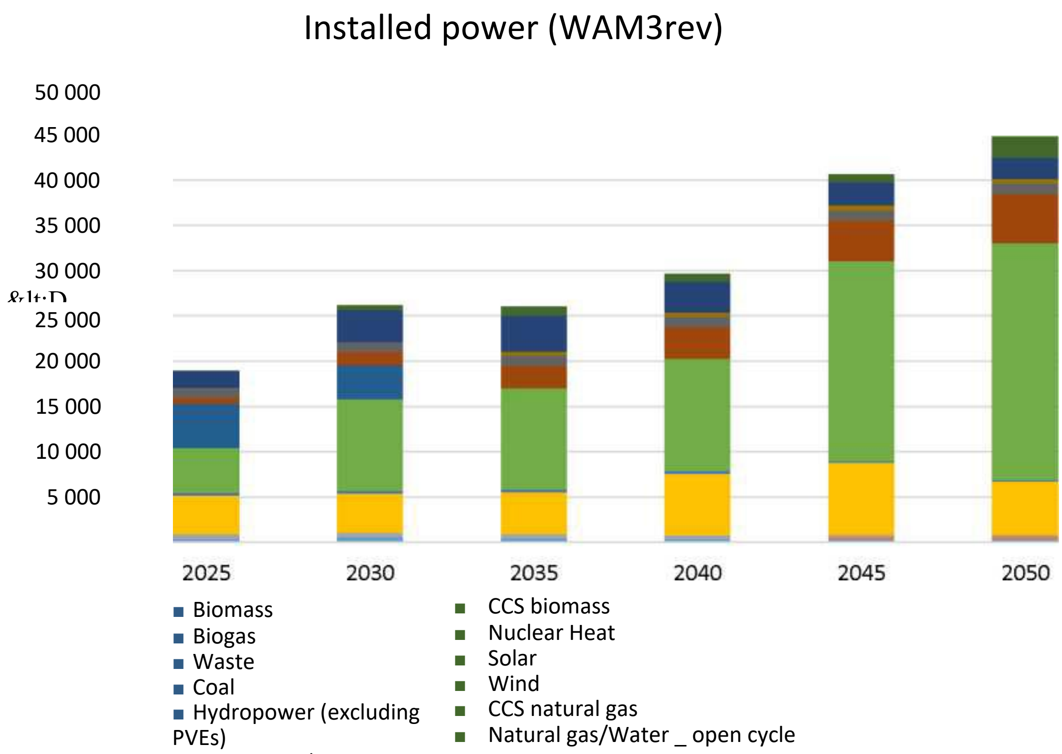
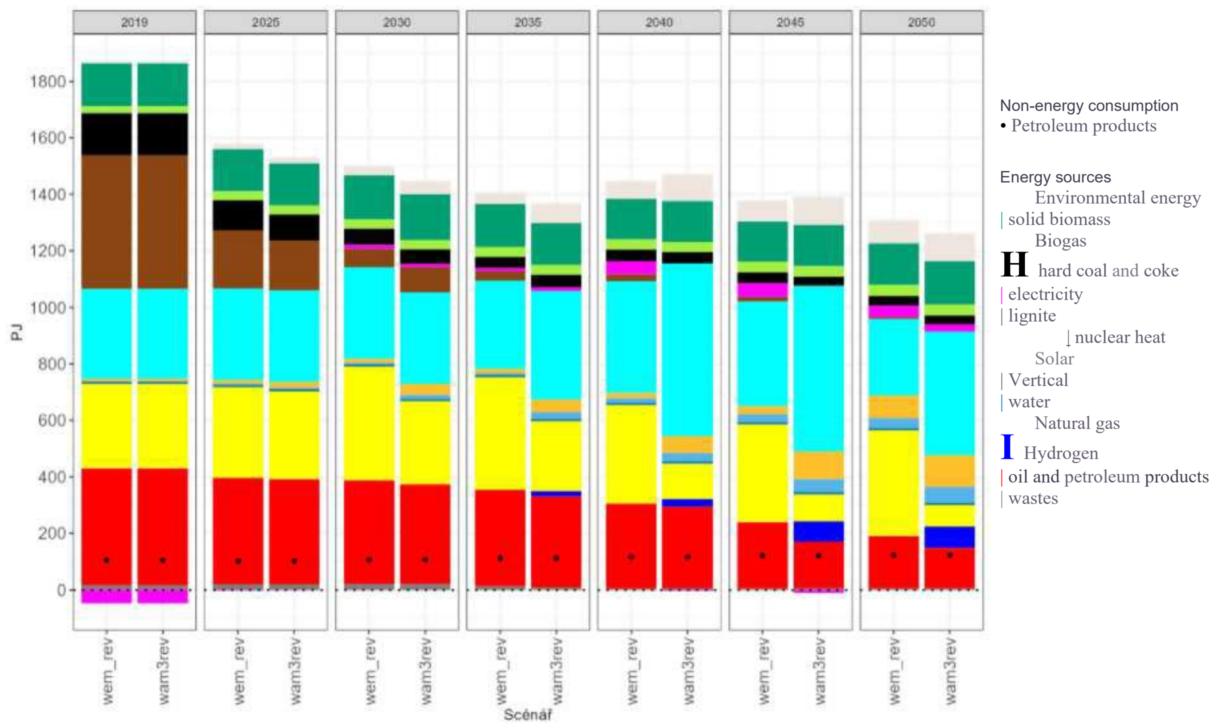


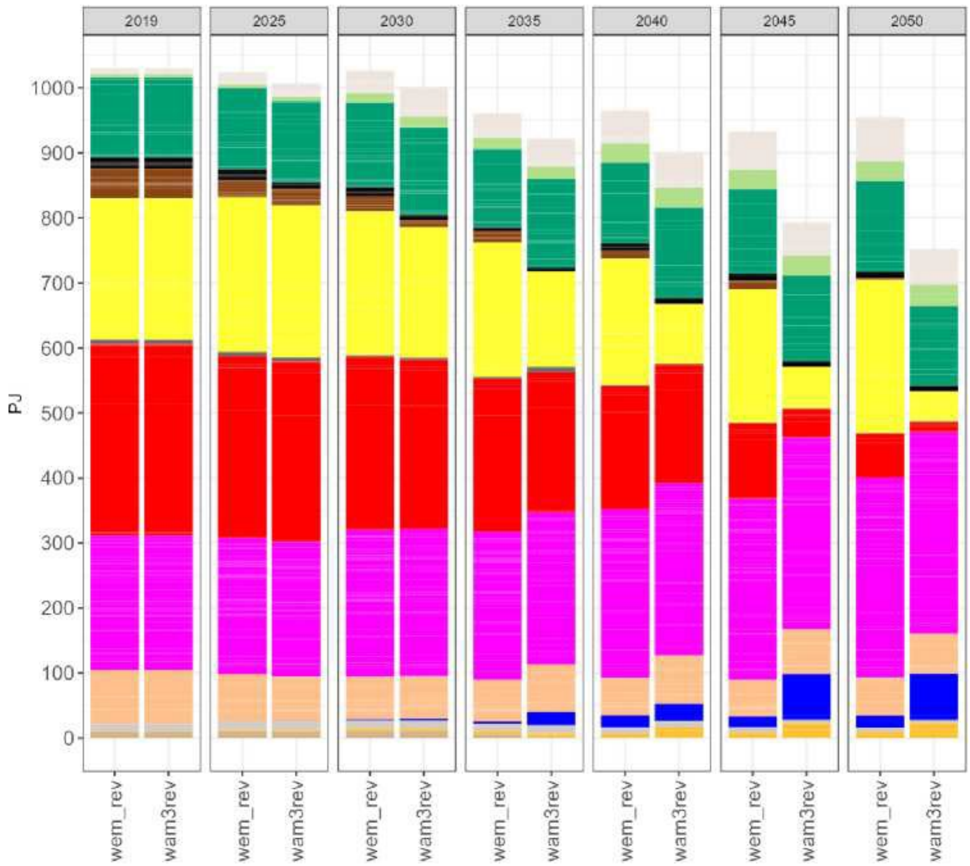
Table 103: Energy savings targets and their achievement according to modelling results

Regulation	Goals	Inclusion v model TIMES-CZ	Model result
savings in final and primary energy consumption (Article 4 of the Directive) 2023/1791 — EED)	—11.7 % vs. REF2020 by 2030 (EU)	not enforced, price effect included	CZECH REPUBLIC (2030): —0.1 % of final consumption vs. REF2020 in WAM (+ 4 % in WEM) —6.6 % of primary consumption vs. REF2020 in WAM (+ 0.3 % in WEM)
cumulative saving final Energy Consumption (Article 8 EED)	annual reduction in % (2021—2023-01-01: 0.8 %; 2024-2025: 1.3 %; 2026-2027: 1.5 %; 2028-2030: 1.9 %)	not enforced, price effect included	CZECH REPUBLIC (2030) compared to 2020): not fulfilled in WAM by ca 109 PJ and WEM by approximately

Graph 116: *Primary energy sources, TIMES-CZ*



Graph 117: *Total final energy consumption, TIMES-CZ*



Heat produced (heating)

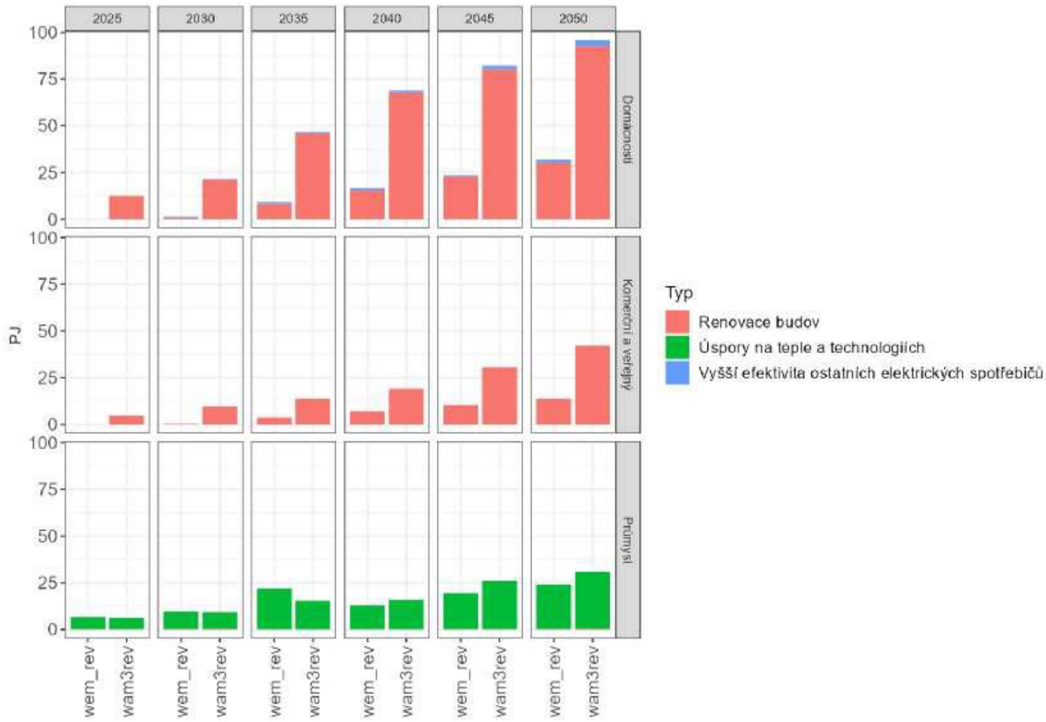
The production of heat in both scenarios is already subject to a significant decrease in total production by 2025. This is most significant in industry, which largely replaces the purchased heat from cogeneration with new own heat and steam sources, in particular gas boilers. Thus, there is a shift from the heating sector to the final consumption in industry. The decreasing production of heat from coal sources is mainly replaced by large heat pumps in the WAM scenario and by gas sources in the WEM scenario. In the WAM scenario, since 2035 at the latest, heat pumps are massively developed, with a large proportion of them delivering heat to the commercial and public sectors. In the TIMES-CZ model, these heat pumps are classified in the heating sector. In reality, these may be relatively decentralised resources, possibly operated by the end consumer, i.e. balance sheeted in final consumption.

Table 104: *Heat produced by source main fuel (PJ)*

Screenplay	Source type	2025	2030	2035	2040	2045	2050
WEM	Biogas	0,8	0,7	0,3	0,9	1,4	1,9
	Biomass	10,9	10,4	13,6	10,0	8,6	7,8
	Coal	34,4	20,8	5,5	5,1		
	Natural gas/Water	27,1	32,7	37,6	20,5	24,6	30,5
	Nuclear Heat	0,3	0,3	0,3	0,3	0,3	0,3
	Oil and petroleum products	0,0					
	Waste incinerator	4,3	5,6	5,7	5,3	2,8	2,6
	Heat pumps/geothermal		0,2	3,1	16,5	19,7	17,0

	of which commercial heat pumps and public sector (not necessarily CZT)					*2,8*	*6,8*
WEM	**Total**	**77,7**	**70,7**	**66,1**	**58,6**	**57,4**	**60,2**
WAM	Biogas	0,8	0,8	0,5	0,7	1,0	1,0
	Biomass	10,9	10,6	8,0	7,0	0,1	
	Coal	33,5	20,7				
	Natural gas/Water	24,5	27,7	24,1	7,5	5,4	4,5
	Nuclear	0,2	2,5	2,5	2,5	2,5	2,5
	Oil and petroleum products	0,0					
	Waste incinerator	3,8	5,8	6,4	4,8	3,3	2,5
	Heat pumps/GEO		1,5	33,7	54,6	60,0	53,7
	of which commercial heat pumps and public sector (not necessarily CZT)			*15,7*	*21,1*	*21,1*	*20,3*
WAM	**Total**	**73,7**	**69,6**	**75,3**	**77,2**	**72,3**	**64,1**

Graph 118: *Energy savings (beyond energy efficiency improvements through technology renewal in the TIMES-CZ model)*



5.1.2.3.3 Renewable Energy & Hydrogen Targets for RES and Hydrogen:

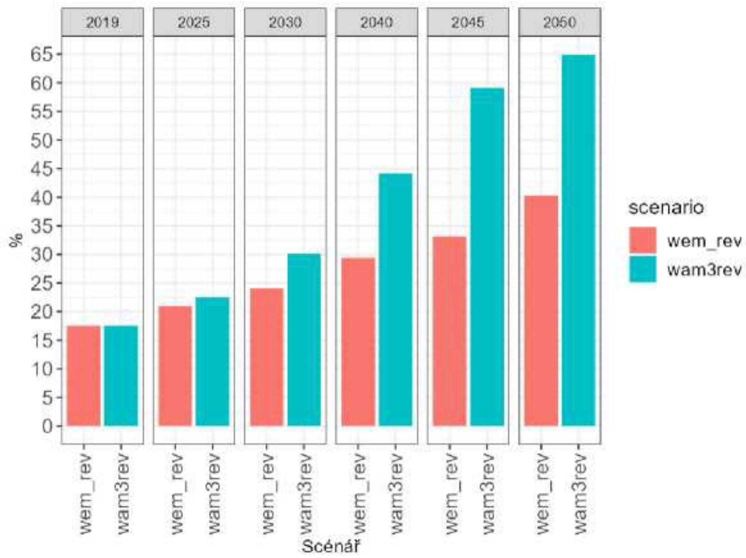
- the share of RES in gross final consumption in 2030 is 30.1 % (WAM) and 24 % (WEM) respectively, rising to 64.9 % (WAM) and 40.3 % (WEM) respectively by 2050;
- the share of energy consumption in transport (incl. multipliers) is 18.1 % in the WAM scenario in 2030 (and 13.7 % in WEM); the achievement of the RED3 target through the reduction of GHG emissions from fuels is validated by linking to the VŠCHT balance sheet model developed in the TAČR TK04010099 (MOSUMO) project;
- the share of RES in gross final electricity consumption is 27.9 % in the WAM scenario and 16.1 % in the WEM scenario in 2030;

- the share of hydrogen in industrial consumption is enforced at 45 % in 2030 and 60 % in 2 035 in the WAM scenario; i.e. under the foreseen application of exemptions from RED 8 and 12 kt of hydrogen;
- the share of advanced biofuels (including multipliers) in transport is around 5 % in the WAM scenario and 1.5 % in the WEM scenario in 2030;
- the share of renewable fuels of non-biological origin (RFNBO) in transport (incl. multipliers) in the WAM scenario is 1 % and 0.6 % respectively in the WEM scenario.

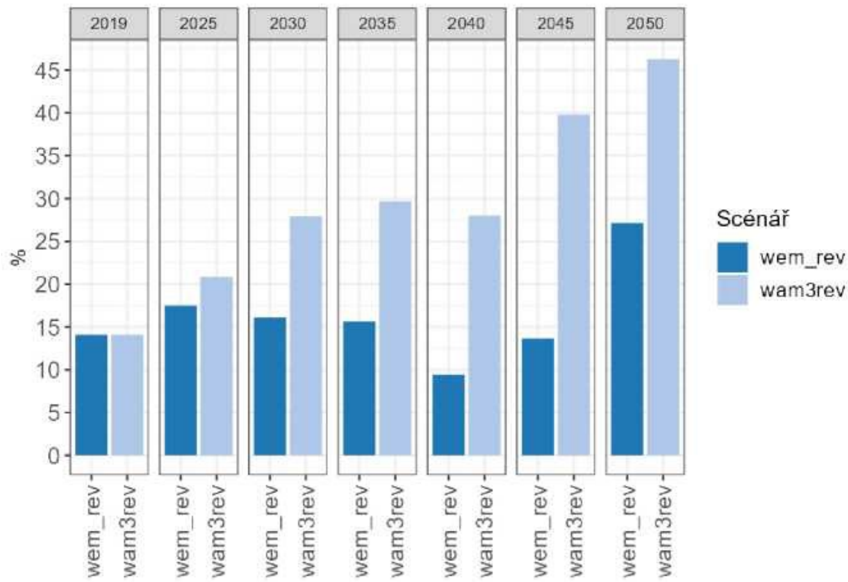
Table 105: *Targets for RES shares and their achievement according to modelling results*

Regulation	**Goals**	**Inclusion in the TIMES-CZ model**	**Model result**
Energy			
share of RES (Article 3 of Directive 2023/2413 – RED3)	42.5 % by 2030 (EU)	result model, not enforced	CZECH REPUBLIC (2030): 30.1 % (WAM), 24 % (WEM)
Industry			
Share of RFNBO in hydrogen consumption in industry (Article 22a RED3)	42 % (2030) 60 % (2035) (mandatory)	8 000 t in 2030 and 12 000 t in 2 035 in industry in WAM (enforced); furtherresult model	24 % (CZECH REPUBLIC 2030) 60 % (ČR 2035) applying RED exemptions
Transport			
share of RES in transport/saving of GHG emissions from fuels (2030) (Art. 25 RED3)	29 % (RES share), 14.5 % (GHG saving)	enforced through GHG emission savings, according to MOSUMO (MOSUMO) balance sheet model	Czech Republic's share of RES (2030): 18.1 % (WAM), 13.7 % (WEM)
Share of RFNBO in transport (by 2030) (Art. 25 RED3)	5,5 % (of which at least 1 % RFNBO) (with multipliers)	1 % RFNBO share enforced in WAM scenario	CZECH REPUBLIC (2030): 1 % (WAM), 0.6 % (WEM)
Share of advanced biofuels in transport (by 2030) (Art. 25 RED3)		not enforced, price effect included	CZECH REPUBLIC (2030): 5 % (WAM), 1.5 % (WEM)
Buildings			
Share of energy from RES in buildings (Article 15a RED3)	49 % (indicative)	model result	CZECH REPUBLIC (2030): 40 % (WAM), 35 % (WEM)
Annual growth rate of RES share in heating and cooling (Article 23 RED)	0.8 pps (2021-2025) and 1.1 pp (2026-2030) (mandatory) (EU) + indicative increases equivalent to 1.8 pps on average for the EU (CZ)	not enforced, price effect included	WAM: 1.4 pps (2021-2025), 1.9 pps (2026-2030) WEM: 1.1 pps (2021-2025), 1.2 pp (2026-2030) (simplified calculation)

Graph 119: *Share of RES in gross final consumption, TIMES-CZ*



Graph 120: *Share of RES in gross final electricity consumption, TIMES-CZ*



5.1.2.3.4 Validation of TIMES results from a resource adequacy perspective (PLEXOS model, ČEPS)

ČEPS, a.s. cooperated with SEEPIA to validate the results of the proposed optimal electricity generation mix with the TIMES-CZ model from a resource adequacy perspective. Validation consists of verifying the ability of the proposed generation portfolio of resources (including import and export capacity) to cover the expected electricity demand on an hourly basis. The PLEXOS modelling software and ENTSO-E modelling data sources designed to fulfil obligations stemming from European legislation, in particular ERAA 2023 (European Reasource Adequacy Assesment) and TYNDP 2024 (10-year network development plan), are used for validation. The validation uses a methodology based on the Resource Adequacy Assessment Methodology (MAF CZ 2022). It should be noted here that ERAA's European modelling results vary each year on the basis of new input from individual TSOs, e.g. the implementation of new policies for the distribution of RES, the entry into operation of new transmission capacities, the change in expected electrification speeds, i.e. growth in electricity demand, changes in the outlook for the production mix, etc. It is therefore appropriate to carry out this validation on an annual basis.

Other key parameters entering the calculation:

- Battery capacities – 15 % of installed capacity of FVE and VTE (10 % in 2025)
- Availability of Market Power Management (DSR) activation – 100 MW
- The calculation was carried out for three climate years

The outputs of the Unit Commitment simulations are:

- deployment of the power of individual production units
- accumulation
- activation of Market Power Management (DSR)
- trade area balances
- non-delivery
- marginal price
- downtimes and outages
- energy frustrated
- emitted CO2 and others.

Unfairness is defined by exceeding the LOLE (Loss of Load Expectation) reliability standard. The capacity of additional resources not realised on a purely market basis (as envisaged by the model) is then designed to ensure that the LOLE does not exceed 7 hours per year, the value applicable to the Czech Republic in 2022. Given the ongoing debate on the reduction of LOLE for the following period, it should be said that there is an inverse dependency between LOLE and the need for additional resources, the lower the LOLE wants, the greater the need for additional resource capacity.

Validation procedure

After receiving the results of the TIMES-CZ model in the form of generation capacities for each generation source category and expected annual electricity consumption, these inputs were converted into the PLEXOS model format. These adjustments include primarily the adjustment of production capacities with the capacity dedicated to the provision of system services, as well as the budgeting of consumption into hourly values for the whole year.

The PLEXOS model then results in the production and deployment of each source category and the balance of exports and imports to cover the load due to expected hourly consumption, as well as information on expected delivery shortfalls, see below. These results (e.g. non-delivery) enter the TIMES model, where, based on these additional inputs, the model will be fine-tuned and the resulting source mix determined to meet the required reliability standard.

As can be seen above, the proposed installed capacities are sufficient until 2040, but by 2045 and 2050 it is no longer sufficient to meet demand at 44 and 99 hours respectively. This can be remedied by the additional installation of flexible resources of 1 200 MW and 2 750 MW respectively.

The results include data on the use of individual production resources, and it is worth mentioning the low use of gas (H2 ready) resources in 2025-2045. With such low utilisation, it is likely that these resources will not be able to cover their economic costs and therefore support mechanisms for their operation will need to be set up.

Macro-economic and, where feasible, environmental, skills, social, employment and education impacts (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least up to the last year of the period covered by the plan,

including a comparison with estimates according to existing policies and measures

5.2.1 Macroeconomic impacts (Analytical background for the update of the 2023 energy and climate strategy in the Czech Republic (SEEPIA)

5.2.1.1 E3ME macroeconometric model assumptions

The economic impact is modelled at the level of the major economic units of the world, and the model contains the EU on a national basis. In the long period to 2050, this is a modelled trajectory to compare WEM scenarios (i.e. without Fit for 55 regulation) with the WAM scenario. We stress that the results of this type of economic impact assessment cannot be interpreted as predicting the status of macroeconomic indicators in the future; the status of the indicator for the policy scenario should always be compared to that of the reference scenario, WEM.

In modelling the impact assessment, several assumptions are made on the use of ETS revenues and other regulatory measures. The measures are regulated for all EU Member States:

Regulatory measures

- Phasing out coal from electricity generation on the basis of known dates by EU Member States.156
- A ban on the registration of new passenger cars with emissions above 0 g CO_2 from 2035.
- The response to the decommissioning of both coal and vehicles is "foreseen", i.e. the likelihood of purchasing these technologies has been decreasing as early as 5-10 years before the actual measure.
- The expected regulation of fossil boilers reduces the likelihood of purchasing them from 2030.
- Oil-based electricity production is limited to 2025 levels.
- Mandatory sustainability reporting under the Directive's CSR introduced in 2029, which is expected to have an effect in reducing energy consumption in listed companies.157

Carbon pricing

Modelling the EU ETS

- The EU ETS in the E3ME model increases fuel prices, endogenously leading to an increase in production prices and thus a reduction in demand for carbon-intensive goods, endogenous energy efficiency measures by industry (reducing their energy consumption) and some change in fuel types (following the effect that the relative price of fossil fuels increases more than non-fossil).
- EU ETS prices also directly influence investors' decisions in the sub-modules FTT:Power, FTT:Steel, FTT:Transport and FTT:Heat by increasing the levelised costs of fossil fuel technologies.

However, by default, the price increase triggered by the EU ETS does not affect the use of biofuels in transport and the demand for passenger kilometres (i.e. distance travelled), while it should (e.g. through the incentive shift and consumption elasticity) capture these impacts, the demand for km of passengers travelled (which is otherwise exogenous) is considered to be decreasing with elasticity 158 159 160 (this option applies to the share of biofuels in the economy

156https://energy.ec.europa.eu/topics/oil-gas-and-coal/eu-coal-regions/coal-regions-transition_en

157Jouvenot, Valentin, and Philipp Krueger. "Mandatory corporate carbon disclosure: Evidence from a natural experiment." Available at SSRN 3434490 (2019).

158The price increase applies to all types of vehicles, which means that once BEVs dominate, even a substantial increase in fossil fuel prices would not change average behaviour.

159Nässén, Jonas, and John Holmberg. 'Quantifying the rebound effects of energy efficiency improvements and energy conserving behaviour in Sweden.' Energy Efficiency 2 (2009): 221-231.

160Cardoso, Leonardo CB, et al. 'Biofuels policies and fuel demand elasticities in Brazil.' Energy policy 128 (2019): 296-305.

rather than absolute quantities).

- Furthermore, CCS is deployed in energy production on an endogenous basis, but this is not the case in industrial sectors with significant process emissions, so data from the ClimAct Net Zero EU technical scenario on CCS is used to simulate the ETS's effect on process emissions reduction. Capacities deployed in industry by country; in endogenous pricing cases, the scale of industrial deployment of CCS changes with an increase in the ETS price.

Subsidy measures

- Energy **efficiency in all sectors**: energy efficiency is achieved by reducing energy demand in the relevant sectors, the reduction is split between fuel types according to their share of sectoral final energy demand (i.e. if the sector uses 50 % of gas for its energy needs, the 50 % energy efficiency effort in the sector goes to gas demand). The level of efficiency achieved in a given year is based on the monetary amount available for this measure. The total impact (which is then distributed among fuel types) is calculated with a downward return assumption. The initial estimate (i.e. reduction of energy demand if previously limited) is a conservative value of 8 000 GJ/MEUR (EUR 125/GJ). The decreasing factor is calculated by bringing the return on investment closer to zero, around 60 % of the energy efficiency already achieved. In addition, efficiency improvements, which are possible in a single year, are limited to 2.5 %.
- Energy **efficiency in industry: the approach**used is the same as above, but in this case energy efficiency is linked to electrification. Electrification follows an approach similar to that described above, i.e. investments in electrification have a decreasing return once 85 % is approached. The initial estimate of the return on the investment is GJ/MEUR 15000 (EUR 67/GJ). However, by sector, only part of the total energy consumption can be electrified, so this limit is limited to 90 % and does not apply to process emissions and heat consumption. In both cases (in this and above) investments in energy efficiency and electrification generate investments from a sector that pre-empts them (i.e. where energy demand is reduced) and generally increases debt and prices of the sector in an endogenous manner.
- **Energy efficiency in households**: A similar approach is used for energy efficiency households, public and commercial buildings. However, the return on investment is calculated here at country level, mostly taking into account the impacts of renovation – energy savings on the EUR invested are a decreasing function of cumulative energy efficiency. The parameters used are derived from the EU-wide building stock model161. Efficiency measures are expected to be partly covered by households, therefore investments of this type increase household debt. Household debt is repaid over 10 years in modelling and reduces household disposable income.
- Capital **subsidies for solar and wind energy, battery electric vehicles (BEVs) and heat pumps**: we are considering capital subsidies for green technologies in transport, energy production and heating. These subsidies are channelled through FTT sub-modules and lead to lower levelised electricity costs (LCOE), balanced transport costs (LCOT) and balanced heating costs (LCOH) for investors' decisions. It may therefore trigger a higher deployment of these technologies. However, the subsidy ratio is limited, see table below.

