THE PHILIPPINES OFFSHORE WIND SUPPLY CHAIN STUDY

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Editors and Acknowledgements

This report was edited by the Global Wind Energy Council team: Feng Zhao, Liming Qiao, Mark Hutchinson, Ann Margret Francisco, and Weng Han Tan.

In particular, GWEC and ERM would like to give its sincere appreciation to stakeholders in the Philippines and Atty. Josefina Patricia Magpale-Asirit (ERM's Senior Advisor) who agreed to be part of this study and made this report a success. This report strived to give an accurate representation of the existing frameworks and market intelligence available, however, at the time of drafting the report policy frameworks were still evolving and so there may be differences between this report and the final frameworks/intelligence when published.

Liming Qiao
Chief Strategy Officer, Asia
Global Wind Energy Council

Foreword

The Global Wind Energy Council (GWEC) is proud to present this report on the offshore wind supply chain in the Philippines. As the country stands on the brink of unlocking its significant offshore wind potential, there is a pressing need to map out the capabilities of local industries in supporting this development. A well-understood and robust local supply chain will ensure that the Philippines not only benefits from offshore wind through energy generation but also through job creation, industrial growth, and technological advancement to achieve long term decarbonisation goals.

This report serves as a catalyst for discussions on how the Philippines can first understand, engage and eventually compete within the regional offshore wind industry, strengthening its position as a leader in Southeast Asia. The report outlines key recommendations for the Philippine government to adopt policies and strategies that will foster both offshore wind development and the growth of a competitive local supply chain, ensuring that the benefits of this emerging sector are shared widely across the country.

GWEC has been actively working in the Philippines, collaborating with the key government agencies - Department of Energy (DOE), Energy Regulatory Commission (ERC), Philippine National Oil Company (PNOC) and National Grid Corporation of the Philippines (NGCP) among others, the local associations - Developers of Renewable Energy for Advancement, Inc (DREAM), Wind Energy Developers Association of the Philippines (WEDAP) and Pilipinas Offshore Wind Energy Resource, Inc (POWER) - and other stakeholders on several important workstreams that are essential for the long-term success of the offshore wind industry such as **Marine Spatial Planning and Permitting, Bankability of the Power Purchase Agreement (PPA) and Auction Design, Port Development and Supply Chain Readiness.**

These workstreams are fundamental because they address key barriers to offshore wind development and establish the foundational infrastructure, policy, and market conditions necessary for the sector's success, giving a clear route-to-market for foreign investors. By advancing these critical workstreams, the Philippines can create a supportive ecosystem for offshore wind that not only attracts investments but also ensures long-term viability and competitiveness.

At GWEC, collaboration remains at the heart of everything we do, and it will continue to guide our efforts moving forward. The success of the offshore wind industry in the Philippines hinges on partnerships between the government, developers, financial institutions, NGOs representing local communities and marine space users, and supply chain stakeholders. It is through these partnerships that we can unlock the full potential of offshore wind in the Philippines, ensuring that it contributes not only to the country's clean energy goals but also to employment growth, technological advancement, and long-term economic resilience.

We hope this report serves as a catalyst for the continued collaboration needed to build a thriving offshore wind industry in the Philippines, one that will be a pillar of the country's renewable energy future and a key player in the region.

Table of Contents

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List of Figures

List of Tables

EXECUTIVE SUMMARY

Executive summary

Objective of the Study

While the Philippines is an early offshore wind (OFW) market, the government is moving fast and working closely with the industry and multilateral development partners to accelerate development. As the country develops a framework to cater for offshore wind development, developing an understanding of its local supply chain capability and its readiness to harness the socio-economic benefits brought on by this new economic sector can help to inform framework discussions.

The objectives of the study are to provide a concise understanding of the current status and future potential of OFW in the Philippines, to analyse and access the existing supply chain, to evaluate the potential for collaboration and partnerships between international and local entities using scenario building, and to advise on a future industrial strategy that could be implemented by the government.

The primary audience for this initiative includes policymakers involved in the energy sector in the Philippines, as well as offshore wind stakeholders such as industry representatives, investors, and local communities. A secondary audience comprises policymakers from Southeast Asia's energy sectors and other emerging offshore wind markets.

Status of Offshore Wind in the Philippines

The Philippines is setting its eyes on offshore wind in a bid to increase its energy security in the medium to long-term. The strong push for offshore wind development will also allow the government to achieve its renewables targets by 2050. Through the Philippine Energy Plan (PEP) 2023-2050, the country aims to significantly increase the share of renewable energy in the nation's power generation, targeting 35% by 2030, 50% by 2040, and over 50% by 2050. To achieve its sustainable economic development goals and meet the country's growing energy demands, the Philippine government is prioritising offshore wind as a key driver. At the time of writing, The Department of Energy (DOE) has awarded approximately 65 GW of offshore wind service contracts, with more under review, based on two possible buildout scenarios:

Clean Energy Scenario (CES) 1: 19 GW of offshore wind operational capacity by 2050; or,

CES 2: 50 GW of offshore wind operational capacity by 2050.