Table 106: *Anticipated intensity of technology subsidies*

	2035	**2040**	**2045**	**2050**
Solar FV	Max. 20 %	Max. 10 %	Max. 5 %	0 %
Wind	Max. 40 %	Max. 35 %	Max. 30 %	Max. 25 %
BEV	Max. 20-50 %, decreasing from 2020	0 %	0 %	0 %

161 ECF and Cambridge Econometrics. 'Modelling the socioeconomic impacts of zero carbon housing in Europe.' Available at https://www.camecon.com/what/our-work/european-climate-foundation-modelling- the-socioeconomic-impacts-of-zero-carbon-housing-in -europe/(2022).

Heat pumps	Max. 45 %	Max. 35 %	Max. 30 %	Max. 25 %

Recycling of ETS revenues

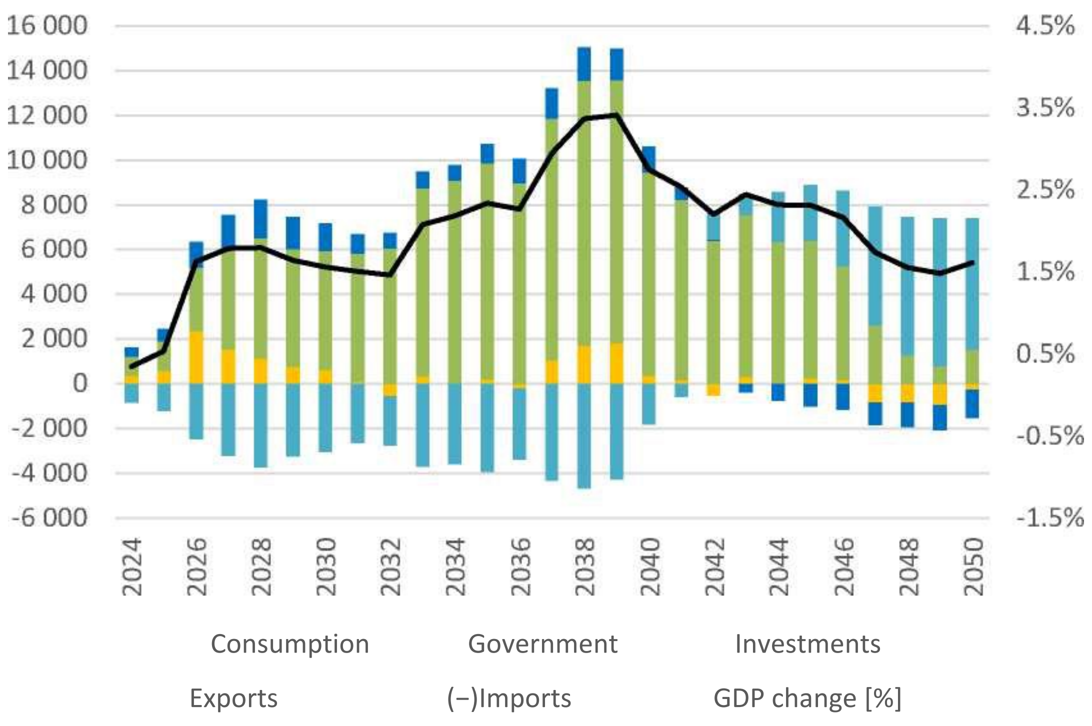
The revenue recycling process collects revenues across the EU ETS and redistributes them in line with fund structures and other agreements. ETS revenues are collected at EU level and then redistributed through pre-determined allocations. Once calculated at Member State level, the funds are distributed among the different funds using defined shares. The resulting allocation of revenues from the sale of emission allowances to investment aid for specific measures presupposes the aid intensity as set out above. Given that the available funding could be higher than what measures resulting from the probable FTT model can absorb (e.g. more HP subsidies are available than the model uses to deploy PV capacities), the optimisation model allows to reallocate unused subsidy funds in subsequent years, including support for technologies other than those to which they were initially allocated (with the exception of funds to support energy efficiency measures, which have to be allocated only within the sector).

5.2.1.2 Impact on the Czech economy

The impact of WAM on GDP ranges between 1.5 % and 3.5 % of GDP in WEM (black curve on the chart). In most of the period up to 2050 (except three years), the absolute difference between annual GDP growth in WAM and WEM is between -0.4 %b and + 0.6 %b, with a slower GDP growth period in the WAM covering 20292031, 2040-2042 and 2046-2049. Overall, WAM's impact on GDP is small; in a different way, the volume of GDP in WAM in 2049 would have been achieved in WEM one year later.

The main driver of moderately increased GDP in WAM is investment, which is increased mainly as a result of increased investment in innovative green tranche technologies, with a large part of it receiving investment support from revenues from the sale of emission allowances.

Graph 121: *Impact on GDP and its components, gap with WEM, EUR million (2010) and % change*



Note: the volume of imports is shown with a negative sign as it reduces GDP.

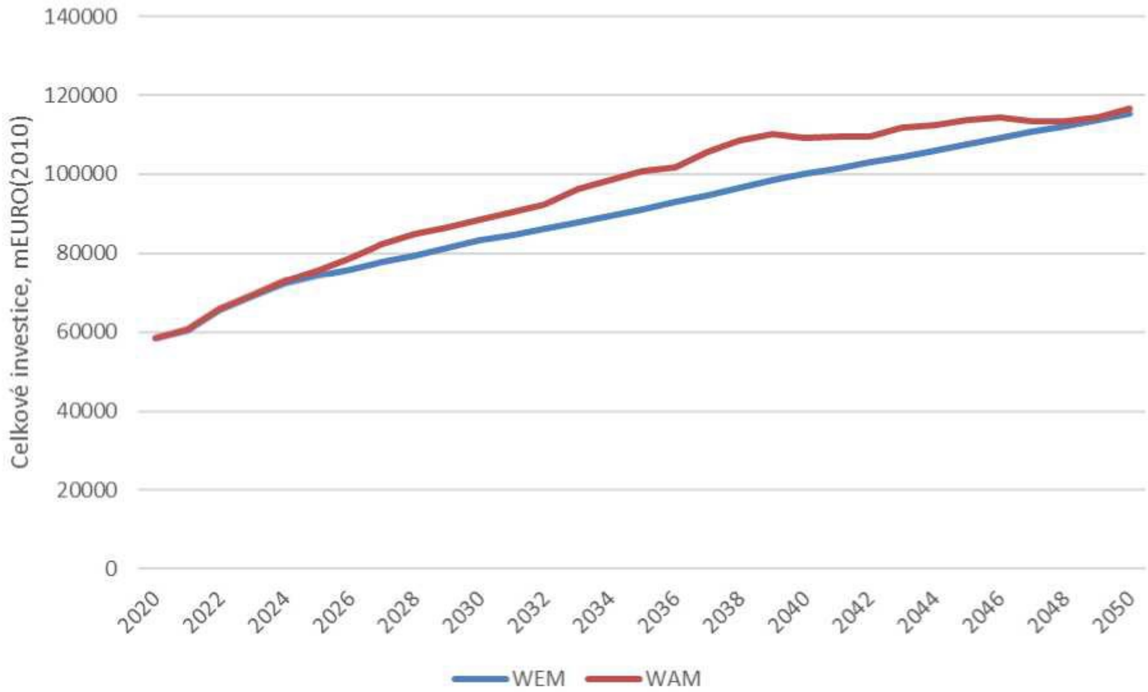
The largest gap between GDP in WAM and WEM occurs mainly in the period 2033-2042, mainly due to increased investment activity, which, despite the support of economic activity, leads to an increase in consumption, in particular during the period 2037-2039. The difference in investment activity between WEM and WAM can be attributed to the construction of new nuclear resources, which implies investments in the E3ME model during the period 2036-2043 (in accordance with the structure of the model, investments are made in the FTT:Power module within 3 years of commissioning of the source, i.e. 2035 (SMR 350 MWe), 2036, 2039 and 2041 (3x1100 MWe). The time distribution of CAPEX's total value to the new NJZ in the E3ME model is shown in the graph below, where the green columns describe the proportion of the amount invested in NJZ in a given year out of the total investment in NJZ of EUR 19.7 billion (CAPEX NJZ in E3ME, shares in the left axis). Such a short period of allocation of NJZ construction investments is not realistic; the simulation of the time distribution of investments foreseen in the *National Action Plan for the Development of Nuclear Energy in the Czech Republic* (MIT 2015) is presented for comparison on the chart in red (the same years of entry into operation of new NJZs are foreseen). This timing would imply a shift in part of GDP growth from 2038-2043 to 2030-2035.

Investments

Over most of the period under review, investment is the main driver of GDP. Significant contributors to positive investment impacts include recycling revenues from the sale of emission allowances, with investments in energy efficiency measures in industry and households playing a key role. In addition, subsidies for renewable energy technologies and the expansion of nuclear capacities, which increase investment in the electricity sector, contribute positively. However, after 2045, investment activity largely converges back to the baseline, where the difference with the baseline is below 1 %. This trend is largely monitored across the EU, but is particularly pronounced in the Czech Republic.

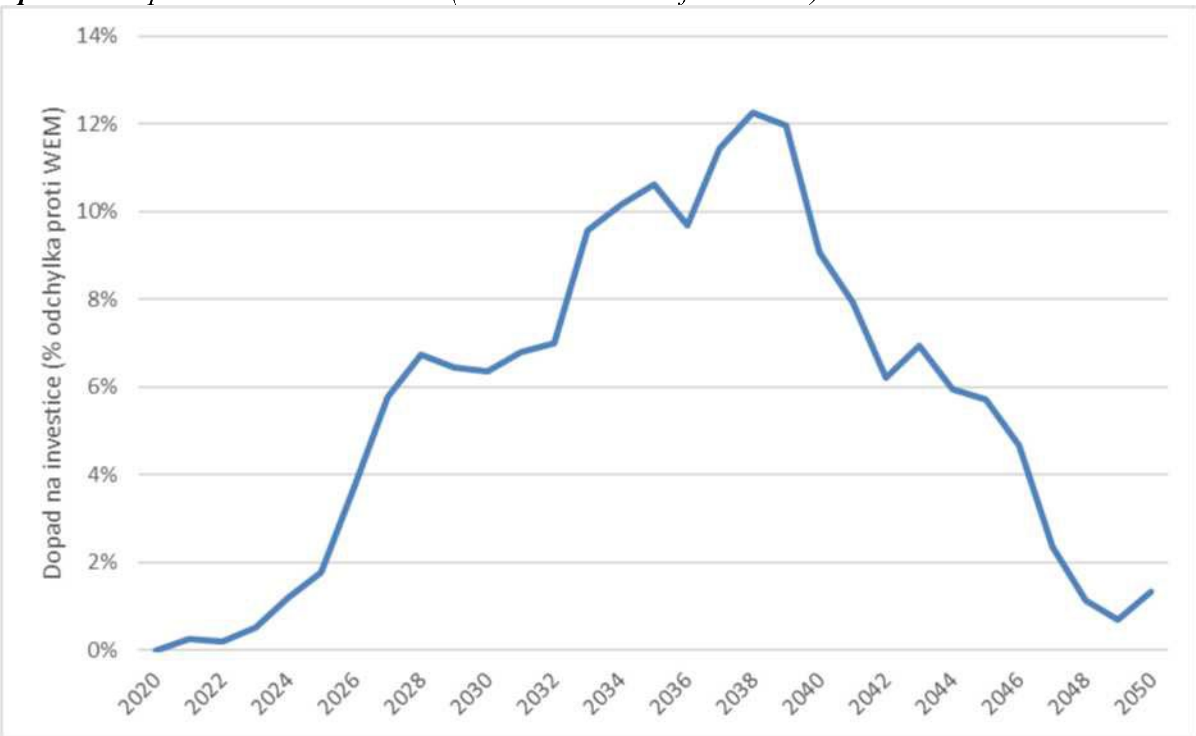
The explanation of the overall European model is that the high level of investment over the period 2025-2045 is driven by the need to make all transition-related investments in order to achieve the climate objectives. These include investments in energy efficiency, the transformation of the electricity generation sector, electrification or the installation of heat pumps. In the case of the Czech Republic, this trend is supported by the timing of investments in new nuclear capacities. Essentially, by 2047, most of the transition-related investments had been made.

Graph 122: *Total investment in WEM and WAM scenarios, EUR million (2010)*



Investments also generate higher prices because their financing has often to be raised with a time lag, for example through loans or bonds. In this period, transition-related investments are shrinking, dominated by price effects caused by previous investments and loan repayments.

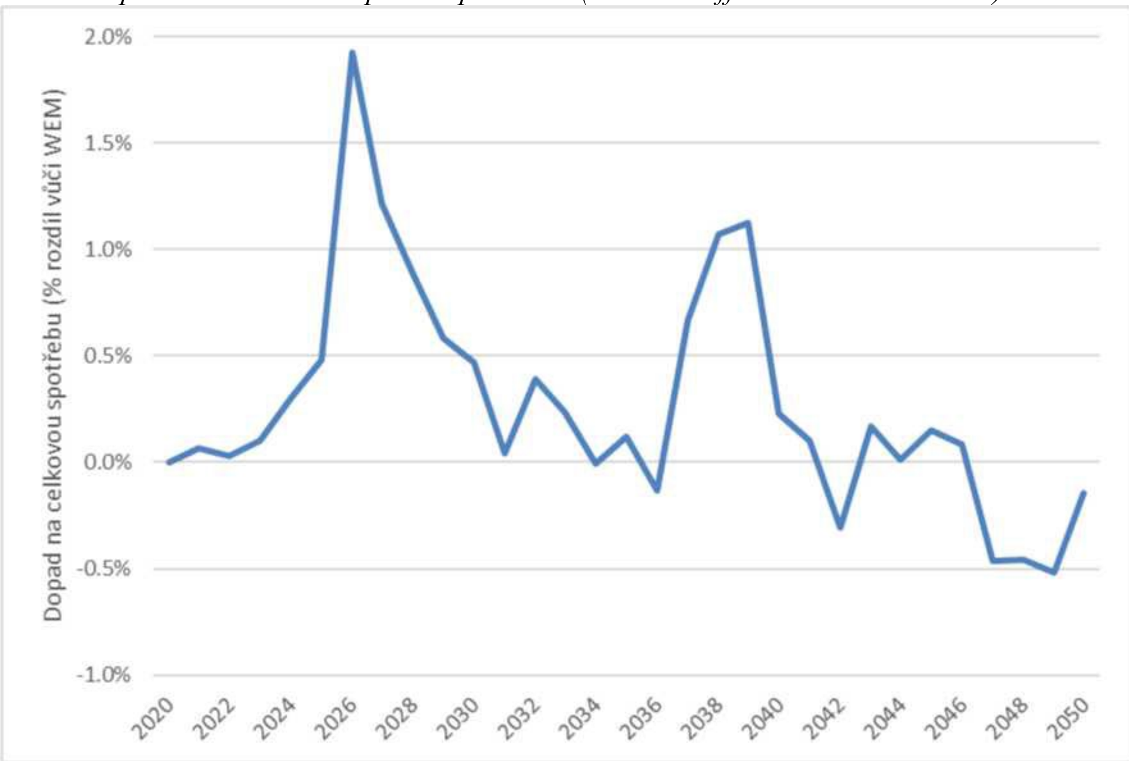
Graph 123: *Impact on total investments (% WAM deviation from WEM)*



Consumables

The evolution of consumption expenditure varies over time. At the end of the 1920s, the WAM scenario has a positive effect in the order of 0.5 % on average. This is mainly due to increased sales of green vehicles, which currently have higher capital expenditure compared to alternatives based on fossil fuels. Furthermore, savings mainly on petrol, but also on gas and electricity – thanks to energy efficiency measures financed by the recycling of ETS revenues – increase the disposable income and thus the consumption of other goods. However, since the mid-1940s, positive effects have been reduced and have become negative. This change is due to accelerated decarbonisation efforts in the transport sector, which significantly reduce petrol consumption. The increased demand for electricity, driven by additional investments in electricity generation and electrification in transport and heating, partly compensates for this decrease, but the overall impact on consumption remains negative. At the end of the modelled period, the effects of electricity prices stabilise around zero, but negative impacts on petrol and gas consumption persist. As a result, overall consumption impacts become negative as decarbonisation is also progressing in the baseline scenario, reducing the impact on disposable income.

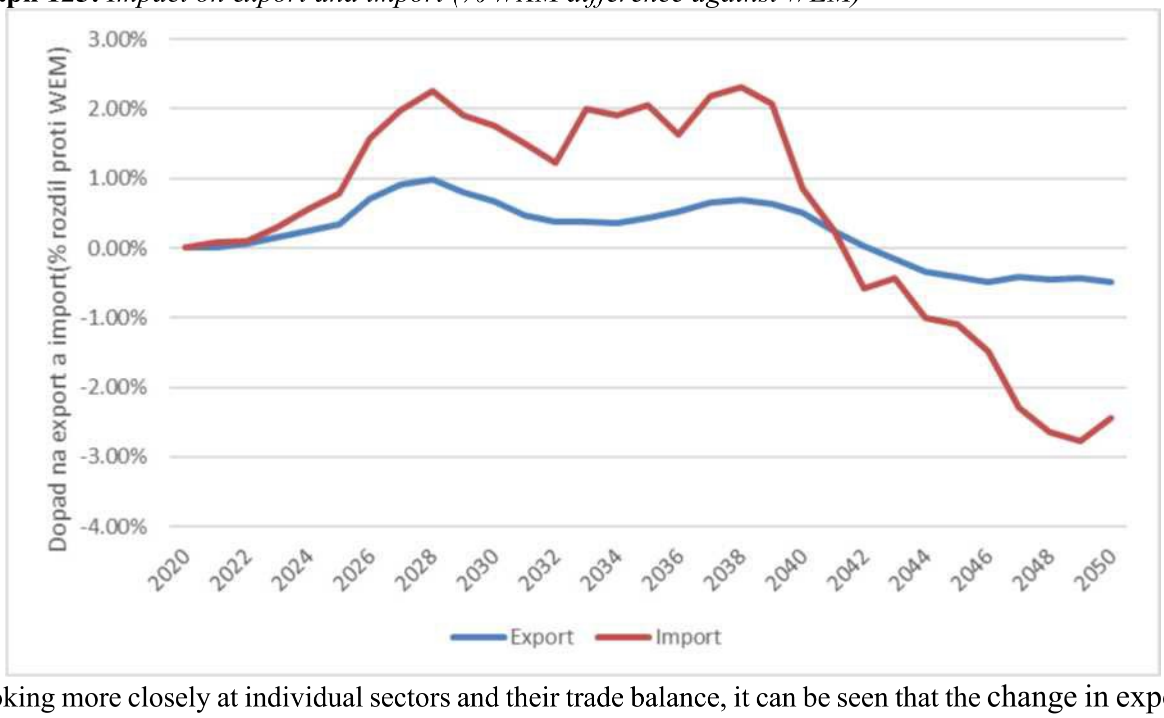
Graph 124: *Impact on total consumption expenditure (% WAM difference vis-à-vis WEM)*



Trade balance

Both imports and exports show similar trends in developments where, until 2040, the positive impact of the WAM scenario is present only with a different intensity. While import is a difference of up to one percent, exports increase by around 2 % compared to the reference case. After 2040, impacts become negative, reducing imports by up to 3 % at the end of the reporting period. Export trends are more smooth and fall only slightly below zero.

Graph 125: *Impact on export and import (% WAM difference against WEM)*

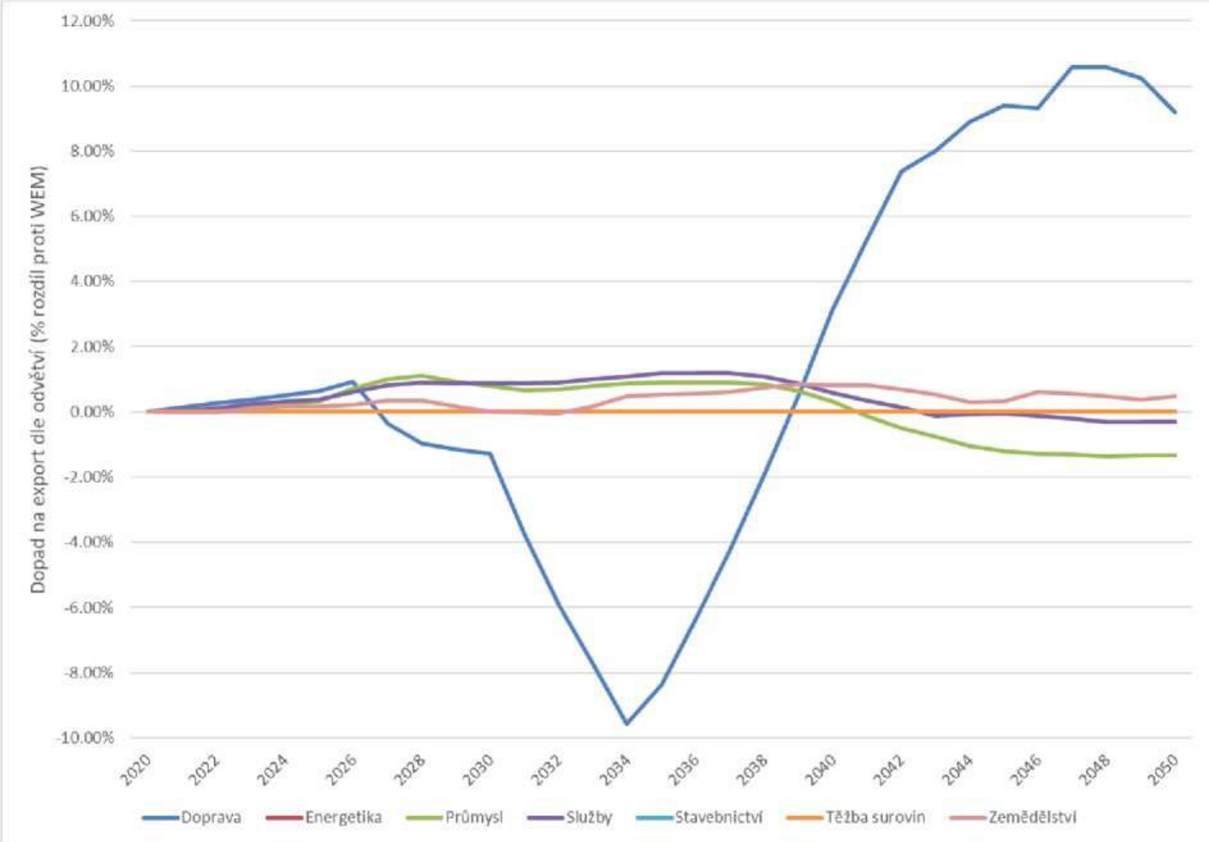


Looking more closely at individual sectors and their trade balance, it can be seen that the change in exports between scenarios is driven primarily by oscillations in the transport sector, where the decline around 2035 is due to a decrease in conventional car availability and this trend is then reversed with the onset of a higher share of electro-mobility and the positive impact on exports increases to 10 %. The remaining sectors are only slightly around one percent and do not show more fundamental changes.

The evolution of imports across the economy is more volatile. A negative impact throughout the reporting period is evident in mineral imports related to the shift away from fossil fuels and the transformation of the economy towards low-carbon technologies. On the other hand, positive impacts on average around two percent can be observed for imports of services, slightly lower in agriculture. Industry follows a similar trajectory until 2040, when its trend is reversing and a negative impact on the level of imports can be observed.

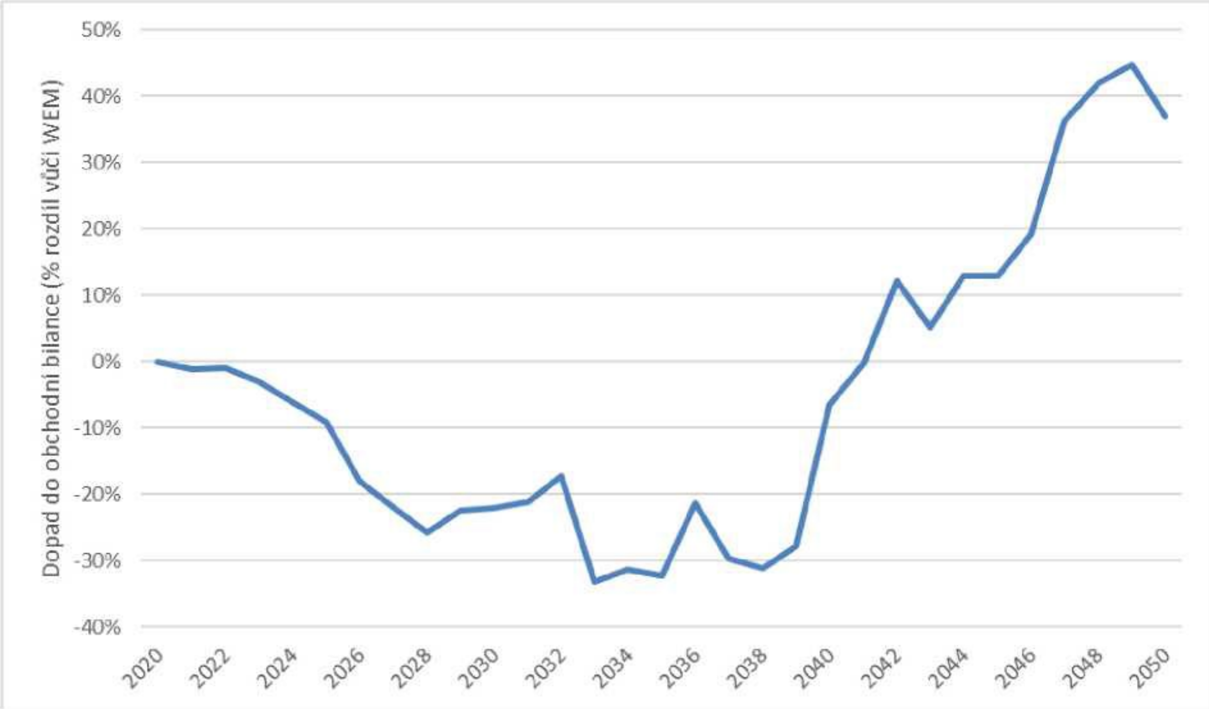
Graph 126: *Impact on imports by industry (% WAM difference vis-à-vis WEM)*

Graph 127: *Impact on exports by industry (% WAM difference vis-à-vis WEM)*



The impact of the trade balance on GDP is negative until 2040, with significant negative effects later in the period. After 2040, the impact of the trade balance has become positive and has become the main contributor to GDP growth in recent years. Negative impacts stem from increased demand for imports of motor vehicles and goods needed for decarbonisation efforts such as steel, electric equipment, rubber and machinery. Further growing domestic demand is hampering exports. However, after 2040, positive impacts are due to a relative increase in exports of decarbonisation-related services and goods, including motor vehicles. The improvement in the trade balance outperforms investment as the main contributor to the positive effects on GDP over the last years of the projection period.

Graph 128: *Impact on trade balance (% WAM difference against WEM)*

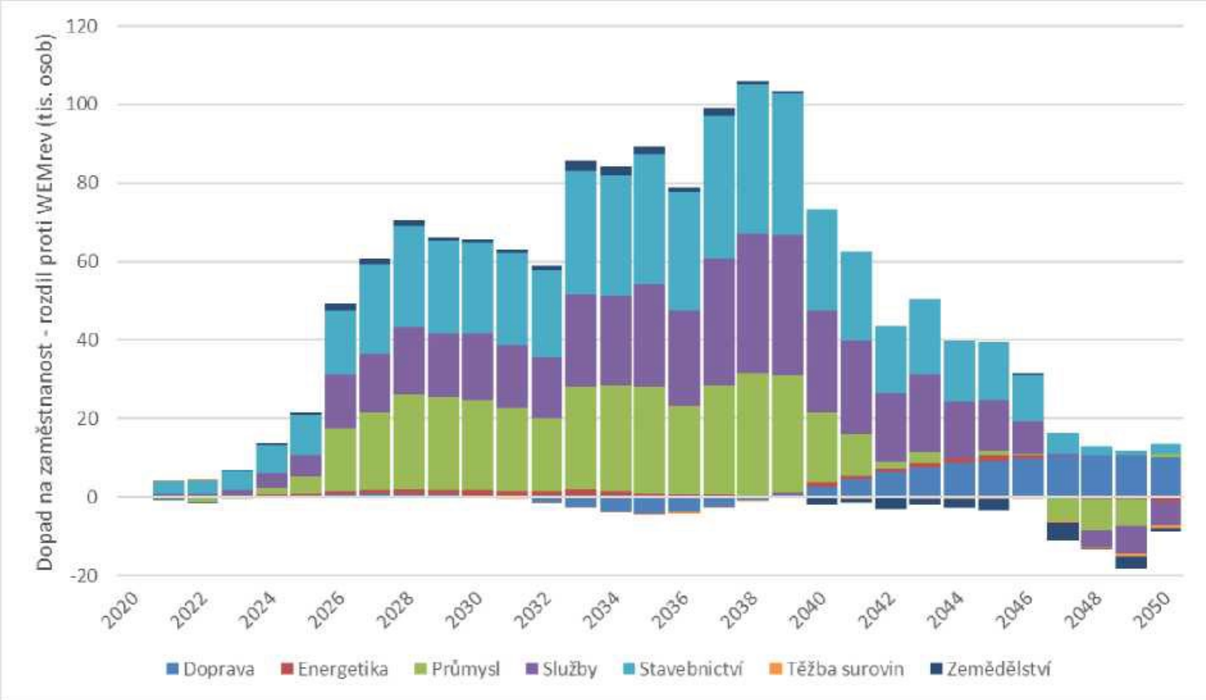


5.2.1.3 Impacts on employment

The allocation of revenues from the sale of emission allowances to investment aid incentivises significant investments in the economy that have a positive multiplier effect on economic activity. On the other hand, increased economic output at EU level encourages exports, but not sufficiently to compensate for increased imports driven by increased economic activity, leading to an increase in net imports in WAM compared to WEM until 2040; from 2041 onwards, the difference between the net imports between WAM and WEM starts to be negative, i.e. the effect of the change in the trade balance in WAM starts to contribute to employment. However, at the end of the period, after 2045, GDP is growing year-on-year in WAM at a lower rate than in WEM.

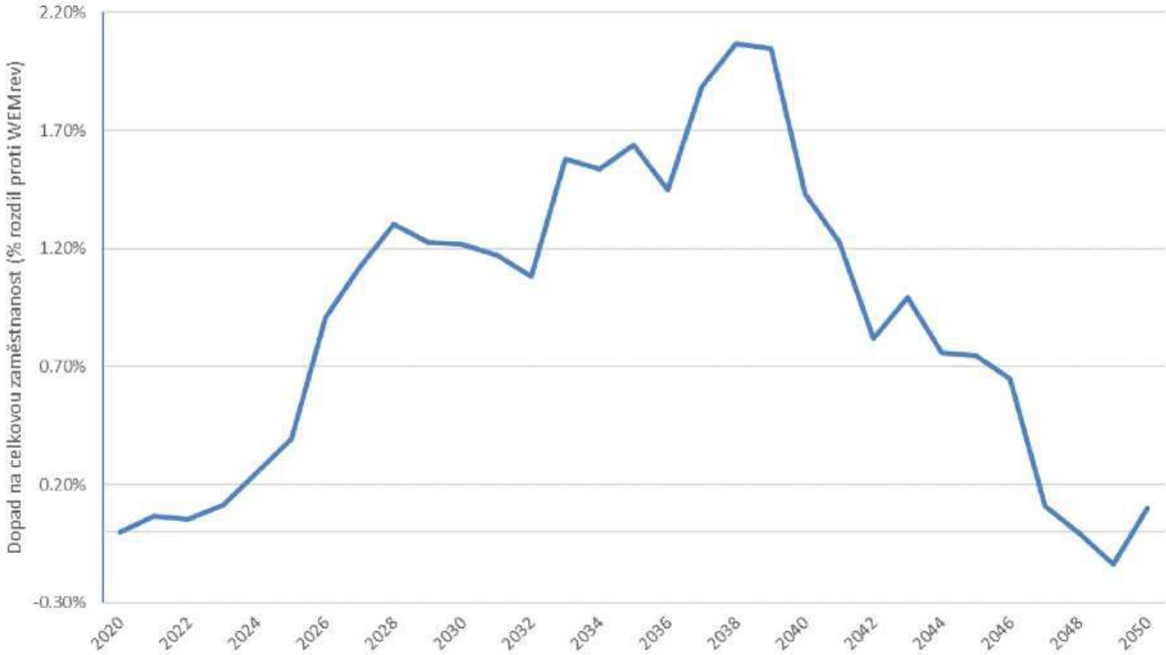
In absolute terms, employment, measured by thousands of people, is increasing slightly year-on-year until 2026, peaking at 5.48 million people, before gradually declining to 4.71 million in 2050. This trend is driven by the prediction of population and benchmark workers in the E3ME model. However, compared to WEM, the number of WAM staff is higher almost throughout the period, with a peak of around 2037-2039 by 1.9-2.1 %. The relative decrease occurs only at the end of the modelled period since 2048, where this is a negative percentage deviation of the order of 0.1 %. WAM is increasing employment compared to WEM in absolute terms around 50-70 thousand persons between 2026-2032, 80-100 thousand between 2033-2039 and around 50 thousand people in 2040-2043.

Graph 129: Impact on employment – WAM difference vis-à-vis WEM (thousands of persons)



The most significant increase in employment is in the construction and construction sectors, which is linked to the investment activity of building new energy sources and saving energy. From 2026 until 2045, employment in the construction sector is just under 5 % to 13.5 % higher than in WEM, with a peak in 2038. In absolute terms, this is a positive difference of 25 thousand jobs on average, with a peak of 35.5 thousand additional jobs in 2038. In 2026-2040, the WAM scenario has a very similar effect on employment in both services and industry, with an average of 24 and 22 thousand jobs added. In the agriculture and energy sectors, the positive effect is modest, in the order of 1 %. After 2040, the positive effect in energy, industry, construction and services is declining and gradually decreasing, but remains positive, while in the agricultural sector it turns negative and we are looking for a 1.5 % fall in jobs in the WAM scenario. The opposite trend is employment in transport, where after an initial negative effect, the number of jobs starts to increase by an average of 8 thousand after 2040 compared to the WEM. Due to falling demand for fossil fuels, the effect on the number of jobs related to raw material extraction is negative almost throughout the reporting period, with a growing negative trend of up to 4 % at the end of the reporting period, but in absolute terms less than a thousand jobs on average.

Graph 130: *Impact on overall employment of the Czech Republic, WAM compared to WEM*

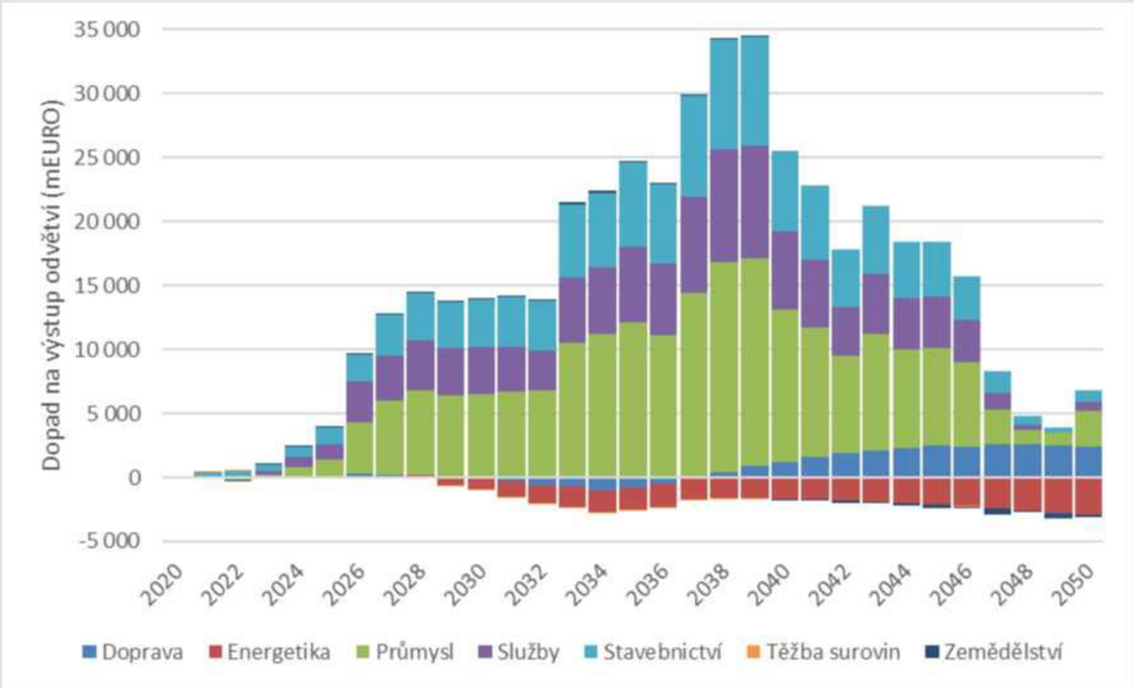


5.2.2 Impacts on the economic activity of the sector

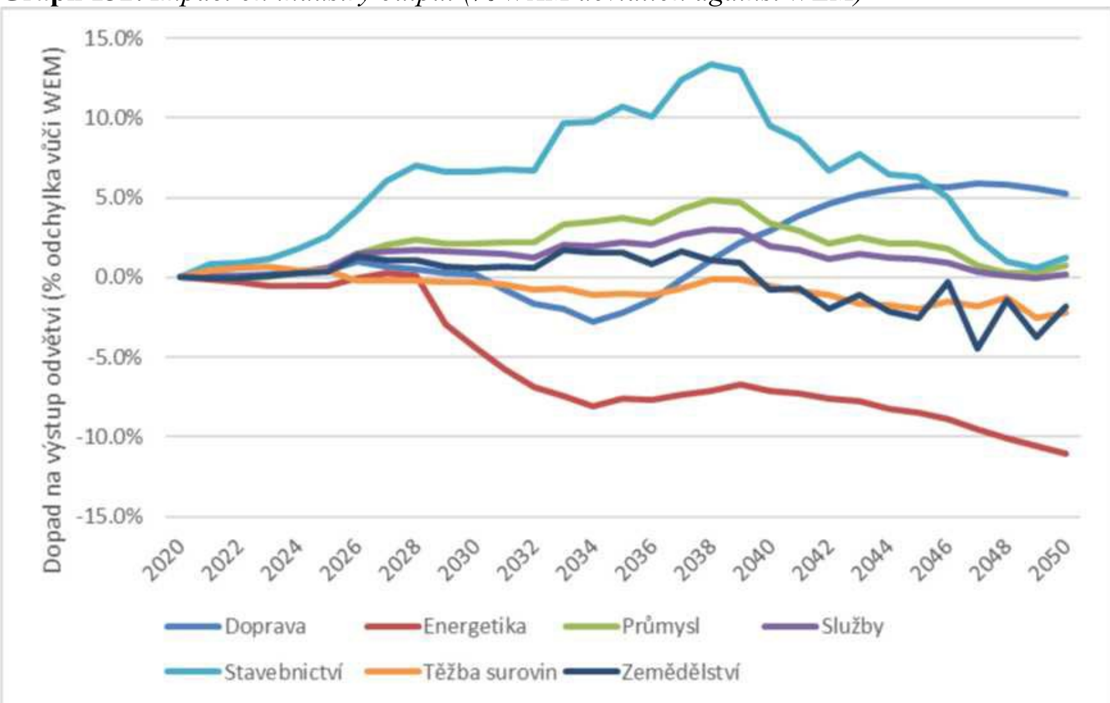
Economic activity

The examination of impacts by economic sector shows different results. The figure below presents sector output compared to the WEM scenario. Output is higher in most economic sectors, including significant positive effects, especially in the construction sector, reaching up to 13 % around 2038, and more moderately also in industry, services and agriculture. On the contrary, negative impacts are seen slightly in the extraction of raw materials and significantly within the energy sector, with an average decrease of 7 % in sectoral output after 2029 compared to the reference case. Transport production, in line with the shift away from fossil fuels, is first declining and, following a higher penetration of alternatively fuelled vehicles, it rises again to almost 6 per cent, moving further away from the WEM scenario.

Graph 131: *Impact on the output of the sector (absolute difference between WAM and WEM in million euro)*



Graph 132: *Impact on industry output (% WAM deviation against WEM)*

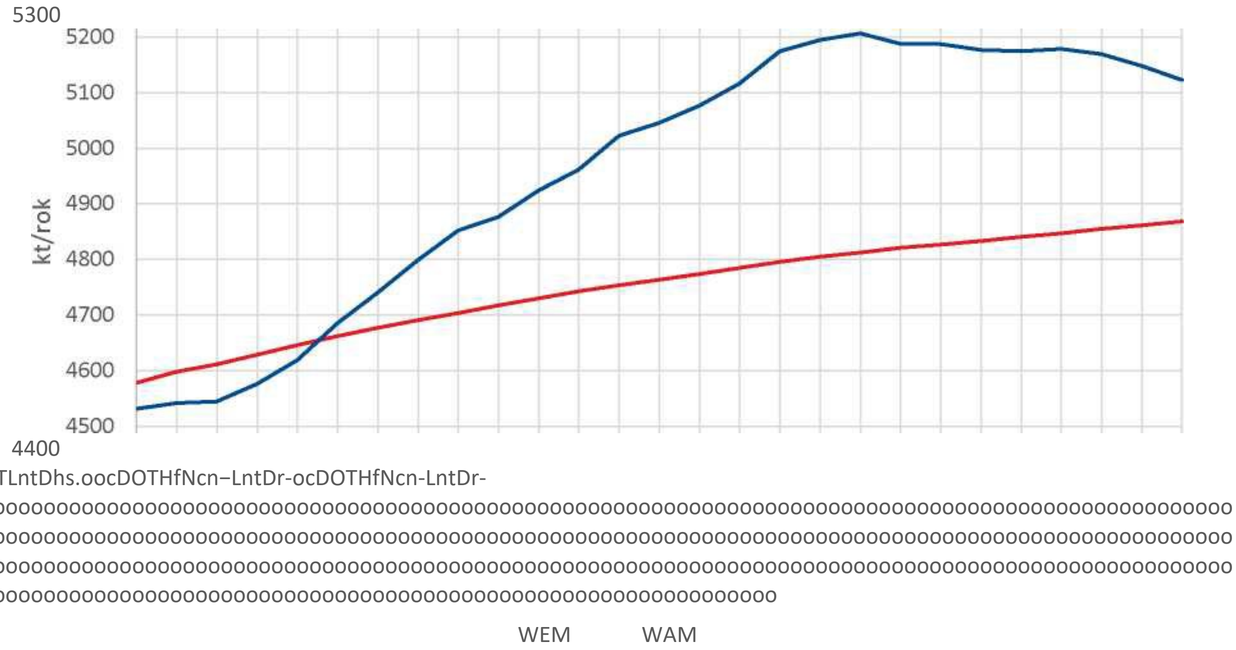


Production of steel

Steel production is essentially unchanged throughout the period in WEM, increasing by 7 % in 2050 compared to the 2023 level of 4.56 million tonnes in the model. By 2028, the steel production volume in WAM is about 1 %b lower than in WEM. The subsequent investment activity in WAM leads to an increase in steel production after 2028, especially in 2040-2043, when the production volume in WAM is 8 % higher than in WEM.

In 2050, the steel production volume in WAM will increase by 13 % compared to the 2023 production volume, while steel production in WEM increases by only 6.7 % in 2050.

Graph 133: *Production of steel*



5.2.3 Just Transition aspects

5.2.3.1 Distributional impacts – Analysis of distributional (social) impacts of NECP-2024 by the DASMOD micro- simulation model (Analytical basis for updating the 2024 Czech Energy and Climate Strategy (SEEPIA)

In this part of the study, we analyse the impacts of the **WEM** and **WAM** scenarios on different types of households. In particular, we simulate the impacts on household expenditure and income by product category in 2027, 2030 and 2032. We also show the impact of scenarios on energy poverty. For this type of analysis, we use the static micro simulation model *Distributional And Social Impact Model* (DASMOD) developed by the UK COŽP site (see Early 2012a; 2012b). The analysis results in a simulation of expenditure shares in disposable income in 2027, 2030 and 2032 relative to the WEM scenario. The basis for this analysis is SILC and SRU data from the reference year 2022. All amounts mentioned are in 2022 prices.

We have chosen the following assumptions to simulate impacts. The simulation uses the same pension elasticities inputs as the E3ME macrosimulation model. We took price elasticities from the Ministry of Finance's macroeconomic prediction from 11/2022. The current version of the model uses neutral cross-price elasticities. The input to the model is the price changes of 43 product categories and the real net income growth predicted for each income decil by the macro-econometric model E3ME for the WEM and WAM scenarios.

In order to assess the impact on the distribution of income and wealth, we compare the WAM scenario with the WEM scenario, similar to the analysis of the results of the TIMES-CZ model. A description of the WEM and WAM scenarios can be found in Chapter 1.1.2. The WAM scenario includes compensation for low-income households D1-D5 which are energy poor according to the M2/LIHC indicator (detailed below), totalling CZK 120.5 billion distributed in 2027-2032. On average, it is around 31.9 thousand per year. CZK per household, see table below.

Table 107: *Amount of compensation in the WAM scenario*

	2027	2028	2029	2030	2031	2032
Compensation in WAM in CZK/year per household	30 573	31 250	30 644	30 024	33 150	36 016

In addition, we introduce in this chapter the WAM NC scenario (without compensation), which is used to insulating the effects of compensation for households. The WAM NC scenario is based on the WAM scenario, but with the difference that households do not receive compensation. This means that the total sum of CZK 120.5 billion, which is earmarked for compensation in 2027-2 032 in the WAM scenario, remains unused in this scenario. The WAM NC scenario was not analysed in E3ME, but only as a WAM variant in DASMOD.

The figure below shows the percentage relative change in the share of total expenditure in net revenues compared to the WEM reference scenario. It is important to note that, in this case, negative values represent a positive change, as they mean that households retain a greater share of their net income when all expenditure has been paid.

(Panel I) is divided into ten groups (deciles) according to income levels, the first decil being the lowest-income households and the tenth decil with the highest. For each decil, columns are displayed for three different years (2027, 2030 and 2032) and two scenarios: WAM rev (WAM): reform scenario and WAM rev NC (WAM NC): a reform scenario without compensation for households.

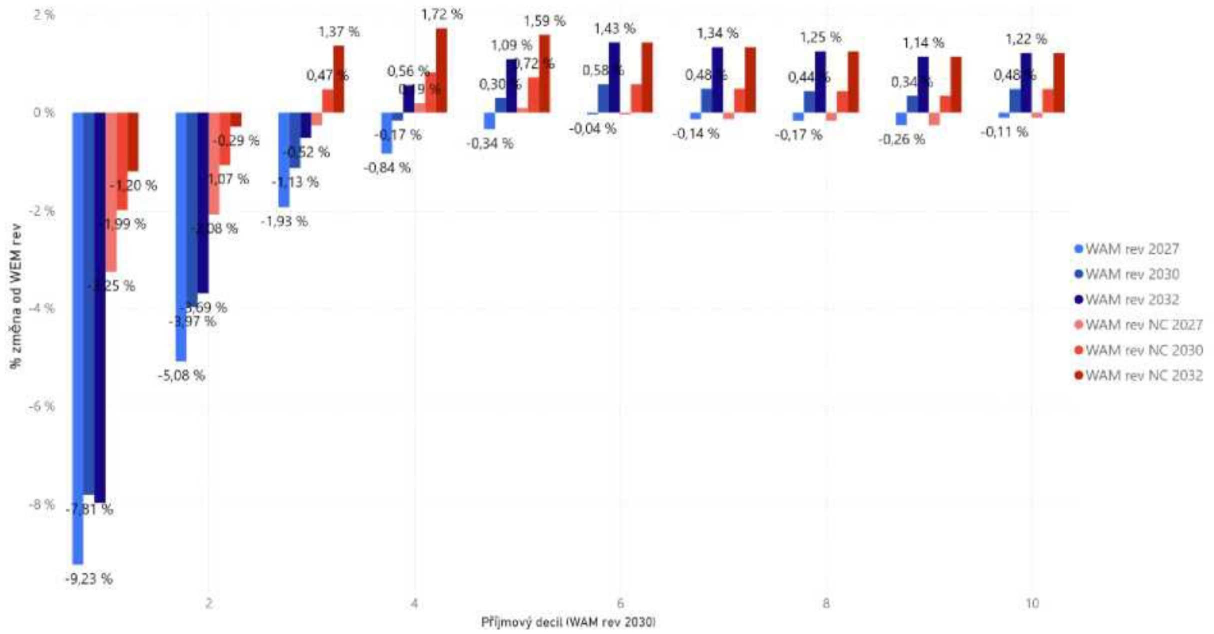
For example, taking the WAM scenario in 2027 for the D1 decil, households will improve as their share of all expenditure in disposable income will decrease by 9.23 % relative to the WEM scenario. In all years for D1-D5 deciles, it appears that the WAM scenario (with compensations) leads to a greater improvement (a larger decrease in the share of expenditure in disposable income) compared to the WAM NC scenario (without compensation). This confirms that offsets mitigate the impact of reforms on low-income households and help them to sustain a larger part of their disposable income. However, only the deciles D1 to D3 in WAM improve relative to the WEM scenario in all years, while the other deciles will relatively increase the share of expenditure. Over the years, both the WAM and WAM NC scenarios show a higher burden on all deciles as the shares of all expenditure in disposable income increase (except WAM 2032 for D1).

Impacts differentiated by type of household, education, type of apartment ownership and type of heating (Panel II and Panel III) are interpreted in the same way as for income deciles. One adult (without a partner, may not be a parent) with at least one child, an individual under the age of 65 and an individual aged 65 or over have the highest share in D1-D3 income deciles (see Table 7). Higher-education households (HEIs) do not record a significant difference from WEM in all scenarios; compared to time, they tend to see an increase in the expenditure ratio, i.e. a deterioration in the situation. Households with lower education tend to improve both WAM and WAM NC compared to WEM in both scenarios.

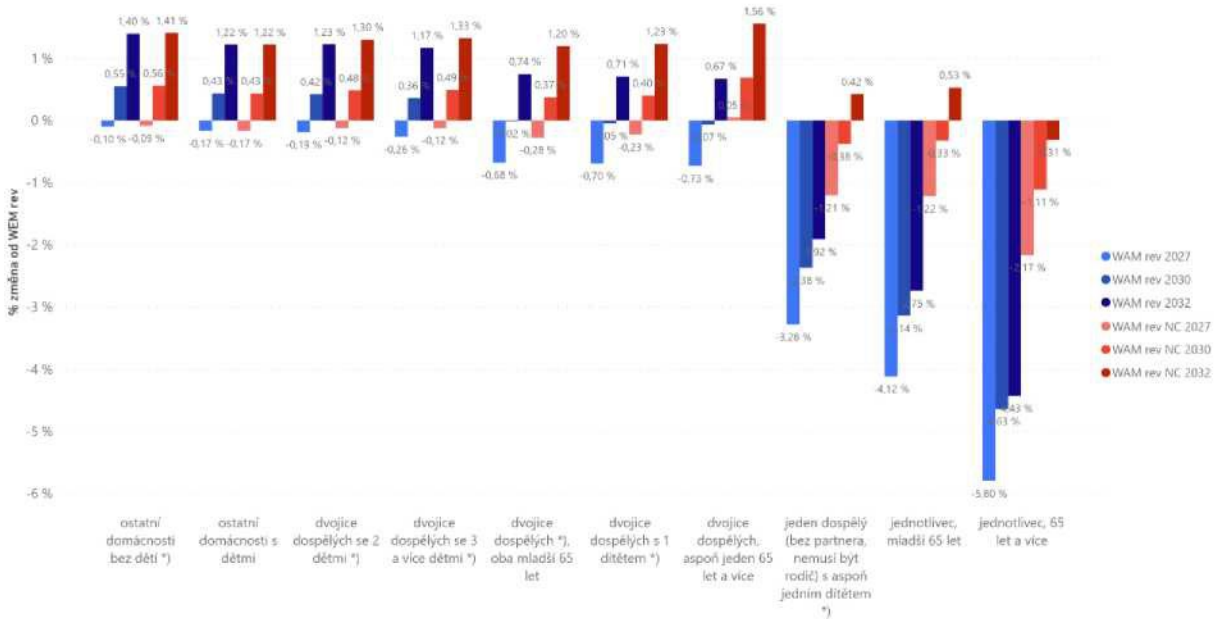
The biggest deterioration is recorded by households with personal, cooperative and home-owned dwellings, especially in the WAM NC scenario in 2030 and 2032. Households using electricity for heating will see a significant improvement in the WAM scenario and the comparison between years, as their share of disposable income will decrease. Similarly, households with heating using natural gas will improve, albeit less than electricity. On the contrary, coal fuel households will experience deterioration in the WAM NC scenario, especially in 2032. Households with a PV system will deteriorate slightly in both scenarios – these households are in higher income deciles, which they tend to deteriorate in both WAM and WAM NC scenarios (see Panel I).

Figure 24: *Distributional impacts, E3ME, WAM and WAM NC compared to WEM – relative % change in total expenditure shares in household net income from WEM*

Panel I – deciduous comparison



Panel II – comparison by type of household (EU definition)



Panel III – comparison by education, type of ownership of the apartment and type of heating

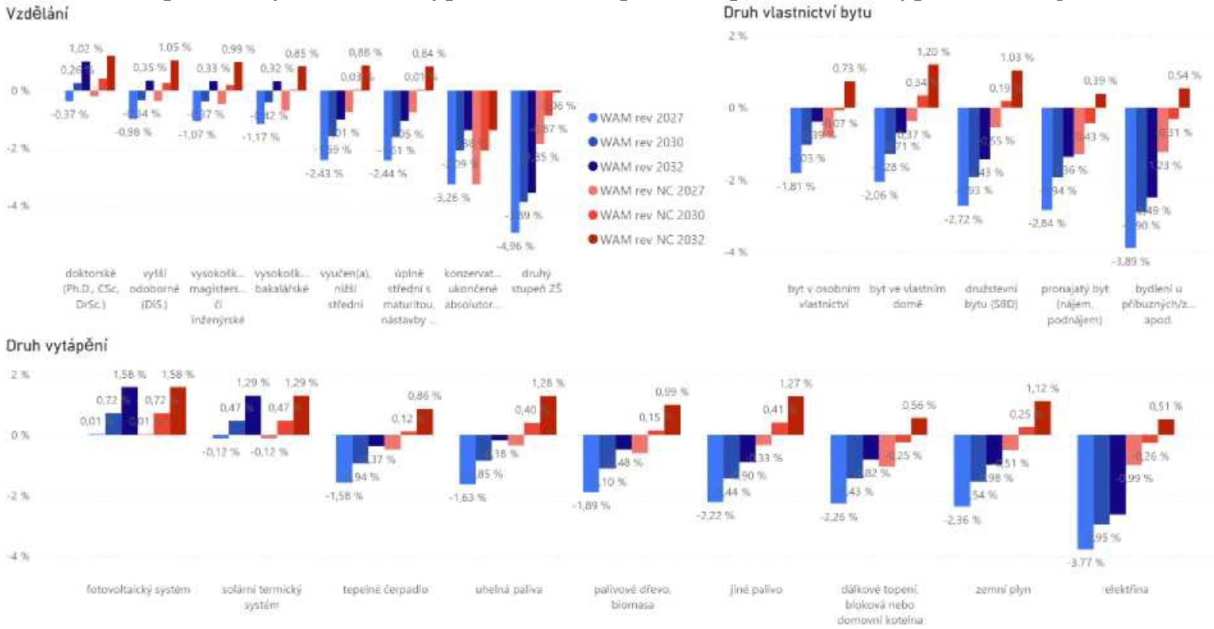


Table 108: *Percentage of households per population by species (row) and income decile (columns)*

Household type - def. EU	1	2	3	4	5	6	7	8	9	10	Total
adult pairs, at least one 65 years old and over	0.04 %	0.27 %	1.73 %	5.08 %	4.63 %	2.10 %	1.43 %	0.77 %	1.22 %	0.88	18.15 %
individual, 65 and over	6.84 %	5.70 %	2.73 %	0.88 %	0.40 %	0.38 %	0.12 %	0.20 %	0.08 %	0.29	17.63 %
individual, under 65	2.21 %	2.35 %	3.30 %	1.74 %	0.95 %	0.95 %	0.68 %	0.22 %	0.12 %		12.52 %
adult pair *), both under 65 years of age	0.23 %	0.19 %	0.53 %	0.40 %	1.16 %	2.34 %	1.64 %	2 67 %	1.81 %	1.42	12.37 %
pairs of adults with 2 children *)			0.08 %	0.23 %	0.85 %	1.65 %	1.76 %	2.54 %	2.63 %	2.11	11.85 %
pairs of adults with 1 child *)	0.14 %	0.02 %	0.06 %	0.26 %	1.01 %	1.38 %	2.32 %	1.66 %	1.07 %	1.40	9.33
one adult (without partner, not required to be a parent) with at least	0.56 %	1.47 %	1.53 %	1.30 %	0.71 %	0.54 %	0.59 %	0.25 %	0.11 %	0.03	7.10
other households without children *)			0.04 %	0.05 %	0.12 %	0.37 %	0.69 %	0.60 %	1.65 %	2.34	5.85
pairs of adults with 3 or more children *)				0.06 %	0.18 %	0.31 %	0.54 %	0.57 %	0.45 %	0.55	2.66
other households with children						0.06 %	0.16 %	0.52 %	0.85 %	0.96	2.55
Total	10.02 %	10.00 %	10.00	9.99 %	10.00 %	10.09	9.92 %	10.01 %	10.00 %	9.97	100.00

Note: The values refer to 2022.