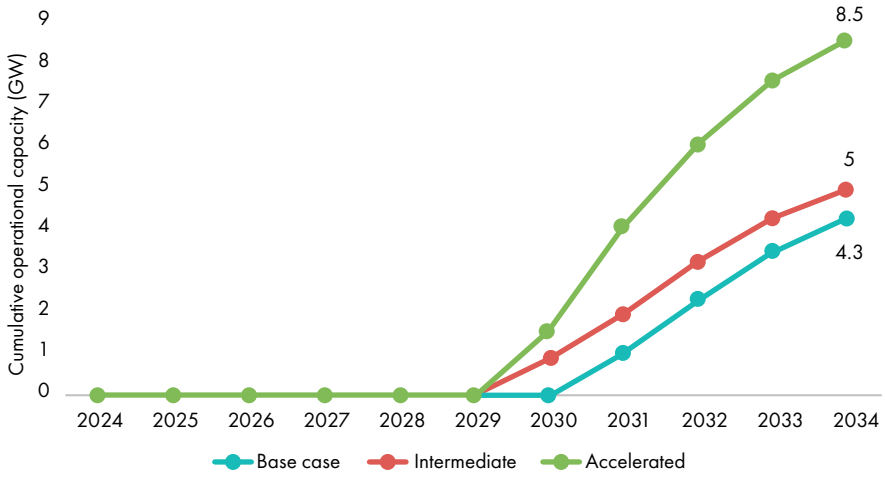
The International Energy Agency states that the country is vulnerable to fluctuations in energy prices, which threatens its energy security as a net importer of energy.

The Philippines Offshore Wind Roadmap estimates circa 178 GW of technical potential, of which 90% is suitable for floating offshore wind (i.e., deeper than 60 meters below sea level).

Political Support: The Philippine government is actively involved in granting OFW service contracts which allows interested developers to conduct a pre-feasibility study. In 2023, the Marcos Jr. administration issued Executive Order 21 which aims to streamline permitting processes for OFW; and released the Omnibus Guidelines governing the procedures for wind energy contract awards. In early October 2024, the Department of Energy and the Department of Environment and Natural (DENR) Resources signed a Memorandum of Agreement granting rights to use offshore areas covered by offshore wind energy service contracts, including auxiliary areas to accelerate the exploration, utilisation and development of offshore wind projects.

Development Scenarios. This report outlines three development scenarios that provide insights into the future of the offshore wind industry in the Philippines. The three scenarios (as shown in Figure A below) assess potential installations of offshore wind through 2034 based on ERM's Global Renewables Infrastructure Projects (GRIP) database and a realistic evaluation of technological and market conditions.

Figure A: The three development scenarios cumulative operational build out capacity.



The **Base Case Scenario** predicts 4.3 GW of offshore wind capacity with the first project reaching commercial operation by 2031, assuming limited policy improvements, low industry interest, challenging economic conditions, and construction starting in 2029.

The **Intermediate Scenario** estimates 5 GW developed by 2034 with the first project becoming operational by 2030, with policy enhancements, moderate industry engagement, and typical economic conditions. Construction would start one year earlier in comparison to Base Case Scenario adding 700 MW to the cumulative capacity.

In the **Accelerated Scenario**, 8.5 GW is expected by 2034, driven by strong policies, high industry engagement, and favourable economic conditions. Construction, similarly to Intermediate Scenario, begins in 2028, with first operations starting in 2030.

Key Findings

In this report the existing supply chain for offshore wind in the Philippines is analysed and assessed to discern opportunities available for the local market. Through the analysis, the key opportunities were found to be the following:

- **Development services:** Filipino companies have a significant opportunity to capture much of the market share in the development phase of offshore wind projects. Development services typically require minimal investment and have low barriers to market entry.
- **Steel:** The Philippines has strong steel manufacturing capabilities which could be transitioned into producing secondary steel components, this with investment into the relevant equipment and training programmes.
- **Cement:** The cement industry can position itself to service floating substructures. Despite the lack of immediate demand, the industry can prepare for future offshore wind projects.
- **Shipbuilding:** Being the fourth largest ship producer, the Philippines has 124 shipyards and around 48,000 employees at the end of 2022. The industry produces small vessels for the domestic market and large vessels for international trade. While foreign-owned shipyards focus on vessel production, domestic ones specialise in repairs and maintenance. With sustained investment and training, the Philippines' shipbuilding industry has the potential to broaden its capabilities and play a pivotal role in supporting offshore wind projects.
- **Transmission & cable manufacturers:** The Philippine cable industry has significant opportunities in offshore wind in the long run, provided that investment is made, as local manufacturers are able to supply copper cables domestically, leveraging the country's vast copper reserves.
- **Skilled workforce:** The strength of the Philippine workforce lies in its skilled seafarers and technical workers, highly sought after globally for their expertise, craftsmanship, and English proficiency, making them valuable assets for offshore wind projects, especially in installation and maritime operations. The Philippines has an opportunity here to optimise the skilled workforce to service offshore wind.