Summarising the results described above, WAM delivers positive impacts on households in the lowest income deciles (D1 to D3, partially D4 and D5) resulting from the recycling of part of the revenues from the sale of emission allowances for social compensation. The appropriations for these compensations in WAM amount to around 120.5 billion by the end of 2032. CZK, with a gradual rise from the level of 19.2 billion. CZK in 2027 to 22.6 billion. CZK in 2032 (all in current prices 2022). These compensations represent an average of 31.9 thousand by the end of 2032. CZK per year per household (see Table 9) in the first five income deciles at risk of energy poverty according to the M2/LIHC indicator. This support is foreseen in the modelling exercise in the form of a direct payment. In the case of support to households in energy poverty, such social compensations can be implemented differently – changes in the tax and social security system (including fiscally neutral reform without burdening the national budget), compensated energy costs or direct support for green investments to vulnerable households with sufficient advisory support. Given the possibility of fiscally neutral implementation, it would not necessarily be an increase in the expenditure of the State budget.

Modelling assumes that all households respond to increased prices due to carbon pricing by changing their demand (by reducing consumption and substitution of consumption items) and implementing energy-saving measures (which are also supported by ETS revenues). Investments in energy savings, which in turn lead to lower energy expenditure, are allocated equally between revenue deciles in the E3ME model. This implicitly means that effective demand response and implementation of investments without any barriers are expected for all households. In reality, there are a number of households where there are significant barriers to any investment activity (e.g. availability of capital, short-term horizons in investment decision-making), which may be compounded by other institutional, legislative and behavioural factors that lead to a departure from economically rational investment decisions (see*'energy efficiency paradox/gap*'). In addition, many households live in rental apartments, and the owner of these apartments may have little incentive to invest in austerity measures that will lead to lower energy payments paid by the tenant.

We use the following 3 indicators to describe and develop energy poverty in the Czech Republic, with only the last of the following indicators (M2/LIHC) used for the modelled WAM and WAM NC scenarios:

- **2 m** – Household is considered to be at risk of energy poverty if its share is energy expenditure more than twice the national median (we use the entire sample to calculate the median).

- **LIHC (Low income high cost)** – Household is considered to be at risk of energy poverty if its disposable income, net of housing and energy costs, is below the poverty threshold (set at 60 % of the national median) and spends more than the national median on energy.

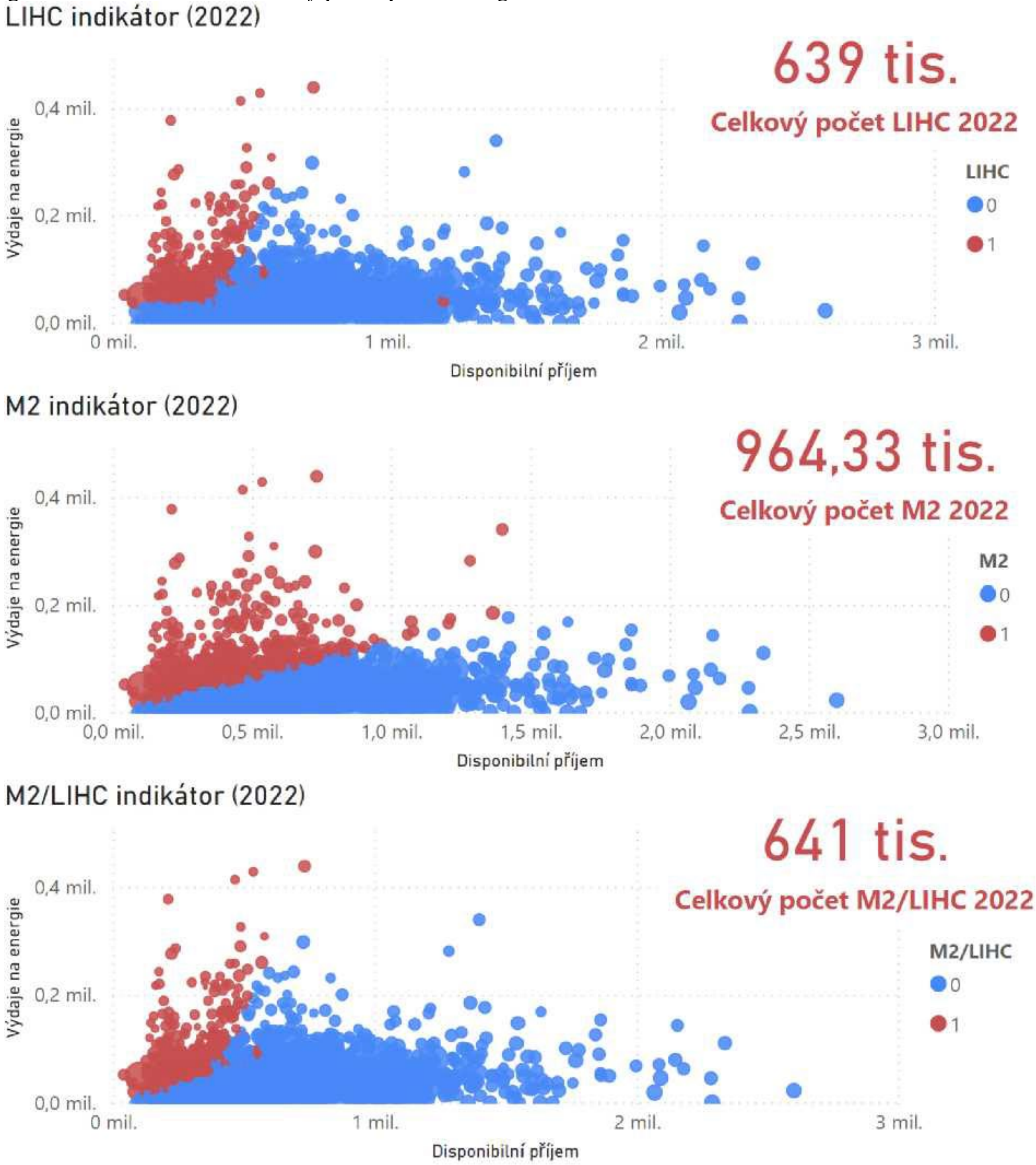
- **M2/LIHC** – Household is considered at risk of energy poverty if it is disposable income less housing and energy costs below the poverty threshold (which is set at 60 % of the national median) and its share of energy expenditure more than twice the national median (we use the entire sample to calculate the median). ***It is therefore a combination of 2M and LIHC of the above indicator.*** This combination is an appropriate use to identify low-income households with abnormally higher energy costs.

Figure 25 shows three points charts illustrating the relationship between disposable income and energy expenditure in 2022. Each graph represents a different indicator of energy poverty.

1. LIHC indicator: The chart shows that energy poor households (red points) are concentrated in an area with lower disposable incomes and higher energy expenditure.
2. M2 indicator: The chart shows a similar trend as LIHC – energy poor households (red points) are concentrated in lower incomes and higher energy expenditure. Compared to the LIHC indicator, there is a visible shift of red points towards higher incomes, suggesting that M2 indicator can identify energy poverty even for households with relatively higher incomes.
3. M2/LIHC indicator: This graph combines both indicators. The chart shows a pattern similar to the previous two graphs, but with a smaller amount of red points, suggesting that the combination of both indicators may lead to a more accurate identification of energy poor households.

In 2022, as measured by M2/LIHC, 14.28 % of households at risk of energy poverty (a total of 641057 households) were at risk of energy poverty. The WAM scenario significantly reduces the number of households at risk of energy poverty according to M2/LIHC in all years 2027, 2030 and 2032 relative to WEM, see Table 8. Conversely, the WAM NC scenario has almost no impact on the M2/LIHC indicator in all years. This is mainly due to the chosen compensation scheme. Comparing different types of households, WAM reduces the share of energy-vulnerable households in retirement, parental leave, full-time self-employed and full-time employees.

Figure 25: *Households at-risk-of-poverty according to LIHC, M2 and M2/LIHC all in 2022*



Note: Graphs show individual households. Red-labelled households are at risk of energy poverty. The size of the dot indicates the weight of the household in the population – the larger the more households are.

Table 109: *Impacts of both WAM and WAM NC on energy poverty measured according to M2/LIHC indicator*

Economic activity of the head (predominant)	Category share in stock (2022)	M2/LIHC share in 2022 population	Number M2/LIHC (2022)	WAM REV from WEM 2027	WAM REV from WEM 2030	WAM REV from WEM 2032	WAM REV NC from WEM 2027	WAM REV NC from WEM 2030	WAM REV NC from WEM 2032
retired	32.41 %	8.77	393 795	—10.62 %	—	—12.03 %	0.28 %	0.64 %	0.86 %
employed – Full-time	43.27 %	2.09	93 82	—10.03 %	7.63 %	—10.06 %	—	2 67 %	0.00 %
employed – part-time	12.71 %	1.88	84	0.00 %	0.00 %	0.00	0.00 %	0.00 %	0.00 %
self-employed – full-time	7.27	0.46	20 71	—11.76 %	11.76	—11.76 %	0.00 %	0.00 %	0.00 %
in invalidity pension, incapable of work	1.19	0.41	18 47	—5.91 %	—5.91 %	—5.91 %	—	0.00 %	—2.94 %
unemployed	1.90	0.37	16 55	0.00 %	0.00 %	—	—0.00	0.00 %	0.00 %
on parental leave (receiving FP), household, caring for children or a relative	0.28 %	0.14 %	6 067	—27.60 %	—10.46 %	—10.46 %	— 8.45 %	13.23 %	13.23 %
self-employed – part -time	0.71	0.11	5 021	0.00 %	0.00 %	0.00	0.00 %	0.00 %	0.00 %
pupil, apprentice, student (daily study)	0.13	0.04	1 947	0.00 %	0.00 %	0.00	0.00 %	0.00 %	0.00 %
other economically inactive	0.13	0.00	114	0.00 %	0.00 %	0.00	0.00 %	0.00 %	0.00 %
Total	100.00 %	14.28 %	641 057	—8.97 %	—7.86 %	—10.16 %	0.09 %	0.90 %	0.56 %

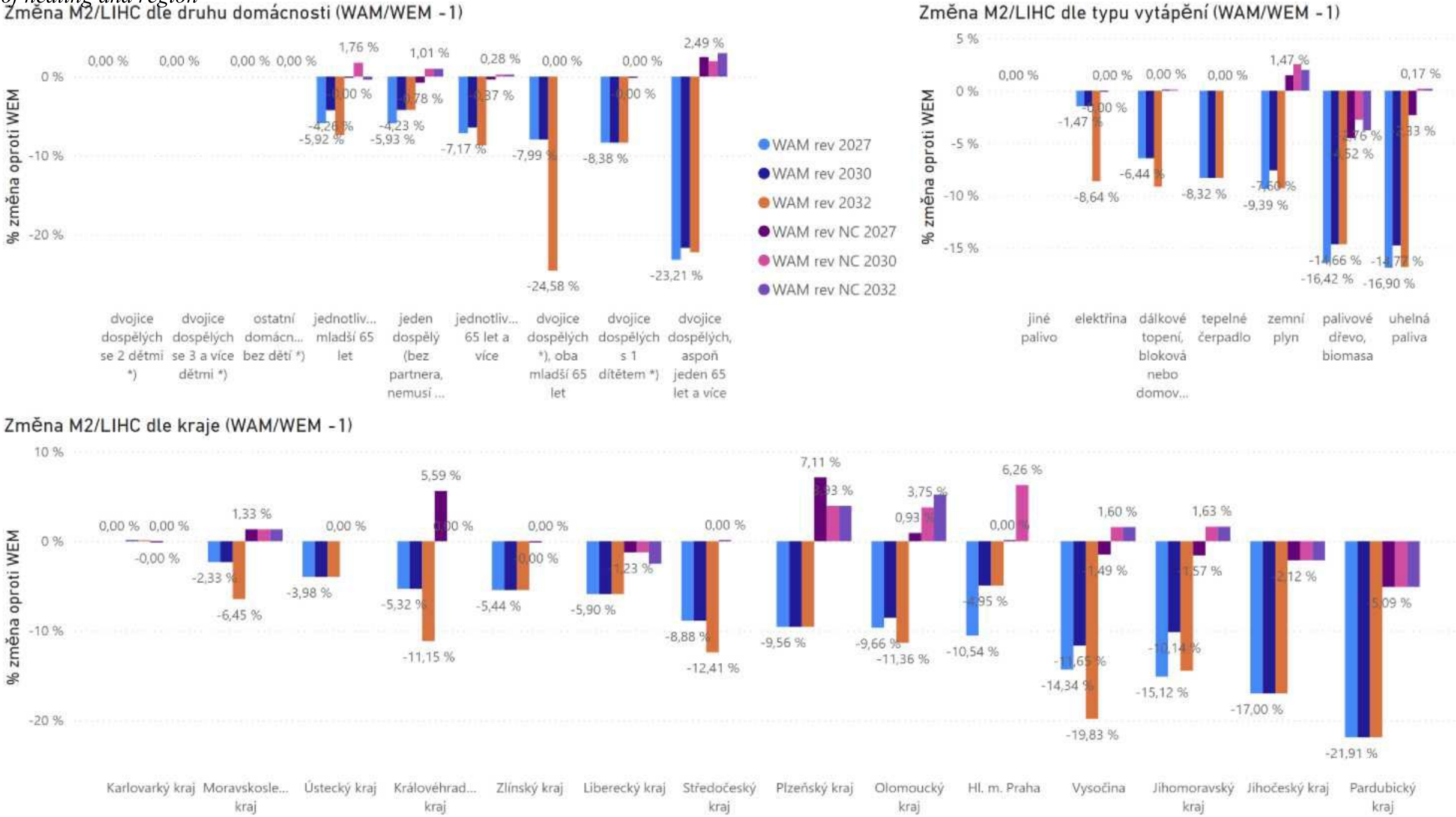
Figure 26 shows in more detail the impact of modelled scenarios. The picture consists of three panels analysing in detail the percentage change in the share of households at risk of energy poverty (M2/LIHC indicator) compared to the WEM reference scenario. The change is displayed for different types of households, types of heating and regions in the Czech Republic, for WAM (with compensations) and WAM NC (without compensation) scenarios in 2027, 2030 and 2032. Negative values imply a reduction in the share of households at risk of energy poverty compared to the WEM, a positive change.

The WAM scenario generally leads to a decrease in energy poverty for most types of households, in particular for households without children. On the contrary, for households with children, the WAM and WAM NC scenarios are not different from the WEM. Furthermore, WAM delivers the greatest improvement for fuel-fired and coal-fired households, with the share of households at risk falling by up to 16.9 % in 2032. In general, the WAM scenario will reduce energy poverty for all households independently of the heating source. In the WAM NC scenario, the share of energy poor households is increasing mainly for those using natural gas.

Similar to the type of heating, the share of households at risk of energy poverty will decrease in all regions. Highest in Pardubice and South Bohemia regions. On the contrary, the modelling in the WAM NC scenario shows that the share of households at risk of energy poverty may also increase in Plzeň, Královeck, Olomouc and Hl. m. Prague.

To summarise, modelling the WAM and WAM NC scenarios showed that the WAM scenario, including offsets, would lead to a significant reduction in energy poverty in all years analysed. On the contrary, the WAM NC scenario without compensation would not have a significant impact on energy poverty. Reforms would have a positive impact on most types of households and in all regions, with the most significant improvements for solid fuel-heated households and in the Pardubice and South Bohemia regions.

Figure 26: *Relative change in the impacts of both WAM and WAM NC in comparison with WEM by type of household, type of heating and region*



5.2.3.2 Social impacts on transport

Social impacts in the field of transport can occur directly or directly increase the cost of transport (public collective/passenger car). Today, transport poverty is one of the new forms of potential threat that households or individuals, in particular low-income ones, may be exposed to as a result of meeting climate targets. This may result in a limited ability of individuals and households to provide basic socio-economic services. The average share of household transport expenditure in the Czech Republic is 4.55 %, with private transport accounting on average for 3.93 % of expenditure and 0.63 % for public transport. This is more accessible in larger cities, whereas rural households spend more on passenger transport (4.69 %), compared to public (0.40 %) and there is a higher risk of transport poverty. In the Czech Republic, up to 479 thousand people were at risk of transport poverty in 2022, including 218 thousand people living in rural areas. Moreover, the provision of public transport in remote regions may not always be sufficient. The Czech Republic has a very dispersed settlement with 6254 municipalities, where half of the municipalities have fewer than 400 inhabitants. The Czech settlement structure puts pressure on the capacity of transport infrastructure, the availability of public transport and dependence on the car. There may be an increase in the number of individuals and households at risk of transport poverty. Investment in low-emission and emission-free transport, integrated and operational transport and the promotion of carsharing will be key in this regard.

5.2.3.3 Overview of programmes and strategies linked to just transition

The Czech Republic's objective is to completely reduce the use of coal for the production of electricity and heat by 2033. In addition to the need for significant investments in the modernisation of energy and heating, it is necessary to address the social and economic effects of this downturn, of course primarily in the coal regions (Karlovarský, Ústecký and Moravskoslezský regions).

In coal regions, the share of employees in mining itself is already relatively small (1-3 % of the region's workforce), following a gradual decline over the last 30 years. Large mining companies are no longer the largest employers in coal regions. Nevertheless, the impact on the regional labour market will be significant, also taking into account the large number of (sub)contractors linked to the extraction itself.

In coal regions, in addition to supporting the economy (e.g. promoting entrepreneurship and innovation) and addressing environmental challenges (rehabilitation of land after mining), it is therefore necessary to address social impacts in a broad sense. Coal regions are characterised not only by relatively higher unemployment (in particular the Ústí nad Labem and Moravian-Silesian regions), but also by other social problems, including a high number of people in execution, early school leaving and lower educational outcomes. These factors make a significant link to regions' development potential and lead to the development of the phenomenon known as 'geography of discontent', i.e. the dissatisfaction of a significant part of society in lagging regions and the growing tendency of their populations to support anti-systemic political parties, which are also undermining Green Deal initiatives. Addressing the social impacts of the transformation of the economy is therefore essential for the success of national and European energy and climate objectives.

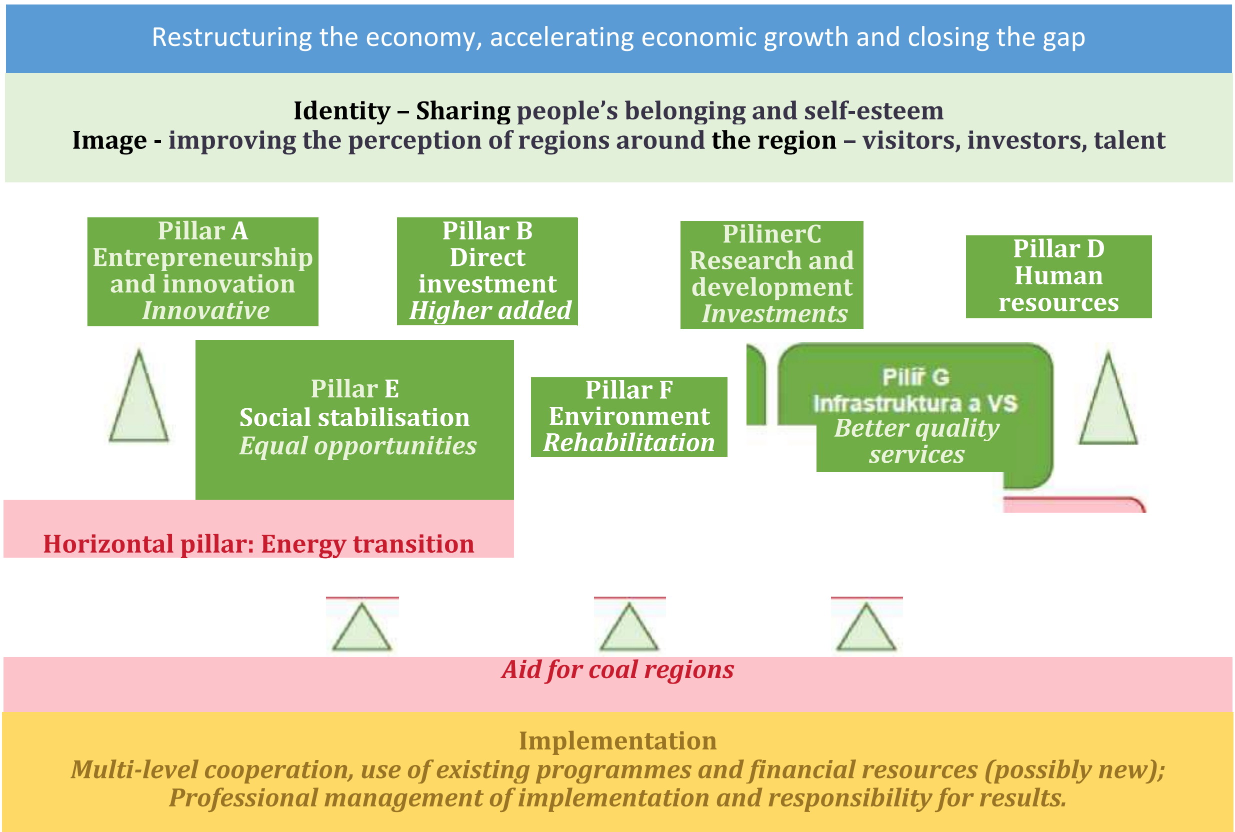
The just transition programme aims to address the social and economic impacts in coal regions. The themes supported include retraining of staff. In 2023, 'Education in firms' calls were launched to upskill and upskill workers for new sectors, such as technical and continuing vocational training. The aid is conditional on the establishment of a transformation plan for the undertaking. In 2024, a call for employment support in the Ústí Region was launched to support active employment policy tools in the region.

Calls will be launched in 2024 to strengthen social stability and support primary and secondary schools with a combination of social problems. Strengthening social stability will be implemented, for example, through specialised training of staff on social and preventive services, ensuring staffing capacity for long-term work with children and youth, and strengthening children's and youth's collectives by supporting preventive stays. In line with the strategy of the Ministry of Education, Youth and Sport, support for regional education will be targeted (in the form of increased financial and methodological support) to schools where pupils from disadvantaged backgrounds are concentrated.

Re:START strategy

The RE:START strategy is the comprehensive framework for the economic restructuring of the Ústí nad Labem, Moravian-Silesian and Karlovy Vary regions to contribute to the just transition of coal regions. The programme was established on the basis of Government Resolution No 826 of 19 October 2015, in which the Government decided on the need to support the economic restructuring of the Ústí nad Labem, Moravian-Silesian and Karlovy Vary regions. On the basis of that resolution, the Ministry of Regional Development commissioned an initial analysis which gave a detailed assessment of the current situation, the most serious problems and the development potential of the regions concerned. The subject of the analysis was not only an extensive macro-economic analysis, but also a collection of input and experience, which was carried out in individual regions. Based on the initial analysis, the so-called 'Strategic Framework' has been developed. This document does not yet contain a proposal for concrete measures, but outlines their basic principles common to all regions. The strategic framework expresses the government's long-term strategy to support, facilitate and accelerate the restructuring of the economy in structurally affected regions. Concrete measures are part of the so-called action plans. The action plans approved by the government combine measures from the business and innovation pillars, direct investment, R & D, human resources, social stabilisation, environment, infrastructure and public administration, energy transition. The 5th update of the Comprehensive Action Plan of the Restructuring Strategy of the Ústí nad Labem, Moravian-Silesian and Karlovy Vary Regions 2023-2024 was approved on 14.12.2022. Figure 18 presents the main objectives and pillars of the RE:START strategy. Table 121 then shows the aggregate financial requirements for measures according to each action plan. U 5. The action plan is a prerequisite for financial requirements.

Figure 27: *Key objectives and pillars of the RE:START strategy*



Source: Re:START strategy

Table 110: Aggregate financial requirements for measures according to individual RE:START action plans

	1. Action plan	2. Action plan	3. Action plan	4. Action plan	5. Action plan
Total allocation in CZK million	**40 445**	**16 901**	**11 090**	**73 644**	**1 950**
Implementation time	2017-2030				

Source: Re:START strategy

Initiative for Coal Regions in Transition

In 2017, the European Commission initiated the establishment of the Coal Regions Transformation Platform, later renamed the 'Initiative for Coal Regions in Transition'. In total, the EU has 41 regions in 12 Member States. In 2019, 18 coal regions, including three regions from the Czech Republic, were actively involved in the platform, namely the Moravian-Silesian, Ústí nad Labem and Karlovy Vary regions. The Czech Republic considers the platform to be very important and will seek maximum involvement.

The initiative aims to assist Member States and regions in their efforts to modernise their economies and prepare them to address the structural and technological transition in coal regions. The EU's commitment to the clean energy transition is irreversible and indisputable. The initiative aims to facilitate the development of long-term strategies in coal regions to support the clean energy transition by focusing more on social fairness, new skills and financing of the real economy.

The Coal Commission of the Czech Republic

The 'Uhelná Commission' was set up by Resolution No 565 of the Government of the Czech Republic of 30 July 2019. The Coal Commission is currently closed. This commission was chaired by the Minister for Industry and Trade together with the Minister for the Environment. The Commission had a total of 19 members. Key departments and offices, trade unions and industry/economic associations, non-profit organisations, regions, the Chamber of Deputies and academia were represented. The Coal Commission's remit was defined by the following outputs: (I) an assessment of the future needs of lignite, focusing on the assessment of individual large combustion sources in the form of a comprehensive analysis; (II) an analysis of options for a future shift away from the use of coal in combustion sources. The terms of reference of the Commission shall not be limited in time. The Coal Commission has appointed three working groups, a working group: (I) for establishing a timetable for phasing out coal use, in the overall context of the Czech Republic's energy mix and climate protection; (II) to define parameters for potential depletion of resources and issues of legislation, and (iii) to identify social and economic impacts.

Territorial Just Transition Plan (TJTP)

Government Resolution No 815 of 17 July 2020 ordered the start of the process of the Territorial Just Transition Plan (TJTP). The Ministry of Regional Development and its coordinator of RESTART have been responsible for coordinating this work. The document was processed according to the prescribed structure of Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Just Transition Fund. The processing was discussed with representatives of the European Commission, structurally affected regions and departments concerned. The fund is intended for three regions – Ústícký, Moravskoslezský and Karlovarský – which face serious socio-economic challenges due to the transition process towards a climate-neutral economy. Support for the so-called coal regions is mainly aimed at creating new jobs, helping workers to move to other sectors and rehabilitating areas after mining or downstream industries. A Just Transition Mechanism has been created to address the social and economic consequences.

The Operational Programme Just Transition, both in its strategic part and in the proposals for each priority, builds on the Territorial Just Transition Plan. Together with this programme, it was approved by the European Commission on 26 September 2022. The update of the Just Territorial Transition Plan is linked to the Czech Republic's National Energy and Climate Plan.

Overview of funding sources and investment needs

5.3.1 Investment needs of the WAM scenario

Decarbonisation consists of modernising the economy – investment activities over time. Technologies are available that are more efficient than existing ones – both for electricity generation and for energy consumption in general. The investment cycles of physical infrastructure are long – the houses are built with the prospect that they will be operational for 50 years or more; industrial installations also have a life cycle for several decades.

The overall investment need for decarbonisation and adaptation measures by 2030 will be significant. The cost of decarbonisation cannot be completely decoupled from the cost of normal capital renewal, where, for example, installations are replaced more efficiently thanks to technological progress.

Even in the reference scenario, significant investments would be made, partly due to normal capital recovery in the economy. However, it can be assumed that the amount of these investments will be lower than in the decarbonisation scenario, as the reference scenario does not include the construction of new nuclear resources. . Developing functional financing models for energy infrastructure, RES operation, energy savings and energy storage will be key to support and meet investment needs.

The decarbonisation scenario shows that for successful decarbonisation, investments need to be prepared so that the modernisation of the economy moves at a very fast pace – the higher investment costs today return over the life cycle – the economy will become more resilient and rising emission allowance prices may not weigh on competitiveness.

5.3.2 Sources of funding

Based on available expertise from the expert community and international financial institutions, it can be assumed that the majority of investments, in particular in decarbonisation, should be financed by the private sector, although the ratio between public and private capital may vary between sectors and categories of investments162. In areas that are too risky for private capital, such as the construction of new nuclear resources, public financial support appears necessary. In any case, care must be taken to ensure that the involvement of public funds is cost-effective, maximises the benefits of each crown spent and does not crowd out private investment but, on the contrary, stimulates them as far as possible.

For the current decade, the Czech Republic has, or will soon have, the following European resources, for which allocations are established at the level of individual EU Member States: EU Cohesion Policy Funds, National Recovery Plan, Modernisation Fund, Social Climate Fund and ETS revenues. A specific area is the financing of the construction of new nuclear resources, which will need to be provided outside EU funding.

European resources can cover the bulk of public investment support. At the same time, new resources may be available until 2030 after the end of the current period of the National Recovery Plan (in 2026) and the cohesion policy programming period (2027).

Most of the costs of decarbonisation will be borne by the private sector. To a large extent, these are investments that would have been made in the reference scenario without the adoption of the Fit for 55 package, i.e. the continuation of the previous decarbonisation policy. The EU framework for financing sustainability should support the channelling of private capital towards climate-driven investments. At the same time, the environmental conditions for implementing the EU funds and making them conditional on the principle of significant harm to the environment (DNSH) and climate proofing are increasing.

Finally, reference should be made to international financial institutions and development banks (e.g.: The World Bank Group, the European Bank for Reconstruction and Development, the European Investment Bank), which increasingly prioritise decarbonisation efforts in the financing provided, thus playing an important role in blending public and private funds. In this way, risk sharing and raising funding for projects that could be too risky for individual institutions/private sectors are beneficial.

The projected investments under the other modelling assumptions (e.g. on the performance of the economy) will lead to a level of decarbonisation by 2030 summarised in Table 111.

162For example: Strengthening the Role of Ministries of Finance in Driving Climate Action: A Framework and Guide for Ministers and Ministries of Finance, Final Report, June 2023, pp. 71-74

Table 111: *GHG emission reductions by 2030 compared to 2019 under the decarbonisation scenario due to the investments and measures implemented (with a more detailed sectoral breakdown).*

Sector	**Emissions** [Mt CO_2eq] 2019	2030	% change
Energy	**46,3**	**12,3**	**—73 %**
Electricity and Heat production	43,0	11,3	—74 %
Fugitive emissions from fuels	3,3	1,0	—70 %
Industry	**31,5**	**19,3**	**—39 %**
Oil refining	0,5	0,6	5 %
Manufacture of solid fuels and other fuel processing	5,6	1,3	—77 %
Manufacturing and construction	9,8	7,7	—21 %
Industrial processes	15,6	9,7	—37 %
Buildings	**11,4**	**4,9**	**—57 %**
Commercial and public sector	3,0	2,8	—8 %
Residential sector	8,4	2,1	—75 %
Transport	**19,0**	**16,8**	**—12 %**
Agriculture	**9,7**	**8,0**	**—17 %**
Agriculture, forestry, fishing – incineration	1,2	0,9	—25 %
Agriculture	8,4	7,1	—16 %
Landscape (LULUCF)	**6,5**	**—3,8**	**—158 %**
Waste management	**5,7**	**3,5**	**—39 %**

5.3.3 Current investment flow

Table 107: *Overview of funding sources and assisted areas at 31/05/2024*

Programme	Source of funding	Time frame	Areas of support
Operational Programme Technology and Competitiveness (OP TAK)	Cohesion Funds	2021-2027	- promoting energy efficiency and reducing greenhouse gas emissions (specific objective 4.1.) - promotion of energy from renewable sources (specific objective 4.2.) - development of smart energy systems, grids and storage (specific objective 4.3.) - promoting access to water and sustainable water management (specific objective 5.1.) - supporting the transition to a resource-efficient circular economy (specific objective 5.2.)
Operational Programme Environment (OP Environment)	Cohesion Funds	2021-2027	- promoting energy efficiency and reducing greenhouse gas emissions (specific objective 1.1.) - promotion of energy from renewable sources (specific objective 1.2.) - promoting climate change adaptation, disaster risk prevention; and resilience to them, taking into account ecosystem-based approaches (specific objective 1.3.) - promoting access to water and sustainable water management (specific objective 1.4.) - supporting the transition to a resource-efficient circular economy (specific objective 1.5.) - — strengthening the protection and conservation of nature, biodiversity and green infrastructure, including in urban areas, and the reduction of all forms of pollution (specific objective 1.6.)
Operational Programme Transport (OPD)	Cohesion Funds	2021-2027	—promoting sustainable multimodal urban mobility as part of the transition to carbon-neutral economy (specific objective RS02.8.)
Integrated Regional Operational Programme (IROP)	Cohesive Funds	2021-2027	- promoting climate change adaptation, disaster risk prevention; and resilience to them, taking into account ecosystem-based approaches (specific objective 2.1.) - strengthening the protection and conservation of nature, biodiversity and green infrastructure, including in urban areas, and control of all forms of pollution (specific objective 2.2) - promoting sustainable multimodal urban mobility as part of the transition to carbon-neutral economy (specific objective 6.1.)
Fisheries Operational Programme (OP R)	Cohesive Funds	2021-2027	- promoting effective fisheries control and enforcement, including the fight against illegal, unreported and unregulated (IUU) fishing, as well as reliable data for knowledge-based decision-making (specific objective 1.4.) - contributing to the protection and restoration of aquatic biodiversity; and ecosystems (specific objective 1.6.) - promoting sustainable aquaculture activities, in particular strengthening competitiveness of aquaculture production, while ensuring that these activities are environmentally sustainable in the long term (specific objective 2.1.) - promoting marketing, quality and added value of fishery products; and aquaculture as well as the processing of these products (specific objective 2.2.)

Modernisation Fund (ModFond)	EU ETS	2021-2030	- support for renewable energy sources - improving energy efficiency - decarbonising industry - decarbonisation of the heating sector - distribution of electricity - reconstruction of public lighting - Community energy - purchase of vehicles for rail transport and combined technology transport
National Recovery Plan (NRP)	Innovation Fund	2021-2026	Component 2.2.1 Measures to improve the energy performance of State organisational units: support for the revitalisation of the buildings of the organisational units of the State with a view to reducing final energy consumption and achieving primary energy savings from non-renewable sources. MINISTRY OF INDUSTRY AND TRADE
			Component 2.2.2 Implementation of projects to increase the energy efficiency of public lighting systems: renovation and innovation of the public lighting system of cities and municipalities to achieve electricity savings, including preparation for charging stations in the form of pre-cabling (EV ready). MINISTRY OF INDUSTRY AND TRADE
			Component 2.2.3 Implementation of measures to improve the energy performance of buildings owned by public bodies of the MoE
			Component 2.5.3 Support for pre-project training and awareness-raising, education, training and information in the field of energy savings vocational training and the enhancement of expertise in energy savings and their achievement by MIT/MEF
			Component 2.3 Clean energy transition: - installation of FVEs in the business sector - modernisation of heat distribution
			Component – 2.4 – MHD in Prague – vehicles and lines
			Component 2.5.1 + 2.5.2 – programme New Green Savings
New Green Savings and New Green Savings Light			Improving the energy intensity of single-family and multi-family buildings
Just Transition Operational Programme		2021-2027	Clean Energy, Digital Innovation, People and Skills, Circular Economy, Rehabilitation, Entrepreneurship, Research and Development
EFEKT programme	State budget	2021-2027	Support for pre-project preparation, advisory activities in the form of energy consultation and information centres, education and energy management and energy concepts with a view to achieving energy savings and improving energy intensity
Panel 2013+ programme	State budget	continuous call	concessional loans to owners multi-family buildings to support the improvement of the energy performance of these buildings
Social Climate Fund	EU ETS	2026-2032	Support will be addressed to vulnerable groups/see box for comments in the area of: - temporary income support for vulnerable groups - measures a investment: (a) energy efficiency; (b) buildings renovation; (C) zero- and low-emission mobility and transport;

5.3.4 Sources of funding

5.3.4.1 Overview of funding sources

The EU's multiannual financial framework and other financial resources at EU level

Under the 2021-2027 multiannual financial framework, at least 30 % is allocated to climate-related issues across the different parts of the entire budget. Table 109 provides anoverview of the sources of funding for energy-climate objectives at EU level for the 2021-2027 period (part of the programmes goes beyond the MFF, i.e. the Innovation Fund, the Modernisation Fund and the EU RES Fund). Table 110 pak provides a quantification of the resources available for financing energy-climate targets at EU level.

Table 109: *Overview of funding sources for energy-climate objectives at EU level*

Name of source	Description
European Regional Development Fund and Cohesion Fund.	Budget 2021-2027: 273 billion EUR; strengthening the link between The European Semester and national plans energy and climate; relevant target area: area 2 'a greener, low-carbonEurope', percentage on climate mainstreeming: ERDF: 30 %, CF: 37 %.
Just Transition Fund	The Just Transition Fund is a financial instrument within the Cohesion Policy, which seeks to provide support to territories facing serious socio-economic challenges arising from the transition towards climate neutrality. The Just Transition Fund will facilitate the implementation of the European Green Deal, which aims to make the EU climate-neutral by 2050. The funds allocated amount to approximately EUR 41 billion. CZK.
Connecting EuropeFacility (CEF)	Budget 2021-2027: EUR 5.84 billion EUR; continued support for TEN-E; new support for cross-border support for renewable energy sources at a level of 15 % (CEF-E), 1 % of the budget dedicated to technical and administrative assistance; percentage of climate mainstreeming: 60 %.
InvestEU programme	New EU financial instrument, budget: 38 billion EUR 650 billion (mobilisation of private capital EUR); main implementing partner: THE EIB; percentage of climate mainstreeming: 40 %.
Horizon Europe	Budget 2021-2027: EUR 95.5 billion EUR (climate, energy and mobility: 15 billion EUR); percentage of climate mainstreeming: 25 %.
Life Programme	Budget 2021-2027: EUR 5.43 billion EUR; programmes: nature and biodiversity, circular economy and quality of life, mitigation and adaptation to climate change, 'clean energy transition' (EUR 997 million); percentage of climate mainstreeming: 61 %.
EU RES Fund	Enshrined in Article 33 of Regulation 2018/1999 on the Governance of the Energy Union and Climate Action. The implemented act should be approved by the Energy Union Commission at the end of 2019 or early 2020.
Innovation fund	Established for the EU as a whole (there is no direct allocation per Member State, as in the case of the Modernisation Fund, but the European Commission proposes
	allocate 5 billion EUR countries with below average GDP/axis); trans-allocation: tens of billions EUR; reception of the first projects: half 2020;cofinancing at 60 %.
Modernisation Fund	Only 10 Member States (BG, CZ, EE; HR, LV,LT, HU, PL RO, SK)[147]; at least 80 % and 90 % respectively must be allocated to so-called priority projects.

Source: Overview presentation by the European Commission sent to the Technical Working Group (17. 9.2019)

Table 110: *Quantification of sources of funding for energy-climate objectives at EU level (EUR million)*

Name of programme	2021-2027 (EU27)	2014-2020 (EU27+EDF)
Main programmes relevant for energy and climate		
Connecting Europe Facility (CEF)	5 838	4163
ITER	5 614	2 910
Nuclear Decommissioning (Lithuania)	552,0	451,0
Nuclear safety and decommissioning (Bulgaria and Slovakia)	626,0	883,0

Life Programme	5 432,0	3 170,0
of which clean energy	997,0	—
InvestEU	14 725,0	—
Horizon Europe	95 517,0	66 034,0
European Fund for Regional Development	226 308,0	193 398,0
The Cohesion Fund	46 692,0	74 589,0
Other programmes with a potential relevance for energy and climate action		
Euratom Research and Training Programme	1 981,0	2 085,0
Neighbourhood, Development and International CooperationInstrument	79 462,0	70 428,0
Instrument for pre-accession Assistance	14 162,0	12 799,0
Programmes outside the multi-annual financial framework		
Innovation fund	40 billion EUR	—
Modernisation Fund	20 000	—

Source: Overview presentation by the European Commission sent to the Technical Working Group (17. 9. 2019)

[147] Since 2024, 13 Member States will be able to benefit – outside the existing new EL, PT and SI

Public sources of funding available to the Czech Republic

Table 111 gives an overview of themain sources of funding for the implementation of the Czech Republic's national plan. The main sources of public finances are (i) the State budget, (ii) the EU Multiannual Financial Framework/Operational Programmes for 2021-2027, (iii) revenues from the sale of emission allowances and (iv) the Connecting Europe Facility (CEF). More detailed information on the different sources of funding is provided below.

Table 111: *Overview of the sources of funding for the implementation of the Czech Republic's national plan*

Source of finance	Description
State budget	Operating support for renewable energy sources as well as programmes linked to the promotion of energy efficiency (e.g. the EFEKT national programmes, PANEL) are envisaged in particular under the State budget.
EU Multiannual Financial Framework/Operational Programmes (EU Funds) 2021-2027	Energy and climate concern mainly the Operational Programme Technology and Applications for Competitiveness, the Operational Programme Environment, the Operational Programme Transport and the Integrated Regional Operational Programme, the Rural Development Programme, etc.
Proceeds from the sale of emission allowances	Pursuant to the amendment to Act No 383/2012 on trading conditions greenhouse gas emission allowances. The Government's draft amendment provides for use through the Modernisation Fund also for the fulfilment of energy-climate objectives under the responsibility of the Ministry of the Environment and the Ministry of Industry and Trade. The Czech Republic will also seek to prepare projects for the use of funds. the Innovation Fund.
Connecting EuropeFacility (CEF)	The Connecting Europe Facility (CEF) is an important financial mechanism for financing key electronics and gas infrastructure.

5.3.4.2 European Union Funds (EU Funds)

The European Green Deal (EGD) set the ambitious objective of transforming the EU economy towards a sustainable future and sets the framework for formulating pathways towards the climate neutrality and circular economy objective by 2050 at the latest. In this context, the Czech Republic commits to using the Funds under the Partnership Agreement ensuring maximum impact: the supply of clean, affordable and secure energy, accelerating the transition to sustainable and smart mobility, mobilising industry for a clean and circular economy, a renovation wave – building and refurbishment in an energy and resource efficient manner, zero pollution ambition for a toxic-free environment, protecting and restoring ecosystems and biodiversity that will make regions and cities resilient to the impacts of climate change, and others, in line with specific initiatives under the European Green Deal.

More operational programmes – the Transport Operational Programme, the Integrated Regional Operational Programme, the Operational Programme Environment and the Operational Programme Technology and Applications for Competitiveness – are relevant for meeting the climate and energy objectives. Table 114 shows the specific objectives that correspond to the PO2 policy objective.

Table 114: Selected *specific objectives under CP2 + JTF*

Indication of the objective	TargetDescription
OP RS SC 1.1.	Promoting energy efficiency and reducing greenhouse gas emissions
OP RS SC 1.2.	Promoting renewable energy in accordance with Directive (EU) 2018/2001, including the sustainability criteria set out therein
OP RS SC 1.3.	Promoting climate change adaptation, disaster risk prevention and resilience, taking into account ecosystem-based approaches
OP RS SC 1.4.	Promoting access to water and sustainable water management
OP RS SC 1.5.	Supporting the transition to a resource-efficient circular economy
OP RS SC 1.6.	Strengthening the protection and conservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution
OP SO SC 4.1.	Promoting energy efficiency and reducing greenhouse gas emissions
OP SO SC 4.2.	Promoting renewable energy in accordance with Directive (EU) 2018/2001, including the sustainability criteria set out therein
OP SO SC 4.3.	Development of smart energy systems, grids and storage outside the trans-European energy network TEN-E
OP SO SC 5.1.	Promoting access to water and sustainable water management
OP SO SC 5.2.	Supporting the transition to a resource-efficient circular economy
OP D SC RSO2.8.	Promoting sustainable multimodal urban mobility in the transition to a carbon-neutral economy (CF)
IROP SC 2.1.	Promoting climate change adaptation and disaster risk prevention, resilience taking into account eco-system based approaches
IROP SC 2.2.	Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution
IROP SC 6.1.	Promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy
OP R SC 1.4.	Fostering efficient fisheries control and enforcement, including fighting against IUU fishing, as well as reliable data for knowledge-based decision-making
OP R SC 1.6.	Contributing to the protection and restoration of aquatic biodiversity and ecosystems
OP R SC 2.1.	Promoting sustainable aquaculture activities, especially strengthening the competitiveness of aquaculture production, while ensuring that the activities are environmentally sustainable in the long term
OP R SC 2.2.	Promoting marketing, quality and value added of fisheries and aquaculture products, as well as processing of these products
JTF	Just Transition Fund

Source: Ministry of Regional Development (National Coordination Authority)

5.3.4.3 Revenues from the auction of emission allowances

Expenditure corresponding to the ring-fenced revenue from the sale of emission allowances is implemented through the Chapter. The Ministry of Industry and Trade, the Ministry of the Environment and the SEF, on the basis of Act No 383/2012 Coll., on the conditions for trading greenhouse gas emission allowances. This Act transposes Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading.

5.3.4.4 Innovation Fund

The common response of European Union countries to the COVID-19 pandemic is to implement policies that help mitigate the impact and support the recovery of the economy. Among them, the Recovery and Resilience Facility (RRF) is an essential economic element. The Recovery and Resilience Facility is one of the results of the agreement reached by the members of the European Council of 17-21 July 2020 on the EU's Multiannual Financial Framework and Next Generation EU for 2021-2027. The instrument is designed to help European Union countries recover from the consequences of the pandemic and to support investment in the green and digital transition of the European economy.

The Government of the Czech Republic has prepared a National Recovery Plan. The national recovery plan is the strategic document by which the Czech Republic applied for a financial contribution from the Recovery and Resilience Facility.

The National Recovery Plan contains the Czech Government's priorities and its various components, including financial allocations, are designed to help lift the Czech economy out of the COVID-19 crisis and contribute to meeting reform and investment requirements.

The plan reflects the Council's country-specific recommendations from 2019 and 2 020 in the context of the European Semester and its actions contribute to building resilience, the digital and green transitions. It also reflects the requirement of European legislation, with 37 % of expenditure to support the climate tranche and a further 20 % to the digital transition.

The investments included in the National Recovery Plan are divided into 6 pillars, subdivided into components and specific reforms and investment actions.

5.3.4.5 Just Transition Fund – Just Transition Operational Programme.

The Just Transition Operational Programme is an entirely new programme for the 2021-2027 period aimed at addressing the effects of the shift away from coal in the most affected regions – Karlovy Vary, Moravian-Silesian and Ústí nad Labem (coal regions).

In particular, the objective of the aid is to provide sufficient jobs for workers leaving the coal industry as well as environmental improvements.

5.4 Impacts of the planned policies and measures described in section 3 on other Member States and regional cooperation at least up to the last year of the period envisaged by the plan, including a comparison with estimates according to existing policies and measures

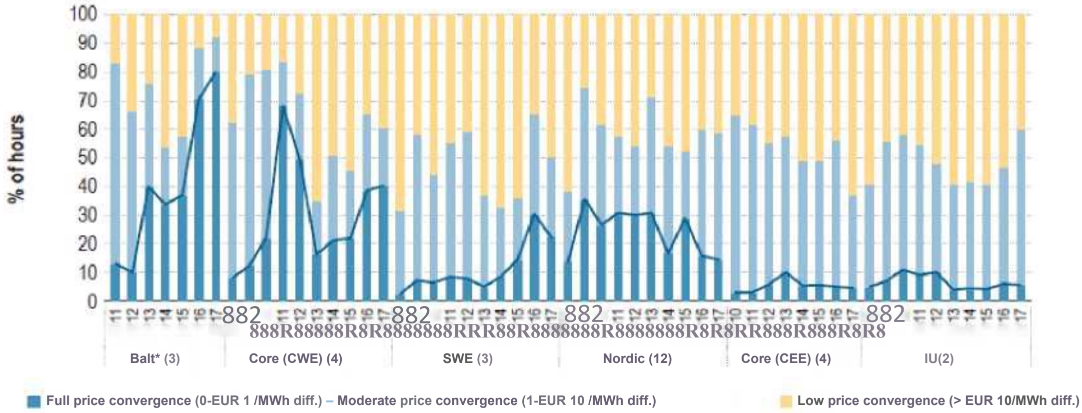
i) Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

As part of the process of consulting the Czech Republic's National Plan with the other Member States, which is described in more detail in Chapter 1.3 and Section (iv) respectively, no policies and measures linked to significant regional impacts have been identified by the Member States consulted. Or policies and measures that may have a potential impact on other Member States that are subject to a specific assessment of these impacts, such as cross-border infrastructure projects or other major projects subject to an environmental impact assessment. Key strategy papers are also subject to an environmental impact assessment, including a regional consultation. The Czech Republic's State Energy Policy went through this process in 2014 and 2015.

ii) Impacts on energy prices, utilities and energy market integration

The Czech Republic is not a market that is large enough to significantly influence the price of electricity in the region. With regard to natural gas, the Czech Republic is a negligible producer in terms of volume. Further integration in electricity and natural gas contributes to gradual price convergence (see Chart 134 and Chart 135 and ACER/CEER source publication respectively).

Graph 134: *Convergence of electricity prices in selected regions*

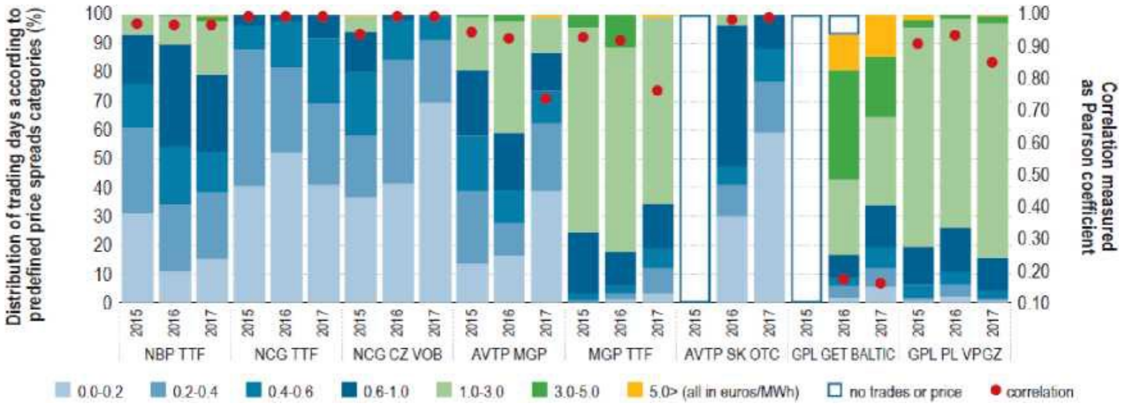


Source: ENTSO-E and ACER calculations (2018).

Notation: The numbers in brackets refer to the number of bidding zones included in the analysis per CCR.

Source: Monitoring the Internal Electricity and Natural Gas Markets in 2017

Graph 135: *Convergence of natural gas prices in selected regions (DA)*



Source: ACER based on Platts and/CIS Heren.

Notes: Spreads in euros/MWh are calculated as the absolute price differential between pairs of hubs, independent of discount or premium. Lithuanian price analyses are based on a combination of day-ahead hub products and, for those days when day-ahead Products were not traded. specific products traded ex-post of delivery for balancing purposes, ear as a proxy. In some instances (e.g. AVTP-MGP), price correlation worsened year on year, despite enhanced price convergence; Narrowing Differentials give some room for price movements in the Opposite direction, which affects correlation resu/ts. Beyond that, some days of price spikes were registered with substantial impacts on correlations.

Source: Monitoring the Internal Electricity and Natural Gas Markets in 2017 (ACER/CEER)

iii) Where appropriate, impacts on regional cooperation

TheCzech Republic is already actively cooperating with other Member States in different areas. The preparation of the National Plan has positively contributed to deepening this cooperation and areas that can be further developed have been identified.

Annex No 1: Action cards for the purpose of complying with Article 8 of the Energy Efficiency Directive 2023/1791

Table 112: *Operational Programme Competitiveness 2021-2027: Specific objective – Support for energy efficiency measures*

Basic information	
Title of the policy action	**Operational Programme 'Technology and applications for competitiveness' 2021-2027: Specific objective – Support for energy efficiency**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at supporting investment in improving the energy efficiency of industrial technological and production processes and improving the energy performance of business buildings.
Planned budget	CZK 13 000 million
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	13 PJ
Estimated new annual energy savings	0.47 PJ (from 2024)
Additional information	Due to the shift in project implementation, energy savings will be generated as of 2022.
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry Industry and Trade Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	Industry, services, non-residential buildings
Eligible individual energy saving measures	increasing the energy efficiency of production and technology processes; improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, use of waste energy in production processes, construction of buildings in high (passive) energy standard; implementation of building monitoring, automation and management elements; energy management

Lifetime of individual measures	Investment measures – Industrial technologies: 10 years Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is evidenced by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy savings over the lifetime of the measure. Lifetime savings energy where implementation energy management is taken into account in the calculation of cumulated savings
Sources of information	Calculation of savings energy within professional the documents are implemented in accordance with the methodology laid down in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on
Additionality and materiality	

How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged.

Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.

Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project is subject to a substantive evaluation process of the individual energy-saving measures proposed. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. Project implementation and energy savings are verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department responsible for the management of the financial mechanism (measures) independent of energy policy-making. Verification of eligibility and reporting of

	Article 7 and Annex V of the Directive are implemented by the department responsible for implementing the energy efficiency policy.
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 113: *New Green Savings Programme*

Basic information	
Title of the policy action	**New Green Savings 2014-2021**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at supporting investment in improving the energy intensity of family and multi-family buildings. Both partial and comprehensive renovations of residential buildings are supported.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	17 PJ
Estimated new annual energy savings	1 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, State Environmental Fund Obligations: Managing the financial mechanism, granting subsidies, approving and controlling projects, independent monitoring and verification of energy
Sectors targeted	households, residential buildings (family houses, apartment houses)
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); installation of self-consumption energy installations; construction of buildings in high (passive) energy standard; implementation of building monitoring, automation and management elements
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	

Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. The calculation of the energy savings is done in both cases by certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures the cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy
Sources of information	Calculation savings energy within professional the documents are implemented in accordance with the methodology laid down in Decree No 264/2020 on the energy performance of buildings and Decree No
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This is due to the low incentive to switch

	levels of awareness of energy savings and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating the proposed individual energy-saving measures by the action manager – the State Environmental Fund. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. The implementation of the project is verified for all projects even ex-post after project implementation. The ex-post control shall be supported by documentation

	implementation of the measure and ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive are: carried out factually to the competent Department
Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. Correctness of energy rating and control activities energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. Verification of the eligibility and reporting of energy savings achieved under the criteria of Article 7 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for implementing the energy efficiency
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 114: *Successor to the New Green Savings Programme*

Basic information	
Title of the policy action	**New green savings 2022-2030**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at supporting investment in improving the energy intensity of family and multi-

Both partial and comprehensive renovations of residential buildings are supported.

Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	62 PJ
Estimated new annual energy savings	1-3 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, State Environmental Fund Obligations: Managing the financial mechanism, granting subsidies, approving and controlling projects, independent monitoring and verification of energy
Sectors targeted	households, residential buildings (family houses, apartment houses)
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); installation of self-consumption energy installations, construction of buildings in high (passive) energy standard; implementation of building monitoring, automation and management elements
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Yes
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. The calculation of the energy savings is done in both cases by certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption

Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures the cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy
Sources of information	Calculation savings energy within professional the documents are implemented in accordance with the methodology laid down in Decree No 264/2020 on the energy performance of buildings and Decree No
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group.

	The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting. It can be assumed that there will be a risk of overlap with the so-called boiler subsidies under OPE III in the successor programme of the NAA programme, as at present, between the NAA and OPE II. This risk will be excluded, as is currently the case in both programmes, by the conditions laid down in the aid conditions.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoringand verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating the proposed individual energy-saving measures by the action manager – the State Environmental Fund. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. The implementation of the project is verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared

	by the provider of financial support when checking the application for support. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive are: carried out factually to the competent Department Ministry of Industry and Trade responsible for
Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. Correctness of energy rating and control activities energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 115: *Operational Programme Environment (2021-2027): Specific objective – Support for energy efficiency measures*

Basic information	
Title of the policy action	**Operational Programme Environment (2021-2027): Specific objective – Support for energy efficiency measures**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measures are mainly aimed at investment aid reductions energy intensities non-residential public buildings and activities related to increasing the use of renewable energy sources.
Planned budget	CZK 14 000 million
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	9.5 PJ
Estimated new annual energy savings	0.2 PJ
Additional information	Due to the shift in project implementation, energy savings will be generated as of 2022.
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, State Environmental Fund Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	households (family houses) and non-residential public buildings
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, construction of buildings in high (passive) energy standards; implementation of building monitoring, automation and management elements
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, it is used

	method proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the
Sources of information	The calculation of energy savings under technical documents is carried out in accordance with the methodology set out in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on energy assessment.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be did not realise energy without existence policy action. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving

In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting. It can be assumed that there will be a risk of overlap with the so-called boiler subsidies under OPE III in the successor programme of the NAA programme, as at present, between the NAA and OPE II. This risk will be excluded, as is currently the case in both programmes, by the conditions laid down in the aid conditions.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating proposed individual energy-saving measures by the measure manager – the State Environmental Fund environment. Within rating is

	ex-ante project implementation. The implementation of the project is verified for all projects even ex-post after project implementation. Ex-post inspection is supported by documentation demonstrating the implementation of the measure and an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a
Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. The verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the departmentMinistries industry a store responsible for implementing energy efficiency policy.
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 116: *PANEL programme*

Basic information	
Title of the policy action	**PANEL programme**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at supporting investment in improving the energy intensity of apartment buildings in the form of subsidised loans.
Planned budget	CZK 15 000 million
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	0.55 PJ
Estimated new annual energy savings	0.01 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: State Housing Development Fund Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and
Sectors targeted	households, residential buildings (dwelling houses)
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems;
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption

Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the
Sources of information	The calculation of energy savings under technical documents is carried out in accordance with the methodology set out in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on energy assessment.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be did not realise energy without existence policy action. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that:

	the monitoring system shall automatically deduct the energy savings in case of overlaps so as to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the system for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating the proposed individual energy saving measures by the measure manager – the State Housing Development Fund. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. The implementation of the project is verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a
Authorities responsible for the monitoring and verification process	State Housing Development Fund, Ministry of Industry and Trade, State Energy Inspectorate

Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the Department of the State Housing Development Fund responsible for administration financial a mechanism (measures) independent of energy policy-making. The verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department Ministries industry a store responsible for implementing energy efficiency
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 117: *Integrated Regional Operational Programme 2021–2027*

Basic information	
Title of the policy action	**Integrated Regional Operational Programme 20212027**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is concerned with investment aid for the acquisition of means of public transport using alternative forms of propulsion. The measure will speed up the replacement of less efficient conventionally powered vehicles and the introduction of new alternatively powered and comparatively more efficient vehicles, thus leading directly to energy-efficiency gains and energy savings in the transport sector.
Planned budget	CZK 8 000 million
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	2.7 PJ
Estimated new annual energy savings	PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry for Regional Development

	Obligations: Management of the financial mechanism, award of financial grants, approval and control of projects
Sectors targeted	Transport
Eligible individual energy saving measures	Individual measures supported: purchase of alternative-powered public transport means of transport
Lifetime of individual measures	Investment measures – 15 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings from the direct purchase of alternatively fuelled vehicles with higher efficiency, a pro rata savings method based on engineering estimates will be used through the normal efficiency of internal combustion engines and engines using alternative propulsions. The calculation takes into account the evolution of car use and the expected state of the car fleet in the absence of a policy measure. The calculation takes into account the energy savings resulting from the accelerated replacement of less efficient conventional cars before their end of life, as well as from the incentive to purchase alternatively fuelled cars instead of market-based conventional vehicles
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of energy savings corresponds to that of
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the purchase of alternative means of transport represent energy savings from early replacement before the end of life of the original vehicle or from an incentive to purchase more efficient vehicles. Under standard conditions without policy action, there would be no purchase of alternatively fuelled vehicles. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices. Additionality is taken into account in the energy savings calculation model in relation to existing EU emission performance standards.

In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the identified market failures, in particular in relation to the low incentive to purchase alternatively fuelled vehicles due to high prices and long payback periods, without the existence of the measure, i.e. without the granting of investment aid by the implementing authority, the target entities would not have been incentivised to switch conventional vehicles or to purchase alternatively
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Supported vehicle replacements must go beyond established EU minimum emission performance standards.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the system for providing financial support under a given financial mechanism (measure), each project undergoes an evaluation process by implementing organ (controller a financial mechanism). The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The evaluation of energy savings itself is carried out by the Ministry of Industry and Trade on the basis of an independently developed model for calculating energy savings. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry
Authorities responsible for the monitoring and verification process	Ministry of Regional Development, Ministry of Industry and Trade
Independence of monitoring and verification from obligated, participating or entrusted parties	Verification shall be subject to a two-level evaluation of the individual energy saving measure. Substantive assessment projects are being implemented Department responsible for the management of the financial mechanism (measures) independent of energy policy making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the unit responsible for the implementation of

Verification of a representative sample	

Table 118: *Modernisation Fund*

Basic information	
Title of the policy action	**Modernisation Fund**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at investment support for improving the energy performance of residential and non-residential public, state and business buildings, improving the energy performance of industrial technological and production processes; reductions efficiency certificate, transport
Planned budget	CZK 50 000 million163
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	80 PJ
Estimated new annual energy savings	2-3 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, State Environment Fund, Ministry of Transport, Ministry of Industry and Trade Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	energy, industry, services, public sector, transport, community energy
Indicative list of energy-saving measures	improving the energy performance of the building (building envelope, technical equipment); increasing the energy efficiency of production and technology processes; refurbishment and replacement of energy generation facilities; purchase of alternatively fuelled vehicles, construction of supporting infrastructure for
Lifetime of individual measures	Investment measures – Industrial technologies: 10 years

163This is not the total 'budget' of the Modernisation Fund (see more detailed information in the other parts), but the projected part allocated to the implementation of Article 7 in the area of energy savings.

Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For calculation of savings energy in building works a the method of measured savings will be applied to industrial processes if it is a cost-effective option with regard to the individual measures implemented. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure. For the calculation of energy savings from the direct purchase of alternatively fuelled vehicles with higher efficiency, the method will be used proportional savings na based on techno-engineering estimates through the normal efficiency of internal combustion and alternative propulsion engines. For the calculation of the energy savings from the effect of building alternative propulsion infrastructure for the purchase of alternatively fuelled vehicles, the surveyed savings method will be used. In order to evaluate the energy savings achieved under this measure, it is essential that: binding between encouraging the construction national infrastructure and the rate of replacement of conventional cars with lower engine efficiency for alternatively fuelled cars with comparatively higher efficiency. Energy savings will be determined on the basis of an upcoming methodology. The calculation takes into account the evolution of car use and the expected state of the car fleet in the absence of a policy measure. The calculation takes into account the energy savings resulting from the accelerated replacement of less efficient conventional cars before their end of life, as well as from the
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy

	The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy savings over the lifetime of the measure.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be did not realise energy without existence policy action. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of vehicles and energy-related products covered by eco-design and represent energy savings from early replacement before the end of life of the original product. Energy savings from the purchase of alternatively fuelled cars represent energy savings from premature end-of-life replacements original vehicles or incentives to purchase more efficient cars. Under standard conditions without a policy measure, the same level of purchase of alternatively fuelled cars would not occur. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices. Additionality is taken into account in the energy savings calculation model in relation to existing EU emission performance standards (Regulation 2019/631 of the European Parliament and of the Council setting CO2 emission performance standards for new passenger cars and for new light commercial
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The evaluation of energy savings will take into account the age of the replaced product/vehicle fleet and the standard replacement time of the vehicles. The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the investment aid, there was no incentive for the targeted entities to implement these measures.

In the light of the study carried out on the incentives for the acquisition of alternatively fuelled cars and the identified market failure, in particular in relation to the low incentive to purchase alternatively powered cars due to high prices and long payback times, as well as the lack of sufficient infrastructure to operate such cars, without the existence of the measure, i.e. without the granting of investment aid by the implementing authority, the target entities would not have been incentivised to replace conventional cars or to purchase alternatively fuelled cars.

Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting. The energy savings calculation model shall take into account: direct State support acquisition alternatively fuelled cars. Energy savings from direct support for the acquisition of cars will be deducted from the energy savings resulting from the support for the construction of infrastructure as part of the calculation of savings for this policy measure.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.

Supported vehicle replacements must go beyond established EU minimum emission performance standards.

Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating proposed individual energy-saving measures by the measure manager – the State Environmental Fund environment. Within rating is the energy savings resulting from the implementation of the project ex-ante are also assessed. The implementation of the project is verified for all projects even ex-post after project implementation. Ex-post inspection is supported by documentation demonstrating the implementation of the measure and an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to practise by Act No. 406/2000 Coll., on energy management, as amended (see methodology for calculating energy savings). In case of migration na alternative drives implemented by evaluation of energy savings by the Ministry of Industry and Trade on the basis of an independently developed model for calculating energy savings. Processing of the concerned documents; correctness calculations and declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the provider of financial support when checking an application for aid.
Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade, State Energy Inspectorate, Ministry of Transport
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000.

	Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. The verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the departmentMinistries industry a store responsible for implementing energy efficiency
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 119: *EFEKT programme*

Basic information	
Title of the policy action	**EFEKT programme**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure focuses on investment and non-investment support measures for energy efficiency improvements. The financial mechanism provides support for a specific energy on a cost-effective basis measures
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	12.5 PJ
Estimated new annual energy savings	0,2-0.3 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry Industry and Trade Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	Public sector, industry, services, households
Eligible individual energy saving measures	Individual investment measures: reconstruction of public lighting Non-investment measures to incentivise the implementation of individual investment measures: providing targeted consultations with an impact on implementation energy savings measures

	through the Network of Energy Consultation and Information Centres (EKIS); processing of documentation for the preparation of the EPC project; Non-investment measures: implementation of energy management actions for active dissemination of information and education on energy savings
Lifetime of individual measures	Investment measure: 12-30 years Training actions: 2 years Energy management: 2 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the implementation of individual investment measures, measured savings shall be used where this is feasible and cost-effective with regard to the individual measure implemented. In other cases the scaled-savings method is used on the basis of engineering estimates. For energy savings resulting from targeted consultations and measures to change consumer behaviour through education and awareness raising, the surveyed savings method is used. In order to evaluate the energy savings achieved through targeted consultations, the link between the consultation itself and the consulting person's follow-up is essential. The energy savings were determined on the basis of the methodology developed by the Czech Technical High Learning. In the case of the method of measured or proportional savings, the calculation of the savings is carried out by certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000 on energy management. The calculation of energy savings is evidenced by a comparison of final energy consumption before and after the implementation of the energy saving measure by an expert document – an energy audit, an energy assessment and/or a building
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the

	Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy savings over the lifetime of the measure. The lifetime of energy savings in the case of actions aimed at changing consumer behaviour and implementing energy management is taken into account in calculation cumulated savings energy.
Sources of information	The methodology used to calculate energy savings is available here: https://www.mpo-efekt.cz/cz/ekis/publikace/90641.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities incentivised to implement these measures. On the basis of the above-mentioned research, it was established, on a representative sample, that on the basis of a policy measures happens
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of individual measures, the risk of double counting is minimised.

	The risk of double counting has been identified in the case of targeted consultations affecting the implementation of energy saving measures, where there are overlaps with other financial mechanisms. The survey carried out in the context of the study entitled 'Assessment of the impact of soft instruments in pursuit of energy efficiency objectives' identified 60 % overlaps between individual measures implemented and other state financing mechanisms. As part of the methodology for calculating energy savings, for a given individual measures counted with reduction
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the system for providing financial support under a given financial mechanism, investment measures undergo a substantive evaluation process. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. Project implementation and energy savings are verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when

	For EPC projects, energy savings are verified a monitored within commitments resulting from a Standard Energy Performance Contract (EPC). As part of the energy savings calculated on the basis of the method of savings examined, an investigation was carried out which verified, on a representative sample of individual measures, the level of energy savings. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	Where the method of measured and proportional energy savings is used ex-ante and ex-post, the energy rating shall be carried out in an independent manner. certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department responsible for the management of the financial mechanism (measures) independent of energy policy-making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the unit responsible for the implementation of the
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 120: *Taxation fuel*

Basic information	
Title of the policy action	**Taxation fuel**
Brief description of the tax measure	The policy measure has the effect of achieving energy savings resulting from the introduction of an excise duty on motor fuels beyond the minimum level of taxation laid down in Council Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity. Savings are achieved by changing consumer behaviour, with an impact on reducing fuel consumption.
Duration of the tax measure	2021-2030

Implementing authority	Ministry of Finance
Target sector and segment of taxpayers	Transport, all fuel consumers
Source of information	Legal reference: https://www.psp.cz/sqw/sbirka.sqw?cz=353&r=2003
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	15 PJ
Estimated new annual energy savings	1.5 PJ
Additional information	
Methodology for calculating energy savings	
Method for calculating savings including taking into account additionality	The energy saving is determined on the basis of the difference between the projected evolution of fuel consumption without application of excise duty and the actual fuel consumption on the basis of the following formula: *(actual tax – minimum level given) *=* AP *energy price* 1, *energy consumption * -— —— = energy consumption without tax* 1 + Ap * *price elasticity* *energy consumption without taxation – Energy consumption = energy saving* In the calculation of price elasticity, robust analysis; which took into account exogenous variables affecting energy consumption. Therefore, the design of the counterfactual scenario is not implemented. Short-term price elasticity of 0,2052 is used to calculate energy savings. Short-term price elasticity was chosen due to the need to minimise overlaps with other measures. Where there is a risk of overlaps with other measures, a deduction of individual bottom-up measures will be made. The calculation of energy savings takes into account the level of taxation in excess of the EU minimum level of taxation. In the calculation, a value corresponding to the difference between the applicable tax amount and
Price elasticity used in the calculation	Short-term price elasticity was used to calculate energy savings. The value of price elasticity corresponds to the conditions in force in the Czech Republic. The calculation of price elasticity was carried out by the Centre of the Regulatory Industry Economy of the University of Economics. Multidimensional regression analysis of the time series of endogenous and exogenous quantities was used to determine the results.

	For the purpose of the calculation, non-seasonally adjusted quarterly data of the relevant variables in the time series 2001 to 2017 were used. The relevant variables studied include: fuel price, fuel consumption, population, number of cars, freight and road passenger transport services including urban public transport (MHD), gross domestic product (GDP) per capita, average nominal gross monthly wage, nominal USD/CZK exchange rate, inflation. The source of data is the official statistics of the Czech Statistical Office, the Ministry of Industry and Trade, the Ministry of Transport, the Czech National Bank and Eurostat.
Taking into account savings reductions over time	In view of the nature of the measure, disturbances do not change over time. Savings are not accumulated during the commitment period.
How are any overlaps with other policy measures addressed to avoid double counting of savings?	Short-term price elasticity has been used to minimise the risk of overlaps and double counting. Where there is a risk of overlaps with other measures, a deduction of individual bottom-up measures will be made.
How independence from the implementing authority is ensured	The implementing authority of the tax measure is the Ministry of Finance. Verification by the Ministry of Industry and Trade of the achieved energy savings, including its eligibility and reporting under the criteria of Article 8 and Annex V of the Directive.
Additional information and sources	**Source of the price elasticity study:** Estimation of the price elasticity of demand for petrol and diesel in the Czech Republic (Vysoká škola Economics in Prague)

Table 121: *Taxation of fuels in households*

Basic information	
Title of the policy action	**Taxation of fuels in households**
Brief description of the tax measure	The policy measure has the effect of achieving energy savings resulting from the introduction of an excise duty on electricity and solid fuels used by households in excess of the minimum level of taxation laid down in Council Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity. Savings are achieved by changing consumer behaviour, with an impact on reducing the consumption of these fuels.
Duration of the tax measure	2021-2030
Implementing authority	Ministry of Finance
Target sector and segment of taxpayers	Households, whole population
Source of information	Legal reference: https://www.psp.cz/sqw/sbirka.sqw?cz=261&r=2007
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	0.5 PJ
Estimated new annual energy savings	0.05 PJ

Additional information

Methodology for calculating energy savings	
Method for calculating savings including taking into account additionality	The energy saving is determined on the basis of the difference between the projected evolution of fuel consumption without application of excise duty and the actual fuel consumption on the basis of the following formula: *(actual tax – minimum* level *given)* ------------------ *= snap* *energy price* 1, energy*consumption * — — = energy consumption without taxation* 1 + Ap * *price elasticity* *energy consumption without taxation – Energy consumption = energy saving* As part of the calculation of price elasticity, a robust analysis was carried out that took into account exogenous variables affecting energy consumption, including the effect of other measures to promote energy savings in households. Of this reason not performed structure counterfactual scenarios. Short-term price elasticity is used to calculate energy savings. Short-term price elasticity was chosen due to the need to minimise overlaps with other measures. In case of risk of overlaps with others measures will executed subtraction individual bottom-up measures. The calculation of energy savings takes into account the level of taxation in excess of the EU minimum level of
Price elasticity used in the calculation	Short-term price elasticity was used to calculate energy savings. The value of price elasticity corresponds to the conditions in force in the Czech Republic. The calculation of price elasticity was carried out by the Centre of the Regulatory Industry Economy of the University of Economics. Multidimensional regression analysis time series endogenous and exogenous quantities. For the purpose of the calculation, a minimum of 15 years was used for seasonally unadjusted quarterly data of relevant variables in the time series. The relevant variables studied include: price of the fuels in question, consumption of the fuels concerned, population, gross domestic product (GDP) per capita, average nominal gross monthly wage, nominal USD/CZK exchange rate, average air temperature, energy savings from other measures. The source of the data is the official statistics

	The Ministry of Industry and Trade, the Ministry of Transport, the Czech National Bank and Eurostat.
Taking into account savings reductions over time	In view of the nature of the measure, disturbances do not change over time. Savings are not accumulated during the commitment period.
How are any overlaps with other policy measures addressed to avoid double counting of savings?	Short-term price elasticity has been used to minimise the risk of overlaps and double counting. Where there is a risk of overlaps with other measures, a deduction of individual bottom-up measures will be made.
How independence from the implementing authority is ensured	The implementing authority of the tax measure is the Ministry of Finance. Verification by the Ministry of Industry and Trade of the achieved energy savings, including its eligibility and reporting under the criteria of Article 8 and Annex V of the Directive.
Additional information and sources	**Source of the price elasticity study:** The price elasticity study was carried out during the finalisation of the Czech Republic's National Plan.

Table 122: *Support to Ecodriving*

Basic information	
Title of the policy action	**Support to Ecodriving**
Type of policy measure	Financial mechanism, behavioural measures
Concise description of the policy measure	The measure aims at promoting energy-saving driving with a direct effect on increasing energy efficacy v transport. Support energy savings rides is implemented through financial support for the organisation of training activities in the field of energy-saving driving.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	6 PJ
Estimated new annual energy savings	0.2 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry Industry and Trade Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	Public sector, industry, services, households

Eligible individual energy saving measures	activities aimed at actively disseminating information and ecodriving
v	Training actions: 2 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	The energy savings method is used to calculate the energy savings. Energy savings will be determined on the basis of an upcoming methodology. The model will be based on the assumption of an incentive for educational activity to drive economically in a means of transport.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of energy savings and their consideration in the calculation of the cumulated energy savings does not foresee a reduction in the annual energy
Sources of information	
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. This is due to a low level of awareness of energy savings and low fuel prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not applicable.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the low level of awareness of energy savings and low fuel prices, without the existence of the measure, i.e. without aid for the implementation of training activities, the target entities would not have been incentivised to reduce fuel consumption.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of individual measures, the risk of double counting is minimised.

How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not applicable.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the system for providing financial support under the financial mechanism, the measures undergo a substantive evaluation process by the administrator of the financial mechanism. The evaluation assesses the key criteria for determining energy savings, i.e. type of training action (individual measure), type of target group, number of people, etc. As part of the analysis for the calculation of energy savings, the following shall be carried out: investigations; which verifies na a representative sample of individual measures, the percentage of energy savings. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry
Authorities responsible for the monitoring and verification process	Ministry Industry and Trade
Independence of monitoring and verification from obligated, participating or entrusted parties	Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department responsible for the management of the financial mechanism (measures) independent of energy policy-making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the unit responsible for the implementation of
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 123: *Operational Programme Enterprise and Innovation for Competitiveness 2014-2020 (SC) 3.2): Energy Savings Programme*

Basic information	
Title of the policy action	**Operational Programme Enterprise and Innovation for Competitiveness 2014-2020 (SC 3.2): Energy Savings Programme**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at supporting investment in improving the energy efficiency of technological and production processes industry a reductions the energy performance of business buildings.
Planned budget	

Estimated energy savings 2021-2030	
Estimated cumulated energy savings	30 PJ
Estimated new annual energy savings	0,5-2 PJ
Additional information	This is a measure implemented in 20142020 that generates new individual measures in the period 2021-2030.
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry Industry and Trade Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	Industry, services, non-residential buildings
Eligible individual energy saving measures	increasing the energy efficiency of production and technology processes; improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, use of waste energy in production processes, construction of buildings in high (passive) energy standard; implementation of building monitoring, automation and management elements energy management
Lifetime of individual measures	Investment measures – Industrial technologies: 10 years Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document (energy assessment and/or energy performance certificate)

	buildings) and is based on a comparison of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy savings over the lifetime of the measure. The lifetime of energy savings in case of implementation of energy management is taken into
Sources of information	The calculation of energy savings under technical documents is carried out in accordance with the methodology set out in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on energy assessment.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be did not realise energy without existence policy action. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.

In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project is subject to a substantive evaluation process of the individual energy-saving measures proposed. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. Project implementation and energy savings are verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects.

	The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to pursue an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department responsible for the management of the financial mechanism (measures) independent of energy policy-making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the unit responsible for the implementation of the energy efficiency policy.
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 124: *Operational Programme Environment 2014-2020 (PO5): Energy savings*

Basic information	
Title of the policy action	**Operational Programme Environment 2014-2020 (PO5): Energy savings**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure focuses on investment support for improving the energy performance of non-residential public buildings under the Operational Programme Environment 2014-2020.

Planned budget

Estimated energy savings 2021-2030	
Estimated cumulated energy savings	15.5 PJ
Estimated new annual energy savings	0,5-1 PJ
Additional information	This is a measure implemented in 20142020 that generates new individual measures in the period 2021-2030.
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, State Environmental Fund Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	households, residential buildings (family houses, apartment houses)
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, construction of buildings in high (passive) energy standards; implementation of building monitoring, automation and management elements
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is supported by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption

Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the
Sources of information	The calculation of energy savings under technical documents is carried out in accordance with the methodology set out in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on energy assessment.
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be did not realise energy without existence policy action. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group.

	The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting. It can be assumed that there will be a risk of overlap with the so-called boiler subsidies under OPE III in the successor programme of the NAA programme, as at present, between the NAA and OPE II. This risk will be excluded, as is currently the case in both programmes, by the conditions laid down for support.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating proposed individual energy-saving measures by the measure manager – the State Environmental Fund environment. Within rating is the energy savings resulting from the implementation of the project ex-ante are also assessed. The implementation of the project is verified for all projects even ex-post after project implementation. Ex-post inspection is supported by documentation demonstrating the implementation of the measure and an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to carry out an activity

	the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the provider of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store responsible for implementing energy efficiency
Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. The verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the departmentMinistries industry a store responsible for implementing energy efficiency policy.
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 125: *Integrated Regional Operational Programme 2014-2020 (SC 2.5): Improving energy intensity in the housing sector*

Basic information	
Title of the policy action	**Integrated Regional Operational Programme 20142020 (SC 2.5): Improving energy intensity in the housing sector**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure is aimed at investment aid to improve the energy intensity of apartment buildings under the Integrated Regional Operational Programme.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	7 PJ
Estimated new annual energy savings	0.25 PJ

Additional information	This is a measure implemented in 20142020 that generates new individual measures in the period 2021-2030.
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry for Regional Development Obligations: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	households, residential buildings (family houses, apartment houses)
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, implementation of monitoring elements, automation and management of energy consumption in the building
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. In both cases, energy savings are calculated by certified energy specialists authorised to do so under Act No 406/2000 on energy management, as amended. The calculation of energy savings is evidenced by an expert document (energy assessment and/or energy performance certificate of the building) and is based on a comparison of the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation.

	The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual
Sources of information	Calculation of savings energy within professional the documents are implemented in accordance with the methodology laid down in Decree No 264/2020 on the energy performance of buildings and Decree No 140/2021 on energy audit and Decree No 141/2021 on
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that savings are automatically deducted under the monitoring system.

	energy in case of overlaps so as to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the system for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating proposed individual energy-saving measures by the measure manager – the Ministry of Regional Development. The evaluation also assesses the energy savings resulting from the implementation of the project ex-ante. The implementation of the project is verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy evaluation of individual measures, ex-ante and ex-post, and the calculation of savings are themselves carried out independent certified energy specialists authorised to pursue an activity under Act No 406/2000 on energy management, as amended (see the methodology for calculating energy savings). The processing of the documents in question, the correctness of the calculations and the declared savings are subject to control by the State Energy Inspectorate during checks pursuant to Act No 406/2000 and by the grantor of financial support when checking an application for aid. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a
Authorities responsible for the monitoring and verification process	Ministry of Regional Development, Ministry of Industry and Trade, State Energy Inspectorate

Independence of monitoring and verification from obligated, participating or entrusted parties	The ex-ante and ex-post energy evaluation and the calculation of savings are carried out by independent certified energy specialists authorised to carry out an activity pursuant to Act No 406/2000. The correctness of the energy evaluation and the control of the activity of energy specialists are carried out by the State Energy Inspectorate pursuant to Act No 406/2000. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the Ministry of Regional Development responsible for administering the financial mechanism (measures) independent of energy policy making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Table 126: *Prohibition of operation of Class 1 and Class 2 solid fuel boilers*

Basic information	
Title of the policy action	**Prohibition of operation of Class 1 and Class 2 solid fuel boilers**
Type of policy measure	Regulatory measures
Concise description of the policy measure	These are regulatory measures setting minimum standards for the operation of stationary combustion energy sources, which are set beyond EU law. As of 2022, the operation of low efficient solid fuel boilers falling under Classes 1 and 2 of standard EN 303-5 will be prohibited for the entire territory of the Czech Republic. The obligation can also be implemented in advance on the basis of the municipality's decision. The legislative obligation is laid down on the basis of Section 17(1) of Act No 201/2012 on air protection, as amended, and Annex 11. Under that law: prohibition of operation combustion stationary sources with a rated thermal input of 300 kW or less that do not meet the requirements of Class 1 and Class 2 boilers according to EN 303-5. Specifically, Class 1 solid fuel boilers with an efficiency of &66 % and Class 2 solid fuel boilers with efficiency & 66-73 %.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	50 PJ
Estimated new annual energy savings	8 PJ
Additional information	The measure generates savings in 2024-2025
Main features of the policy measure	

Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of the Environment, municipalities with extended competence Obligations: implementation of legislation, monitoring compliance with established obligations
Sectors targeted	Energy consumers
Eligible individual energy saving measures	Regulatory measures – banning the operation of low-energy efficient combustion sources using solid fuels and making them mandatory to replace with energy efficient energy sources.
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of energy savings is based on the calculation of the difference between the energy consumption of the legally binding weaned boilers a consumption normal a the most likely alternatives available on the market to replace the weaned boilers.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures the cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy savings
Additionality and materiality	
How has the additionality criterion been taken into account?	Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition of

How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period for individual measures, without the existence of the measure, i.e. without the granting of investment aid, licences were not targeted entities motivated
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. Under the established financial support rules, it is not possible to financially support compliance with the legislative obligation United SE prohibition operation the boilers. Of this reason is the risk of overlap between this measure and other measures or financial mechanisms is minimised.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	In accordance with Law No 201/2012, monitoring compliance with the prohibition on operating the classes of solid fuel boilers in question falls within the competence of the municipalities with extended competence, which have the right to: inspections na location, including checks operated boilers a their accessories, used fuels, raw materials and technology related to operations. Failure to comply with the obligations under this Act shall be sanctioned. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried
Authorities responsible for the monitoring and verification process	Ministry of the Environment, Ministry of Industry and Trade, municipal authorities of municipalities with extended competence
Independence of monitoring and verification from obligated, participating or entrusted parties	The calculation of energy savings is carried out on the basis of an analysis carried out by a body independent of the implementation of the ban on the operation of combustion sources in question. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	The ex-post evaluation will verify the impact of the legislative obligation on a representative sample.

Table 127: *Voluntary scheme for improving energy efficiency*

Basic information

Title of the policy action	**Voluntary scheme for improving energy efficiency**
Type of policy measure	**Voluntary agreement/EEOS**
Concise description of the policy measure	Voluntary scheme for improving energy efficiency represents implementation schema energy efficiency obligation under Article 9 of the Energy Efficiency Directive, based on voluntary arrangements between the state and stakeholders to implement end-consumer activities aimed at reducing final energy consumption. Interested parties may be energy distributors and/or sellers active in the energy services market in the electricity, gas and heating sectors; and/or companies significant energy consumption. Individual stakeholders to implement individual energy savings measures compliant with responsibilities resulting from Directives 2023/1791/EU o energy efficiency[164]
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	18.5 PJ
Estimated annual energy savings	1 PJ
Additional information	
Main features of the scheme	
Implementing authority, stakeholders and their responsibilities	Implementing authority: Ministry Industry and Trade Stakeholders: distributors and/or energy vendors active in the electricity, gas and heating sectors Obligations: initiating, implementing and recording energy-saving measures to reduce final energy consumption; evaluation of energy-saving measures on the basis of an agreed methodology; providing information by 31 March of the calendar year on the implementation of energy saving measures in the previous year in accordance with the approved methodology, namely: the type of measures implemented; the amount of savings achieved from each individual measure determined on the basis of an approved imputation methodology; provide information and/or copies of documents upon request showing implementation individual measures and reported energy savings respecting data protection requirements;

[164] Directive 2018/2002 is not the only directive which regulates the wording of Directive 2012/27/EU

	where financial support has been used for the implementation of a measure or project from national or European funds, provide this overview to the responsible ministry; work together to verify energy savings from the implementation of measures; communicate best practices and experience through communication and information activities for the professional/general public, including the communication content standard prepared by the responsible Ministry; cooperate with the responsible Ministry to develop a catalogue of measures; cooperate with the regulator to prepare a single information system for reporting energy savings.
Sectors targeted	Households, industry, services, public sector
Eligible individual energy saving measures	improving the energy performance of the building (building envelope, technical equipment); replacement of lighting (external, internal), implementation of steering elements and optimisation improving the energy efficiency of production and technological processes, including the recovery of waste heat refurbishment and replacement of self-consumption energy installations; reconstruction of electricity, gas and heat distribution systems, implementation of monitoring elements, automation and management of energy consumption in the building construction of charging stations for electric vehicles, hydrogen refuelling stations and CNG/LNG refuelling stations; construction of supporting infrastructure for alternatively fuelled vehicles purchase of new alternatively fuelled cars support for the establishment and implementation of energy management consultation and targeted promotion activities awareness-raising activities on options for reducing energy consumption
Lifetime of individual measures	Investment measure: 12-30 years Training events, awareness-raising activities: 2 years Energy management: 2 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	

Methods for measuring energy savings	The expected method will be used to calculate the energy savings savings na based on catalog standardised energy-saving measures, drawn up on the basis of energy saving measures monitored by an independent body and subsequently approved by the Ministry of Industry and Trade, as the leader of the energy efficiency policy.
Metrics to express energy savings	Final energy consumption
Taking into account savings reductions over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the energy services provided by stakeholders over the lifetime of the measure, there is no reduction in the annual energy savings over the lifetime of the measure. Lifetime savings energy where implementation training, awareness-raising and energy management activities are taken into account in the calculation of cumulated savings energy. The annual energy savings over the lifetime of the
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the involvement of stakeholders. In the case of building renovation (derogation in accordance with Annex V, paragraph 2(b)), the default value for determining energy savings is the energy consumption before the individual measure is implemented. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving
In case the scheme supports the accelerated uptake of more energy efficient products, how has the savings calculation methodology been approached?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.

How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, the targeted entities would not have implemented the measures without the involvement of the interested
Other criteria	
How are any overlaps in the scheme and policy measures addressed to avoid double counting of savings?	The monitoring and verification system will use an IT platform for reporting, monitoring, verification of implemented individual actions. The IT platform will track unique identifiers that allow assigning an individual action to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Where individual measures are implemented on a building, individual parts of a building shall comply with the minimum energy performance requirements of Directive 2010/31/EU on the energy performance of buildings. In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged. Supported vehicle replacements must go beyond the EU minimum emission performance standards.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Energy savings are monitored and verified under the standard energy performance contract obligations. Stakeholders provide information through an online IT platform on the implemented measures needed to report energy savings by the implementing authority. The implementation of individual actions is supported by adequate documentation from stakeholders, which is archived for ex-post control purposes. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry of Industry and Trade responsible for implementing the energy efficiency policy.
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, stakeholders

Independence of monitoring and verification from obligated, participating or entrusted parties	The monitoring of energy savings shall be carried out by stakeholders on the basis of a developed catalogue of standardised measures. Verification of the implementation of the declared individual measures shall be carried out by the implementing body, where appropriate, by an independent state control authority on the basis of the documentation provided and, where appropriate, an on-the-spot check. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade
Verification of a representative sample	The energy savings achieved are verified ex-post on a representative sample of individual measures.
Treatment if progress towards achieving savings is not sufficient	Introduction of a legislative obligation to achieve energy savings under Article 8a of Directive 2012/27/EU on energy efficiency as amended by Directive 2018/2002

Table 128: *Voluntary agreement with energy appliance distributors and sellers*

Basic information	
Title of the policy action	**Voluntary agreement with energy appliance distributors and sellers**
Type of policy measure	**Voluntary Partnership Agreement**
Concise description of the policy measure	The objective of the voluntary agreement is to implement measures to promote the replacement of energy-intensive appliances by distributors and dealers of such appliances. On the basis of a voluntary agreement, stakeholders will incentivise energy consumers to replace obsolete appliances, quickly replace appliances and purchase the most efficient alternatives available on the market. Increased motivation is implemented through impact exchanges appliances, customer services and information activities by distributors and sellers of energy
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	6.6 PJ
Estimated annual energy savings	0.12 PJ
Additional information	Not yet implemented.
Main features of the scheme	

Implementing authority, stakeholders and their responsibilities	Implementing authority: Ministry Industry and Trade Stakeholders: distributors and/or sellers of energy-related products Obligations: implementation of information activities, monitoring of sales of energy appliances according to energy performance classes, monitoring the decommissioning of energy appliances according to energy performance classes
Sectors targeted	Households, industry, services, public sector
Eligible individual energy saving measures	exchange of energy-related products consultation and targeted promotion activities awareness-raising activities on reduction opportunitiesconsumption energy through correct operation of energy appliances
Lifetime of individual measures	Investment measure: 10 years Training events, awareness-raising activities: 2 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	The energy savings method will be used to calculate the energy savings. The survey carried out shall demonstrate the impact of the voluntary agreement on the replacement of energy appliances on the basis of an analysis of data on discarded energy appliances, purchased appliances and information activities of
Metrics to express energy savings	Final energy consumption
Taking into account savings reductions over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the energy services provided by stakeholders over the lifetime of the measure, there is no reduction in the annual energy savings over the lifetime of the measure. The lifetime of energy savings for the implementation of educational and awareness-raising activities is taken into account in the calculation of the cumulated energy savings. The annual energy savings over the
Additionality and materiality	

How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these savings would be energy did not implement without activities stakeholders. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the scheme supports the accelerated uptake of more energy efficient products, how has the savings calculation methodology been approached?	The average age of the replaced products will be taken into account when assessing energy savings. The calculation of the energy savings will be done in accordance with the Commission Recommendation on the transposition of the energy savings obligation.
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to low awareness and long payback times for individual measures, without the involvement of stakeholders, the target entities would not be able to carry out exchanges of energy appliances to such a significant extent and would also not purchase the most efficient alternatives on the market.
Other criteria	
How are any overlaps in the scheme and policy measures addressed to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no financial mechanism or any other policy measure for the replacement of energy appliances. For this reason, the risk of overlap and double counting is minimised.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	In the case of the implementation of exchanges of energy-related products covered by ecodesign, only replacements for products meeting these parameters shall be encouraged. Where energy-labelled products are replaced, only replacements for products falling within the two highest energy performance classes, according to the relevant EU regulations, are encouraged.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Energy savings are monitored and verified on the basis of data on discarded, sold energy appliances and stakeholder activities. Stakeholders provide information through an online platform on the implemented measures needed to report energy savings by the implementing authority.

	Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store responsible for implementing energy efficiency
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, stakeholders
Independence of monitoring and verification from obligated, participating or entrusted parties	Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	

Table 129: *Awareness-raising campaign on energy efficiency*

Basic information	
Title of the policy action	**Awareness-raising campaign on energy efficiency**
Type of policy measure	Behavioural measures
Concise description of the policy measure	The measure is aimed at raising awareness of energy efficiency in order to change the behaviour of energy consumers and reduce energy consumption. The information campaign will be multi-layered in order to maximise the impact on energy consumers. The outreach activities will be implemented through TV spots, print media information activities, social media outreach activities and, last but not least, an online platform.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	
Estimated new annual energy savings	
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authority: Ministry Industry and Trade Obligations: implementation of individual measures, independent monitoring and verification of energy savings.
Sectors targeted	households
Eligible individual energy saving measures	national multi-level awareness-raising campaign on energy efficiency
Lifetime of individual measures	Training actions: 2 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For energy savings from measures to change consumer behaviour as a result of education and awareness raising, the surveyed savings method is used. As part of the calculation of energy savings, the impact of campaigns on consumer behaviour is taken into account when reducing consumption energy v normal households. This presupposes that these entities would in most cases not deal with their energy consumption without energy advice.

	The average level of energy savings is in the range of 2-3 % per year. On the basis of a survey carried out by the Ministry of Industry and Trade, it is clear that the level of awareness among households of energy consumption and the importance of energy savings in the Czech Republic is low. Therefore, the level of average energy savings can be considered to be at the upper limit of 3 %. Average household consumption is used in the calculation of energy savings.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of energy savings when implementing actions to change consumer behaviour shall be taken into account in the calculation of the cumulated energy savings. The annual energy savings over the lifetime of the measure are not expected to be reduced.
Sources of information	Research demonstrating average energy savings: Hunt Allcott. (2011). Social norms and energy conservation. Journal of Public Economics, Volume 95, Issues 9- 10, https://doi.org/10.1016/j.jpubeco.2011.03.003
Additionality and materiality	
How has the additionality criterion been taken into account?	In view of the market failure in relation to low awareness o wider benefits energy these energy savings would not be realised without the existence of policy measures and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not applicable.
How has the materiality criterion been taken into account?	In view of market failures, without the implementation of a targeted awareness-raising campaign, the target entities would not be incentivised to change behaviour and reduce energy consumption. On the basis of the above-mentioned research, it was found, on a representative sample, that there is a reduction in energy consumption based on awareness-raising measures.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of individual measures, the risk of double counting is minimised. There will be no other national awareness-raising campaign in a given year. Other activities in the field

	awareness-raising in other measures or stakeholder activities will be deducted based on a bottom-up approach.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not applicable.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Research has carried out an investigation that will determine the level of energy savings on a representative sample of individual measures. As part of the evaluation of the impact of the campaign, the impact of information activities on the number of energy consumers will be examined. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the competent service Ministries industry a store responsible for implementing energy efficiency
Authorities responsible for the monitoring and verification process	Ministry Industry and Trade
Independence of monitoring and verification from obligated, participating or entrusted parties	The evaluation of the campaign's impact on energy consumers will be carried out by an independent body.
Verification of a representative sample	The ex-post evaluation will identify the percentage energy savings of selected energy consumers through a representative sample survey.

Basic information	
Title of the policy action	**New green savings Light**
Type of policy measure	Financial mechanism
Concise description of the policy measure	The measure focuses on investment support to improve the energy intensity of single-family houses owned by vulnerable low-income households affected by energy poverty.
Planned budget	
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	4 PJ
Estimated new annual energy savings	0.5 PJ
Additional information	
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	<u>Implementing authorities:</u> Ministry of the Environment, State Environmental Fund <u>Obligations</u>: Management of the financial mechanism, provision of financial grants, approval and control of projects, independent monitoring and verification of energy savings.
Sectors targeted	households
Eligible individual energy saving measures	• improving the energy performance of the building (building envelope, technical equipment), • refurbishment and replacement of self-consumption energy installations; • reconstruction of electricity, gas and heat
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Yes
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	For the calculation of energy savings, the method of measured savings will be used if it is a cost-effective option with regard to the implemented individual measures. In other cases, the method is used proportional savings na based on engineering estimates. Energy savings are calculated by energy consultants. The calculation of energy savings is supported by an expert document and is based on a comparison

	the state of final energy consumption before and after the implementation of the energy saving measure.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account: lifetime individual air— measures referred to above. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the commitment period. Taking into account the conditions for providing financial support and the sustainability period, there is no reduction in the annual energy
Additionality and materiality	
How has the additionality criterion been taken into account?	Individual measures and savings achieved are monitored, calculated and verified at the level of implemented individual energy saving measures. In view of the market failure, these energy savings would not be realised without the existence of a policy measure. In the case of building renovation (derogation according to Annex V, paragraph 2(b)), the default value for determining energy savings is consumption energy before implementation individual action. Energy savings resulting from the implementation of individual exchanges of energy-related products covered by ecodesign constitute energy savings from early replacement before the end of life of the original product. This situation is due to low motivation to replace products owing to a low level of energy-saving awareness and low energy prices.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	The assessment of energy savings shall take into account the age of the replaced product. Calculation of savings energy will executed compliant s Commission Recommendation on the transposition of the energy savings obligation.

How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without the granting of an investment aid, licences were not targeted entities
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. In the Czech Republic, there will be no other financial mechanism for the same type of target group. The monitoring and verification system tracks unique identifiers that allow assigning an individual measure to a specific entity or object. This ensures that energy savings in the event of overlaps are automatically deducted in the monitoring system in order to avoid double counting.
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Under the scheme for providing financial support under a given financial mechanism (measure), each project undergoes a substantive process of evaluating proposed individual energy-saving measures by the measure manager – the State Environmental Fund environment. Within rating is the energy savings resulting from the implementation of the project ex-ante are also assessed. The implementation of the project is verified for all projects even ex-post after project implementation. The ex-post control is supported by documentation demonstrating the implementation of the measure and by an ex-post random on-the-spot check for a random sample of projects. The energy assessments of individual measures themselves are carried out by independent energy consultants. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry of

Authorities responsible for the monitoring and verification process	State Environmental Fund, Ministry of Industry and Trade
Independence of monitoring and verification from obligated, participating or entrusted parties	The energy evaluation is carried out by independent energy consultants. Verification shall be subject to a two-level evaluation of the energy savings achieved. The substantive evaluation of projects is carried out by the department of the State Environmental Fund responsible for administering the financial mechanism (measures) independent of energy policy making. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for implementation policies increasing energy
Verification of a representative sample	Each project implemented (individual measures) is verified as part of the ex-post evaluation.

Basic information	
Title of the policy action	**Structural technical requirements for construction and renovation**
Type of policy measure	Regulatory measures
Concise description of the policy measure	This is a regulatory measure setting new stricter minimum technical requirements for the construction and renovation of buildings applicable from 2022. The obligation is laid down in Act No 406/2000 on energy management and Implementing Decree No 264/2020 on the energy performance of buildings.
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	90 PJ
Estimated new annual energy savings	1.7 PJ
Additional information	The measure generates savings in 2023-2030
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry Industry and Trade Obligations: implementation of minimum requirements, control of compliance with established obligations

Sectors targeted	Energy consumers
Eligible individual energy saving measures	• Regulatory measures — • Minimum technical and energy requirements for the construction and renovation of buildings
Lifetime of individual measures	Investment measures – buildings: 12-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of the energy savings shall be based on the calculation of the difference between the energy consumption of buildings normally constructed and renovated before the new requirements and buildings after the new strengthened minimum requirements are
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures v cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the measure go beyond the minimum requirements stemming from Union law, as this is a tightening based on Czech policy beyond transposition.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not relevant
How has the materiality criterion been taken into account?	In view of the market failure, in particular in relation to the long payback period of individual measures, without the existence of the measure, i.e. without minimum requirements, investors would minimise costs.
Other criteria	

How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised. Under the established financial support rules, it is not possible to financially support compliance with the legislative obligation. For this reason, the risk of overlap between this measure and other measures or financial mechanisms is minimised.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Monitoring compliance with the obligations in question is the responsibility of the building authorities and the State Energy Inspectorate, which is the body concerned in construction procedures and checks compliance with specific interests pursuant to Act No 406/2000 on energy management. Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry of Industry and Trade responsible for implementing the
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, State Energy Inspectorate, Construction Administration Bodies
Independence of monitoring and verification from obligated, participating or entrusted parties	Monitoring and verification shall be carried out by authorities other than the implementing authority. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	The ex-post evaluation will verify the impact of the legislative obligation on a representative sample.

Basic information	
Title of the policy action	**Heating rules**
Type of policy measure	Regulatory measures
Concise description of the policy measure	This is a regulatory measure setting requirements for the regulation of the heating system, heating rules linked to compliance with average temperatures in

	heated spaces and rules for the allocation of the cost of heating and hot water. The requirements are or will be laid down in Act No 406/2000 on energy management and implementing legislation regulating temperature regulation and Act No 67/2013 and Implementing Decree 269/2015 on the allocation of heating costs and the joint preparation of hot water for a house.
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	70 PJ
Estimated new annual energy savings	10 PJ
Additional information	The measure generates savings in 2024-2030
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of Industry and Trade, Ministry of Regional Development Obligations: implementation of minimum requirements, control of compliance with established obligations
Sectors targeted	Energy consumers
Eligible individual energy saving measures	Regulatory measures • buildings • minimum heating requirements • regulating heating systems
Lifetime of individual measures	Regulatory measures – Savings generated every year
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of energy savings shall be based on the calculation of the difference between the energy consumption of households, commercial and public bodies before and after the introduction of new obligations. The ENERGO 2021 statistical survey, among others, was used for baseline energy consumption, analyses Odyssee-Mure a
Metrics to express energy savings	Final energy consumption

Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures v cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the measure go beyond the minimum requirements stemming from Union law, as this area is not regulated by Union law.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not relevant
How has the materiality criterion been taken into account?	In the light of existing statistical data, it is clear that the energy performance mainly in domestic heating, but also in commercial and public buildings, is high compared to the EU average, due to inefficient heating, the high level of temperature reached in heating rooms in heating seasons and inefficient regulation. The measures directly address all these factors affecting energy consumption for heating.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Monitoring compliance with the obligations in question falls within the competence of the State Energy Inspectorate's authorities, which is body responsible for monitoring compliance special interests under Act No 406/2000 on energy management.

	Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry of Industry and Trade responsible for implementing the
Authorities responsible for the monitoring and verification process	Ministry of Industry and Trade, State Energy Inspectorate
Independence of monitoring and verification from obligated, participating or entrusted parties	Monitoring and verification shall be carried out by authorities other than the implementing authority. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	The ex-post evaluation will verify the impact of the legislative obligation on a representative sample.

Basic information **Title of the policy action**	**Maximum masses of trucks**
Type of policy measure	Regulatory measures
Concise description of the policy measure **Estimated energy savings in period 2** **Estimated cumulated energy savings**	This is a regulatory measure laying down requirements on the maximum authorised masses of combinations pursuant to Decree No 209/2018, which allow more efficient transport of goods and a reduction in fuel consumption. **21-2030** 10 PJ
Estimated new annual energy savings	1 PJ
Additional information **Main features of the policy measure implementing the authorities, stakeholders or entrusted parties and their responsibilities in the process of implementing the policy measure**	The measure generates savings in 2021-2030 Implementing authorities: Ministry of Transport Obligations: implementation of minimum requirements, control of compliance with established obligations
Sectors targeted	Transport, fuel consumers
Eligible individual energy saving measures	• Regulatory measures • fuel saving
Lifetime of individual measures	Regulatory measures – Savings generated every year

v . ---------- ------------------------- Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of energy savings is carried out on the basis of the calculation of the difference between the fuel consumption of semi-trailers operated in the Czech Republic with the maximum authorised weight under European legislation and the weight given by Decree No 209/2018. For one set, it is possible to increase transport capacity by 12 %, thus reducing the need to increase the number of combinations, thus reducing fuel
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures v cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the measure go beyond the minimum requirements stemming from Union law.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not relevant
How has the materiality criterion been taken into account?	Taking into account the direct impact of authorised transport weights on the energy consumption of lorries and the energy intensity of freight transport, the measure leads to direct savings.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised.

How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	The calculation of the amount of savings and the verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive are carried out by the relevant department of the Ministry of Industry and Trade responsible for the implementation of the
Authorities responsible for the monitoring and verification process	The Ministry of Industry and Trade,
Independence of monitoring and verification from obligated, participating or entrusted parties	Monitoring and verification shall be carried out by authorities other than the implementing authority. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	A study was carried out as part of the ex-post evaluation.

Basic information	
Title of the policy action	**Modal change in transport**
Type of policy measure	Regulatory measures, Financial measures
Concise description of the policy measure	This is a regulatory measure setting requirements for passenger and freight transport, together with a positive incentive for energy consumers to use less energy-intensive modes of transport in line with the Czech transport policy. The measure will lead to a reduction in the energy performance of passenger transport by promoting urban public transport and reducing the share of individual passenger transport. Furthermore, the measure will also lead to a reduction in the energy intensity of freight transport by encouraging a shift from
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	50 PJ
Estimated new annual energy savings	5 PJ
Additional information	The measure generates savings in 2022-2030

Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of Transport Obligations: implementation of minimum requirements, control of compliance with established obligations
Sectors targeted	Transport, fuel consumers
Eligible individual energy saving measures	• Combination of regulatory and financial measures to improve the energy performance of passenger and freight transport, including: • completion of transit rail corridors; upgrading of lines • electricisation of railway trails, acceleration electrification of backbone lines to regions • ensuring sufficient capacity for freight transport for connecting industrial zones of strategic importance • replacement of diesel locomotives electric • traction power conversion • construction of cycle paths • standards for bicycle parking spaces; and scooters • promoting the deployment and use of urban public transport infrastructure • supporting the creation of multimodal transport terminals • information campaigns on sustainable forms transport
Lifetime of individual measures	10-30 years
Addressing energy poverty	Not
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of energy savings shall be based on the calculation of the difference between energy consumption for passenger transport on the basis of individual passenger transport and urban public transport and for freight transport on the basis of road and rail transport. Only the difference between

	the usual and scenarios following the implementation of the measures defined in the Czech Transport Policy. Savings are counting based on statistical data.
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of 10 years or more. The contribution of individual measures in the cumulated savings is taken into account in line with the Commission Recommendation on the transposition of
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the measure go beyond the minimum requirements stemming from Union law, as this area is not regulated by Union law.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not relevant
How has the materiality criterion been taken into account?	Taking into account the direct impact of authorised transport weights on the energy consumption of lorries and the energy intensity of freight transport, the measure leads to direct savings.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	The overall amount of savings was reduced by 30 % (25 PJ) due to possible overlaps with other measures of the transport scheme.
How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	The calculation of the amount of savings and the verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive are carried out by the relevant department of the Ministry of Industry and Trade responsible for the implementation of the
Authorities responsible for the monitoring and verification process	The Ministry of Industry and Trade,
Independence of monitoring and verification from obligated, participating or entrusted parties	Monitoring and verification shall be carried out by authorities other than the implementing authority.

	Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	As part of the ex-post evaluation, statistical data will be analysed for the entire commitment period.

Basic information	
Title of the policy action	**Crisis measures to reduce energy consumption**
Type of policy measure	Regulatory and behavioural measures
Concise description of the policy measure	A combination of broad spectra regulatory; behavioural a financial measures implemented during the energy crisis, final
Estimated energy savings 2021-2030	
Estimated cumulated energy savings	65 PJ
Estimated new annual energy savings	65 PJ
Additional information	The measure generates savings in 2022
Main features of the policy measure	
Implementing authorities, participating or entrusted parties and their responsibilities in the process of implementing a policy measure	Implementing authorities: Ministry of Industry and Trade, Ministry of the Environment, Ministry of Labour and Social Affairs Obligations: implementation of minimum requirements, control of compliance with established obligations
Sectors targeted	Energy consumers
Eligible individual energy saving measures	• temperature control of heated compartments • information campaigns • replacement of inefficient energy appliances • technical building management; • monitoring of energy consumption and energy management • energy consultancy — • advice centres; • mobile advisors; • information line, • information web portals; • energy poor consultancy services households and vulnerable customers

	through employment offices and social workers
Lifetime of individual measures	1 year
Addressing energy poverty	Yes
Methodology for calculating energy savings (Basic information on the methodology for calculating energy savings)	
Methods for measuring energy savings	A combination of the proportional and surveyed savings method based on statistical data and engineering estimates will be used to calculate energy savings. The calculation of energy savings shall be based on the calculation of the difference between the standard energy consumption of households, commercial and public bodies before and after the implementation of the
Metrics to express energy savings	Final energy consumption
Considering lifetimes and reducing energy savings over time	The calculation of the cumulated energy savings takes into account the lifetime of individual measures above. Contribution individual air— measures v cumulated savings are taken into account in accordance with the Commission Recommendation on the transposition of the energy savings obligation. The lifetime of savings in case of implementation of investment measures exceeds the length of the
Additionality and materiality	
How has the additionality criterion been taken into account?	The energy savings resulting from the measure go beyond the minimum requirements stemming from Union law.
In case the measure supports the accelerated uptake of more energy efficient products, how has the methodology for calculating savings been applied?	Not relevant
How has the materiality criterion been taken into account?	Without the implementation of the measures, energy consumers would not make such substantial energy savings.
Other criteria	
How are any overlaps between different policy measures addressed in order to avoid double counting of savings?	Given the nature of the measure and the target group, the risk of double counting is minimised.

How are quality standards (for products, services and installation of measures) supported or required by the policy measure?	Not relevant
Monitoring and verification of energy savings achieved	
Brief description of the monitoring and verification system and the process of the verification;	Verification of the eligibility and reporting of energy savings achieved in accordance with the criteria of Article 8 and Annex V of the Directive shall be carried out by the relevant department of the Ministry of Industry and Trade responsible for implementing the
Authorities responsible for the monitoring and verification process	Ministry Industry and Trade
Independence of monitoring and verification from obligated, participating or entrusted parties	Monitoring and verification shall be carried out by authorities other than the implementing authority. Verification of the eligibility and reporting of energy savings achieved according to the criteria of Article 8 and Annex V of the Directive is carried out by the department of the Ministry of Industry and Trade responsible for the implementation of the energy
Verification of a representative sample	The ex-post evaluation examined the impact at the level of the economy.

Annex 2: Cost assumptions for KETs

Table 130: *Assumptions on the evolution of KETs costs (1st part)*

Technology (Description)	Overnight Investment Costs in a greenfield site, excluding financial costs during construction time				Fixed Operation and Maintenance Costs, Year			
	EUR 2015/kW				EUR 2015/kW			
	2020	2030	2040	2050	2020	2030	2040	2050
CCS Retrofit for EPLT Condensing PP GAS CO2ff.	600	600	600	600	15,0	15,0	15,0	15,0
CHP/EPLT: Fuel Cell.SOFC. BIOGAS	2326	1023	744	744	93,5	81,3	81,3	81,3
CHP/EPLT: Fuel Cell.MCFC.GAS.New	2791	930	930	930	49,0	49,0	49,0	49,0
CHP: Comb CYC Backpressure.Gas L.PUB	837	837	837	837	24,9	24,9	24,9	24,9
CHP: Comb CYC Backpressure.Gas S.PUB	861	861	861	861	29,4	29,4	29,4	29,4
CHP: Comb CYC Condensing GAS.Large	907	907	907	907	27,2	27,2	27,2	27,2
CHP: Comb CYC Condensing CO2Seq.GAS.IND.Large	1758	1712	1712	1712	54,3	54,3	54,3	54,3
CHP: Comb CYC Condensing CO2Seq.GAS.IND.SMALL	2158	2112	2112	2112	54,3	54,3	54,3	54,3
CHP: Comb CYC Condensing CO2Seq.GAS.PUB	1558	1512	1512	1512	54,3	54,3	54,3	54,3
CHP: Comb CYC Condensing GAS. Memdium	930	930	930	930	36,2	36,2	36,2	36,2
CHP: Comb CYC Condensing GAS. Small	977	977	977	977	45,3	45,3	45,3	45,3
CHP: Fuel Cell MCFC Backpressure.BIOGAS	3024	930	930	930	93,5	93,5	93,5	93,5
CHP: Fuel Cell MCFC.GAS	2791	930	930	930	49,0	49,0	49,0	49,0
CHP: Fuel Cell SOFC Backpressure.HH2.PUB	2093	930	698	698	110,2	49,0	36,7	36,7
CHP: Fuel Cell SOFC Backpressure.BGS.PUB	2326	1023	744	744	93,5	81,3	81,3	81,3
CHP: Fuel Cell SOFC Backpressure.GAS.PUB	2093	930	698	698	49,0	36,7	36,7	36,7
CHP: Fuel Cell SOFC.GAS.COM	2093	930	698	698	49,0	36,7	36,7	36,7
CHP: Fuel Cell SOFC.HH2.COM	2093	930	698	698	110,2	49,0	36,7	36,7
	6980 —	5900 —	5000 —	4400 —				
CHP: Hot Dry Rock Backpressure GEO Large	7808	6728	5828	5228	248,0	209,6	177,7	156,3
CHP: HTR Backpressure NUC L.PUB	6517	6517	6517	6517	36,5	36,5	36,5	36,5
CHP: IGCC CO2Seq.COA.IND	2868	2868	2868	2868	63,2	63,2	63,2	63,2

CHP: IGCC.Backpressure Biomass	3396	3163	2977	2977	133,6	133,6	133,6	133,6
CHP: INT Combust liquid fuel. Medum	870	870	870	870	40,1	40,1	40,1	40,1
CHP: INT Combust. Biogas Medium	854	854	854	854	44,1	44,1	44,1	44,1
CHP: INT Combust. Backpressure BDL L.PUB	768	768	768	768	34,3	34,3	34,3	34,3
CHP: INT Combust. Backpressure BGS Large	747	747	747	747	34,3	34,3	34,3	34,3
CHP: INT Combust. Backpressure Gas. Small	1713	1713	1713	1713	57,9	57,9	57,9	57,9
CHP: INT Combust.Backpressure GAS. Medium	791	791	791	791	40,1	40,1	40,1	40,1
CHP: INT Combust.Backpressure GAS. Large	698	698	698	698	31,2	31,2	31,2	31,2
CHP: INT Combust.Biogas. Small	1884	1884	1884	1884	63,7	63,7	63,7	63,7
CHP: STEAM TURB Backpressure.STW	2600	2600	2600	2600	106,6	106,6	106,6	106,6
CHP: STEAM TURB Backpressure. BIOMASS.PUB	1750	1750	1750	1750	71,8	71,8	71,8	71,8
CHP: STEAM TURB Condensing S.COL.PUB	2452	2452	2452	2452	52,7	52,7	52,7	52,7
CHP: STEAM TURB Condensing. (WASTE)	1750	1750	1750	1750	73,6	73,6	73,6	73,6
CHP: STEAM TURB Condensing. BIOMASS	1750	1750	1750	1750	71,8	71,8	71,8	71,8
CHP: STEAM TURB Condensing. WST	1520	1520	1520	1520	73,6	73,6	73,6	73,6
CHP: STEAM Turbine Condensing CO2Seq.COH.PUB	2668	2668	2668	2668	63,2	63,2	63,2	63,2
CHP: STEAM Turbine Condensing CO2Seq.COL.PUB	2768	2768	2768	2768	63,2	63,2	63,2	63,2
CHP: STEAM Turbine oxyfuel Condensing CO2Seq.COH.PUB	2843	2843	2843	2843	67,2	67,3	67,5	67,6
CHP: STEAM Turbine oxyfuel Condensing CO2Seq.COL.PUB	2943	2943	2943	2943	67,2	67,3	67,5	67,6
EPLT: Comb Cyc CO2Seq.GAS.New	1184	1159	1133	1109	21,2	21,2	21,2	21,2
EPLT: Comb Cyc CO2Seq.GAS.New Post	967	947	926	906	49,0	49,0	49,0	49,0
EPLT: Comb Cyc.BIOGAS S.New	454	454	454	454	19,8	19,8	19,8	19,8
EPLT: Comb Cyc.GAS L.New	848	848	848	848	17,2	17,2	17,2	17,2
EPLT: Comb Cyc.GAS S.New	848	848	848	848	20,1	20,1	20,1	20,1
EPLT: Fuel Cell.Hydr.New	2093	930	698	698	110,2	49,0	36,7	36,7
EPLT: Fuel Cell.SOFC. GAS.New	2093	930	698	698	49,0	36,7	36,7	36,7
EPLT: GEO Thermal Hot Dry Rock.GEO.New	6980	5900	5000	4400	248,0	209,6	177,7	156,3
EPLT: GEO Thermal Steam Turbine.GEO.New	3974	3571	3210	2885	139,3	120,5	106,0	106,0
EPLT: Hydro.Lake.New.	3500	3500	3500	3500	45,0	45,0	45,0	45,0
EPLT: Hydro.Pumped Storage.New.	2106	2106	2106	2106	45,0	45,0	45,0	45,0
EPLT: Hydro.Run of River Large.New.	2842	2842	2842	2842	45,0	45,0	45,0	45,0

EPLT	Hydro.Run of River Medium.New.	3158	3158	3158	3158	55,0	55,0	55,0	55,0
EPLT	Hydro.Run of River Small.New.	3790	3790	3790	3790	59,0	59,0	59,0	59,0
EPLT	IGCC.CO2Seq.COH.New	3289	3213	3142	3074	57,9	57,9	57,9	57,9
EPLT	IGCC.CO2Seq.COL.New	2472	2472	2426	2426	57,9	57,9	57,9	57,9
EPLT	IGCC.CO2Seq.WOO.New	1980	1980	1980	1980	117,0	117,0	117,0	117,0
EPLT	IGCC.MUN.New	1584	1584	1584	1584	70,2	70,2	70,2	70,2
EPLT	INT Combust.BGS L.PUB	870	870	870	870	40,1	40,1	40,1	40,1
EPLT	PV Commercial Size.SOL.New	1015	793	546	376	20,4	14,4	10,2	7,2
EPLT	PV Plant Size.SOL.New	770	601	414	285	15,8	11,1	7,7	5,3
EPLT	PV Roof panel.SOL.New	1398	1103	760	524	25,1	17,8	12,7	9,1
EPLT	SC comb. Cycle.Oxyfuel CO2Seq.GAS.New	1439	1408	1377	1348	26,2	26,2	26,2	26,2
EPLT	SC Steam Turb.Oxyfuel CO2Seq.COH.New	2938	2862	2790	2723	74,8	72,8	71,0	69,3
EPLT	SC Steam Turb.Oxyfuel CO2Seq.COL.New	3148	3072	3001	2933	68,6	66,9	65,4	63,9
EPLT	SC.Steam.Turb.700 L.COH.New	1451	1451	1451	1451	36,9	36,9	36,9	36,9
EPLT	SC.Steam.Turb.700 L.COL New	1638	1638	1638	1638	35,7	35,7	35,7	35,7
EPLT	SC.Steam.Turb.CO2seq.L.COH.New	2763	2687	2615	2548	70,3	68,4	66,6	64,9
EPLT	SC.Steam.Turb.CO2seq.L.COL New	2973	2897	2826	2758	64,8	63,1	61,6	60,1
EPLT	SC.Steam.Turb.COH.L.New	1209	1209	1209	1209	30,8	30,8	30,8	30,8
EPLT	SC.Steam.Turb.COH.M.New	1369	1369	1369	1369	36,7	36,7	36,7	36,7
EPLT	SC.Steam.Turb.COL LARGE.New	1579	1579	1579	1579	34,4	34,4	34,4	34,4
EPLT	SC.Steam.Turb.HFO.New	720	720	720	720	50,0	50,0	50,0	50,0
EPLT	Solar Thermal.SOL.New	7002	6319	5703	5147	60,5	60,5	60,5	60,5
EPLT	Solar Thermal.SOL.New	2991	2429	1971	1600	50,4	50,4	50,4	50,4
EPLT	STEAM Turb.WOO.PUB	2474	2326	2186	2054	71,8	71,8	71,8	71,8
EPLT	STEAM Turbine GAS.New	421	421	421	421	34,0	34,0	34,0	34,0
EPLT	Steam.Turb.COH.Lifetime extension for BaseYear PP	50	50	50	50	0,8	0,8	0,8	0,8
EPLT	Steam.Turb.COH.New	1263	1263	1263	1263	45,3	45,3	45,3	45,3
EPLT	Steam.Turb.COL.Lifetime extension for BaseYear PP	50	50	50	50	0,8	0,8	0,8	0,8
EPLT	TURB Distributed Gas DGS.New	302	302	302	302	10,4	10,4	10,4	10,4
EPLT	TURB Peak.DSL.New	333	333	333	333	11,5	11,5	11,5	11,5
EPLT	TURB Peak.GAS.New	302	302	302	302	10,4	10,4	10,4	10,4

EPLT: TURB Peak.OIL.New	333	333	333	333	11,5	11,5	11,5	11,5
EPLT: Wind Onshore medium speed.New.	1917	1812	1208	1184	25,1	17,8	12,7	9,1
Generic industrial boiler from BFG	92	92	92	92	2,6	2,6	2,6	2,6
Generic industrial boiler from BIO	240	240	240	240	5,0	5,0	5,0	5,0
Generic industrial boiler from BLQ	92	92	92	92	2,6	2,6	2,6	2,6
Generic industrial boiler from COG	92	92	92	92	2,6	2,6	2,6	2,6
Generic industrial boiler from ELC	92	92	92	92	2,6	2,6	2,6	2,6
Generic industrial boiler from GAS	92	92	92	92	2,6	2,6	2,6	2,6
Generic industrial boiler from HFO	135	135	135	135	2,6	2,6	2,6	2,6
Generic industrial boiler from SLU	180	180	180	180	5,0	5,0	5,0	5,0
Industrial Waste Heat ORC	700	700	700	700	40,4	40,4	40,4	40,4
Industrial Waste Heat Steam Turbine	700	700	700	700	40,4	40,4	40,4	40,4
Industrial.boiler.BIOMASS	320	320	320	320	6,0	6,0	6,0	6,0
Industrial.boiler.GAS	92	92	92	92	2,6	2,6	2,6	2,6
Pump Storage Power Plant Hydro large New	700	700	700	700	45,0	45,0	45,0	45,0

Table 131: *Cost assumptions for KETs (2nd part)*

Technology (Description)	Variable non fuel cost (VARCOM/ACT_COST) EUR 2015/MWh 2020	2030	2040	2050	Technical lifetime (LIFE/NCAP_Tlife) Years
CCS Retrofit for EPLT Condensing PP GAS CO2ff.	0,54	0,54	0,54	0,54	35
CHP/EPLT: Fuel Cell.SOFC. BIOGAS	21,37	21,37	21,37	21,37	7
CHP/EPLT: Fuel Cell.MCFC.GAS.New	12,47	12,47	12,47	12,47	7
CHP: Comb CYC Backpressure.Gas L.PUB	1,96	1,96	1,96	1,96	30
CHP: Comb CYC Backpressure.Gas S.PUB	1,96	1,96	1,96	1,96	30
CHP: Comb CYC Condensing GAS.Large	1,96	1,96	1,96	1,96	30
CHP: Comb CYC Condensing CO2Seq.GAS.IND.Large	3,21	3,21	3,21	3,21	30
CHP: Comb CYC Condensing CO2Seq.GAS.IND.SMALL	3,21	3,21	3,21	3,21	30
CHP: Comb CYC Condensing CO2Seq.GAS.PUB	3,21	3,21	3,21	3,21	30
CHP: Comb CYC Condensing GAS. Memdium	1,96	1,96	1,96	1,96	30
CHP: Comb CYC Condensing GAS. Small	1,96	1,96	1,96	1,96	30
CHP: Fuel Cell MCFC Backpressure.BIOGAS	21,37	21,37	21,37	21,37	7
CHP: Fuel Cell MCFC.GAS	12,47	12,47	12,47	12,47	7
CHP: Fuel Cell SOFC Backpressure.HH2.PUB	12,47	12,47	12,47	12,47	7
CHP: Fuel Cell SOFC Backpressure.BGS.PUB	21,37	21,37	21,37	21,37	7
CHP: Fuel Cell SOFC Backpressure.GAS.PUB	12,47	12,47	12,47	12,47	7
CHP: Fuel Cell SOFC.GAS.COM	12,47	12,47	12,47	12,47	7
CHP: Fuel Cell SOFC.HH2.COM	12,47	12,47	12,47	12,47	7
CHP: Hot Dry Rock Backpressure GEO Large	1,07	1,07	1,07	1,07	25
CHP: HTR Backpressure NUC L.PUB	0,45	0,45	0,45	0,45	60
CHP: IGCC CO2Seq.COA.IND	4,99	4,99	4,99	4,99	30
CHP: IGCC.Backpressure Biomass	2,67	2,67	2,67	2,67	30
CHP: INT Combust liquid fuel. Medum	8,90	8,90	8,90	8,90	15
CHP: INT Combust. Biogas Medium	11,13	11,13	11,13	11,13	15

CHP: INT Combust. Backpressure BDL L.PUB	8,35	8,35	8,35	8,35	18
CHP: INT Combust. Backpressure BGS Large	8,35	8,35	8,35	8,35	15
CHP: INT Combust. Backpressure Gas. Small	12,47	12,47	12,47	12,47	15
CHP: INT Combust.Backpressure GAS. Medium	8,90	8,90	8,90	8,90	15
CHP: INT Combust.Backpressure GAS. Large	6,68	6,68	6,68	6,68	18
CHP: INT Combust.Biogas. Small	15,58	15,58	15,58	15,58	15
CHP: STEAM TURB Backpressure.STW	2,56	2,56	2,56	2,56	30
CHP: STEAM TURB Backpressure. BIOMASS.PUB	2,56	2,56	2,56	2,56	30
CHP: STEAM TURB Condensing S.COL.PUB	3,33	3,33	3,33	3,33	35
CHP: STEAM TURB Condensing. (WASTE)	2,56	2,56	2,56	2,56	20
CHP: STEAM TURB Condensing. BIOMASS	2,56	2,56	2,56	2,56	30
CHP: STEAM TURB Condensing. WST	2,56	2,56	2,56	2,56	20
CHP: STEAM Turbine Condensing CO2Seq.COH.PUB	4,99	4,99	4,99	4,99	30
CHP: STEAM Turbine Condensing CO2Seq.COL.PUB	4,99	4,99	4,99	4,99	30
CHP: STEAM Turbine oxyfuel Condensing CO2Seq.COH.PUB	6,12	6,12	6,12	6,12	40
CHP: STEAM Turbine oxyfuel Condensing CO2Seq.COL.PUB	6,12	6,12	6,12	6,12	40
EPLT: Comb Cyc CO2Seq.GAS.New	2,28	2,28	2,28	2,28	30
EPLT: Comb Cyc CO2Seq.GAS.New Post	3,03	3,03	3,03	3,03	30
EPLT: Comb Cyc.BIOGAS S.New	1,85	1,85	1,85	1,85	30
EPLT: Comb Cyc.GAS L.New	1,78	1,78	1,78	1,78	30
EPLT: Comb Cyc.GAS S.New	1,78	1,78	1,78	1,78	25
EPLT: Fuel Cell.Hydr.New	12,47	12,47	12,47	12,47	7
EPLT: Fuel Cell.SOFC. GAS.New	12,47	12,47	12,47	12,47	7
EPLT: GEO Thermal Hot Dry Rock.GEO.New	1,07	1,07	1,07	1,07	25
EPLT: GEO Thermal Steam Turbine.GEO.New	1,08	1,08	1,08	1,08	30
EPLT: Hydro.Lake.New.	0,00	0,00	0,00	0,00	120
EPLT: Hydro.Pumped Storage.New.	0,00	0,00	0,00	0,00	120
EPLT: Hydro.Run of River Large.New.	0,00	0,00	0,00	0,00	70
EPLT: Hydro.Run of River Medium.New.	0,00	0,00	0,00	0,00	70
EPLT: Hydro.Run of River Small.New.	0,00	0,00	0,00	0,00	70
EPLT: IGCC.CO2Seq.COH.New	4,45	4,45	4,45	4,45	30

EPLT	IGCC.CO2Seq.COL.New	4,81	4,81	4,81	4,81	30
EPLT	IGCC.CO2Seq.WOO.New	3,25	3,25	3,25	3,25	30
EPLT	IGCC.MUN.New	3,25	3,25	3,25	3,25	30
EPLT	INT Combust.BGS L.PUB	8,90	8,90	8,90	8,90	15
EPLT	PV Commercial Size.SOL.New	0,00	0,00	0,00	0,00	25
EPLT	PV Plant Size.SOL.New	0,00	0,00	0,00	0,00	25
EPLT	PV Roof panel.SOL.New	0,00	0,00	0,00	0,00	25
EPLT	SC comb. Cycle.Oxyfuel CO2Seq.GAS.New	4,53	4,53	4,53	4,53	30
EPLT	SC Steam Turb.Oxyfuel CO2Seq.COH.New	5,46	5,46	5,46	5,46	30
EPLT	SC Steam Turb.Oxyfuel CO2Seq.COL.New	5,82	5,82	5,82	5,82	30
EPLT	SC.Steam.Turb.700 L.COH.New	3,56	3,56	3,56	3,56	40
EPLT	SC.Steam.Turb.700 L.COL New	3,92	3,92	3,92	3,92	40
EPLT	SC.Steam.Turb.CO2seq.L.COH.New	4,45	4,45	4,45	4,45	40
EPLT	SC.Steam.Turb.CO2seq.L.COL New	4,81	4,81	4,81	4,81	40
EPLT	SC.Steam.Turb.COH.L.New	3,56	3,56	3,56	3,56	40
EPLT	SC.Steam.Turb.COH.M.New	3,56	3,56	3,56	3,56	40
EPLT	SC.Steam.Turb.COL LARGE.New	3,92	3,92	3,92	3,92	40
EPLT	SC.Steam.Turb.HFO.New	1,50	1,50	1,50	1,50	35
EPLT	Solar Thermal.SOL.New	0,00	0,00	0,00	0,00	30
EPLT	Solar Thermal.SOL.New	0,00	0,00	0,00	0,00	30
EPLT	STEAM Turb.WOO.PUB	2,56	2,56	2,56	2,56	30
EPLT	STEAM Turbine GAS.New	1,69	1,69	1,69	1,69	35
EPLT	Steam.Turb.COH.Lifetime extension for BaseYear PP	7,50	7,50	7,50	7,50	15
EPLT	Steam.Turb.COH.New	3,56	3,56	3,56	3,56	40
EPLT	Steam.Turb.COL.Lifetime extension for BaseYear PP	7,50	7,50	7,50	7,50	15
EPLT	TURB Distributed Gas DGS.New	1,85	1,85	1,85	1,85	30
EPLT	TURB Peak.DSL.New	2,05	2,05	2,05	2,05	30
EPLT	TURB Peak.GAS.New	1,85	1,85	1,85	1,85	30
EPLT	TURB Peak.OIL.New	2,05	2,05	2,05	2,05	30
EPLT	Wind Onshore medium speed.New.	0,00	0,00	0,00	0,00	25
Generic industrial boiler from BFG		0,55	0,55	0,55	0,55	30

Generic industrial boiler from BIO	1,80	1,80	1,80	1,80	30
Generic industrial boiler from BLQ	0,55	0,55	0,55	0,55	30
Generic industrial boiler from COG	0,55	0,55	0,55	0,55	30
Generic industrial boiler from ELC	0,46	0,46	0,46	0,46	30
Generic industrial boiler from GAS	0,46	0,46	0,46	0,46	30
Generic industrial boiler from HFO	0,55	0,55	0,55	0,55	30
Generic industrial boiler from SLU	1,80	1,80	1,80	1,80	30
Industrial Waste Heat ORC	3,92	3,92	3,92	3,92	40
Industrial Waste Heat Steam Turbine	3,92	3,92	3,92	3,92	40
Industrial.boiler.BIOMASS	2,16	2,16	2,16	2,16	30
Industrial.boiler.GAS	0,46	0,46	0,46	0,46	30
Pump Storage Power Plant Hydro large New	0,00	0,00	0,00	0,00	120

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Annex 4: List of abbreviations

4M MC	trading in the Czech-Slovakia-Hungary-Romanian linked day-ahead interconnected market (4M market coupling)
YES	Unsatisfied citizens' events (political party)
BACI	interconnector between the Czech and Austrian natural gas transmission networks (Bidirectional Austrian-Czech Interconnection)
BAT	best Available Technology
BAU	'business as usual'
BEV	battery Electric Vehicle
bottom-up	bottom-up approach (in regional cooperation reference)
BP	kerosene Society (British Petroleum)
BPS	biogas station
BRKO	biodegradable municipal waste
BRO	biodegradable waste
BSD	security of supply (natural gas)
BT	block market (electricity in the Czech Republic)

business as usual under normal conditions

CACM	capacity Alocation and Congestion Managment
CCS	carbon Capture and Storage
CCU	carbon Capture and Utilisation
CDD	number of cooling degree days
CEE GRIP	preparation platform for the Gas Regional Investment Plan for Central and Eastern Europe
CEF	Connecting Europe Facility
CEGH	central European gas switchboard – Baumgarten
CEP	Central project log

ceteris paribus	indication of the condition or assumption that the result is valid only if the other conditions remain unchanged
CF	The Cohesion Fund
CIF	cost of Insurance and Freight
CNG	compresed natural gas
WHAT	Carbon monoxide
CO_2	Carbon dioxide
COP 21	the Paris Agreement (Conference of Parties)
Core flow-based	common methodology for the calculation of intraday capacity developed transmission system operators of the region
Coreso, TSC, SSC	coordination platforms to ensure operational coordination between the dispatch offices of the participating TSOs
CPI	Czech-Polish Interconnection (Czech-Polish Interconnection)
CPO02	European energy efficiency target
ČEPS	Operator of the Czech transmission system (ČEPS, a.s.)
ČGS	The Czech Geological Service
ČHMÚ	Czech Hydrometeorological Institute
CNB	Czech National Bank
CZECH REPUBLI	Czech Republic
ČSSD	Czech Social Democratic Party (Political Party)
CSO	Czech Statistical Office
DEZ	secondary energy sources
DS	distribution system
DT	daily spot market (with electricity in the Czech Republic)
EBGL	Commission Regulation (EU) establishing a guideline on electricity balancing
EDU	Dukovany Nuclear Power Plant
EEPR	European Energy Programme for the Economic Recovery of the Energy Sector

EEX	European Energy Exchange
EFFECT	State programme to support energy savings
EIA	Environmental Impact Assessment
EKIS	Energy consultation and information centres
ENERGO	Identification of the statistical survey in the household sector
ENS	energy deficit indicator to cover expected typically annual consumption, including energy not served
ENTSO-E	European Network of Transmission System Operators for Electricity
EPC	method of financing high-quality energy-efficient renovation of buildings for the efficient use of public funds (Energy Performance Contracting)
ERD	execution diagram system
ERDF	European Fund for Regional Development
ERÚ	Energy Regulatory Office
ES CR	Czech electricity system
ESF	European social fund
ESIF	European Structural and Investment Funds
ESR	(EU) measures for compliance with the LULUCF Regulation, covering all key emitting sectors and sectors to improve removals, with a view to becoming a low-emission economy in line with the Paris Agreement
ETP	energy Technology Perspectives – IEA publication
EU ETS	European Union emission trading scheme
EUA	European Emission Allowances
EUPHEMIA	single algorithm for efficient electricity pricing and use of cross-border transmission capacity
Euracoal	European Association for Coal and lignite Lignite)

Eurostat	statistical Office of the European Union
EU-SILC	survey (EU) conducted only in permanently populated private dwellings (population projection, number of households)
EZ	Energy Act
FACTS	use of high temperature or superconductors and devices for the control of active and reactive power flows
FCA	Regulation (EU) establishing a guideline on forward capacity allocation
FID	Final investment decission
FSC	Forest Stewardship Council
FVE	photovoltaic power plant
GASPOOL	German trade zone
Gazelle	pipeline
GHG	green House Gas
HDD	number of heating degree days
GDP	gross domestic product
GNI	gross national income
HPH	gross added-value
HPS	border transfer station
IEA	International Energy Agency
IGCC	International Grid Control Cooperation
IPCC	Intergovernmental Panel on Climate Change
IPP	Industrial production index
IPPC	Integrated pollution prevention and control
IROP	Integrated Regional Operational Programme
KO	municipal waste
ktoe	thousand tonnes of oil equivalent
CVET	combined generation of electricity and heat
LČR	Forests of the Czech Republic

LIP 15 joint project for cross-border trade in the Czech Republic, Bulgaria, Austria; Germany, Hungary, Poland, Romania, Slovenia, Croatia

LOLE supply reliability standard indicator (Loss of Load Expectation)

LPG liquefied Petroleum Gas

LRF linear reduction factor/emission allowances/

LULUCF land use, land use change and forestry sector

M1 vehicles with a maximum of eight passenger transport points

M2 vehicles with more than eight passenger transport points (weight not exceeding 5 000 kg)

M3 vehicles with more than eight passenger transport points (weight exceeding 5 000 kg)

MAF reliability methodology usable in the planning of corrective actions in the case of

indication of source insufficiency and ENTSO-E report (Mid-term Adequacy Forecast)

MARI Manual Activated Reserves Initiative

MC principle of implicit allocation of cross-border capacities (market coupling)

MCO a plan setting out the performance of the functions of the nominated market operators in the field of

market Coupling Operator Plan

Mero ČR, a.s. the Czech company owning and operating the Družba and IKL pipelines on

Czech territory

RME Rapeseed oil methyl ester

MF CR Ministry of Finance

MMR Ministry for Regional Development

PRIMES model modelling tool for EU analysis (in impact assessment) and policy options analysis)

Mothballing deactivation and preservation of equipment or production equipment for possible future use

MINISTRY OF INDUSTRY AND TRADE Ministry of Industry and Trade

MRC	a connected region of Western Europe based on the flow-base of cross-border capacity allocation (Multi Regional Coupling)
MT	Megatuna (equivalent to million tonnes)
Mtoe	million tonnes of oil equivalent
MOI	Ministry of the Interior of the Czech Republic
MW	megawatt
N1	vehicles with a maximum permissible mass not exceeding 3 500 kg
N-1	safety criterion
N2	vehicles with a maximum authorised mass exceeding 3 500 kg but not exceeding 12 000 kg
N_2O	nitrous oxide
N3	vehicles with a maximum authorised mass exceeding 12 000 kg
NAP CM	National Clean Mobility Action Plan
THE NAP IS	National Action Plan for the Development of Nuclear Energy
RES NAP	National Renewable Energy Action Plan
NAP SG	National Smart Networks Action Plan
NAPEE	National Energy Savings Action Plan
NATO Central	European Pipeline System (CEPS) NATO Central European Pipeline System
NC CAM	Network Code Capacity Allocation Management
NC ER	EU Commission Regulation establishing an Emergency Restoration Network Code
NCG	German trade zone
NEMO	NEMO according to CACM (Nominated Electricity Market Operator)
NOT APPLICAB	non-renewable energy sources
NET4GAS	Transport operator in the Czech Republic
NIL	National forest inventory

NPISHS	adjusted disposable income (transfers to households from general government or non-profit institutions serving households)
NKR	National concept for the implementation of cohesion policy
NN	low-voltage (low-voltage networks)

North Sea Brent FOB (FOB – free on board)

No_x	Oxides of nitrogen
NPOV	National oriented research priorities
NTC	net Transmission Capacity
NV	Government Regulation
OECD	Organisation for Economic Co-operation and Development
OLTC	increased use of reclosers, smart section switches, vn/nn transformers with the possibility to switch under load in network operation
OP PIK	Operational Programme Enterprise and Innovation for Competitiveness
OPD	Operational Programme Transport
OPEC	Organisation of the Petroleum Exporting Countries
OPM	metered location where electricity transmission and take-over takes place between two market participants, or where electricity is to be taken
OPPI	Loans to municipalities to upgrade housing 0 9 7 0 2.3
ENVIRON MENT OP	Operational Programme Environment
UN	United Nations (United Nations)
OTE, a.s.	Electricity and gas market operator
RES	renewable sources of energy
PCIs	project of Common Interest
PCR	energy Exchange Coupling of Regions project under the MCO Plan
PEFC	Programme for the Endorsement of Forest Certification

PEZ	primary energy sources
PFCs	perfluorocarbons
PHEV	plug-in hybrid electric vehicles
PHM	motor fuels and lubricants
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
PJ	Petajoule (energy unit)
PLEXOS	Integrated energy model for energy market modelling
PM 10 matter)	particle size (semi-coated dust) in micrometres (particulate)
POH OF THE	Waste management plan of the Czech Republic
POK	Climate protection policy in the Czech Republic
PPL	cross-border pipeline
PPS	a transmission system operator
C4G project	increasing cross-border transport capacities at the borders of the Czech Republic with BRD and SK (“Capacity for Grid”)
RDP	Rural development programme
PS OF THE CZECH	transmission system of the Czech Republic
PST	transversely controlled transformers
PUPFL	land designated to fulfil forest functions
PZE	supported energy sources
RDE	real Driving Emissions
RIA	Final report on Regulatory Impact Assessment
RIS3 National	Research and Innovation Strategy for Smart Specialisation of the Czech Republic
RSC	regional Security Coordinator
RTPA	regulated third party access

SDAC	single day-ahead electricity market in the EU
SEA	Strategic Environment Assessment
SEC OF THE	State Energy Policy of the Czech Republic
Set plan	European Strategic Energy Technology Plan
SIDC	single intraday electricity market in the EU
SO GL	EU Commission Regulation establishing a guideline on electricity transmission system operation (System Operation Guidelines)
SOAF	ENTSO-E Report
SOS	Security of Supply
PZ	balance responsible parties
STA	heat supply system
THE CZECH	Technology Agency of the Czech Republic
TAL	pipeline managed by TAL Group (Transalpine Pipeline)
TAP	solid alternative fuels
TCEP	IEA publication (Tracking Clean Energy Progress)
TEN-E	Trans-European Energy Networks
TEN-T	Trans-European Transport Networks
TERRE	Trans European Replacement Reserves Exchange)
THÉTA	programme to support applied research, experimental development and innovation
I.E.	terajoule (energy unit)
TKO	municipal solid waste
TNS	domestic net consumption
TriHyBus	Czech hydrogen-powered hybrid bus, fuel cell electric bus

TRU	the project to improve the business area/gas/TRU service allows direct interconnection of the Czech and Austrian gas markets (Trading Region
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan of the Czech Republic/European Ten-Year Transmission System Development Plan
ÚHÚL	Forest Management Institute
USD PPP	USD in purchasing power parity
USD/bbl	dollars per barrel
VAV	science and research
VDT	intraday market (with electricity in the Czech Republic)
VIPS	virtual interconnection point
VN	high voltage (high-voltage networks)
VOB	virtual Trading Point/gas/
VOC	volatile organic compound
VOLL	supply reliability standard indicator (Value of Loss Load)
VPS	national transmission system
VŠPS	labour force survey
VTE	wind power plant
VTL, STL, NTL	high-pressure, medium-pressure and low-pressure pipeline system
VVTL	very high pressure gas pipelines
VZP	virtual gas storage
WEO	World Energy Outlook (IAA Publication)
XBID	joint Cross-Border Business Project Czech-Polish and Bulgarian-Romanian
ZD	nomination of a commitment to supply/natural gas/
ZO	nomination of an obligation to withdraw/natural gas/
NB	natural gas

ESF+	European Social Fund Plus