Figure B: Indicative timelines of when the supply chain components are needed

	2025	2026	2027	2028
Steel and Cement	✔			
Shipbuilding/vessels	✔			
Skilled Workforce		✔		
Cables			✔	
Development Services	✔			

Figure B above shows an indicative timeline for when these supply chain components will be required for the offshore wind sector to enable local sourcing. Steel and cement will be essential not only for offshore wind construction but also for port infrastructure. Vessels for surveys and site preparation are needed by 2025, while vessels for foundation installation, turbine installation, and cable laying will be required during the construction phase, which developers aim to begin by 2027/2028. This timeline highlights the need for the industry to start upgrading capabilities as early as 2025.

Building out the Philippine offshore wind supply chain and optimising the opportunities outlined above requires strategic drivers and enablers. These key drivers for offshore wind supply chain expansion in the Philippines include a strong policy commitment to increasing renewable energy (RE) in the national energy mix, aligning with the country's ambitious decarbonization targets to combat climate change. Additionally, offshore wind development is driven by the need for greater energy security to reduce dependence on imported fuels, ensuring a stable and sustainable energy future.

The following elements serve as critical enablers for the development of the offshore wind supply chain:

- Significant capital investment in local supply chain,
- Policy and government support including comprehensive renewable energy policies and financial incentives, such as subsidies and grants,
- Investment in port facilities to meet the specific needs of the offshore wind industry,
- Education and research facilities expanding the local offshore wind knowledge base,

Correlation between CapEx and LCoE

Capital expenditure (CapEx) accounts for 70-80% of the total levelized cost of energy (LCoE) of offshore wind and hence any changes in CapEx significantly impact the overall cost of energy produced. Which is why as offshore wind energy targets in the Philippines increase in the future, there will be a need to develop a robust, local supply chain instead of depending on imports. By recognising the significant role of CapEx in determining LCoE, the government and the private sector could prioritise long-term planning and strategic investments in domestic technology and infrastructure that contribute to lowering CapEx and improving overall project feasibility.

Conclusions and Recommendations

The Philippines has strong potential to become a key player in the APAC offshore wind market, thanks to its resources like shipbuilding, skilled labour, and critical minerals. However, policy improvements are needed to fully unlock these opportunities. The government is already taking steps, such as streamlining processes and expediting permit approvals through a whole-of-government approach. While initial offshore wind projects will rely mostly on foreign supply chains, there is an opportunity for the Philippines to develop its own local supply chain in some segments. To capture this potential, a comprehensive industrial strategy for the wider renewable energy sector could be developed.

Recommendation 1: Clear regulatory framework and streamlined permitting process.

The DOE and Energy Regulatory Commission (ERC) can collaborate on creating a 10 to 15 year installation pipeline, integrated into the PEP, to attract foreign investment and address supply chain needs. Upon awarding the auction, the Department of Energy (DOE) could consider ensuring adequate transmission capacity through strategic integration in the Transmission Development Plan. This proactive approach would help secure necessary transmission resources to support offshore wind projects, facilitating timely project development and contributing to a more resilient and efficient grid infrastructure. Developers and foreign investors tend to be risk-averse when considering first-mover opportunities; they may be hesitant to submit binding bids due to concerns over potential challenges in securing reliable grid connections.

Policy continuity between administrations is also crucial, and the government could consider forming an inter ministerial task force to oversee offshore wind projects and supply chain development. This task force, possibly under the National Economic and Development Authority (NEDA), could help to ensure long-term commitments and stability in the sector. Additionally, aligning Green Energy Auction Reserve (GEAR) prices with regional and global markets could help balance consumer protection while encouraging supply chain movements.

Recommendation 2: Industry incentives and risk mitigation

The government can promote the retail electricity option for supply chain manufacturers, addressing concerns over high energy costs by highlighting the ability to choose energy suppliers, including renewable energy options. This could also make Philippine-manufactured goods more competitive in the long run, particularly in markets such as the EU where imported products need to comply with certain green standards. Additionally, expanding the existing Energy Projects of National Significance (EPNS) framework to include other critical industries, such as steel, shipbuilding, and transmission cable manufacturing, could streamline approvals for key infrastructure projects under a proposed Infrastructure Projects of National Importance (IPNI). The IPNI framework, if passed into law, would adopt the fast-tracked permitting process of EPNS. Lastly, the Department of Trade and Industry (DTI) could explore allowing supply chain companies serving both domestic and international markets to benefit from export incentives, ensuring that domestic offshore wind projects can source locally while supporting export growth.

Recommendation 3: Workforce development and capacity-building

The government could leverage existing programs like the Balik Scientist Program to attract skilled Filipino workers abroad to return home and contribute to the sector. This program could offer attractive financial and living incentives to encourage Filipino professionals abroad to move back. Technical Education and Skills Development Authority (TESDA) and Commission on Higher Education (CHED) can collaborate with various stakeholders to create specialised programs that upskill local talent for offshore wind requirements, ensuring a steady workforce for both the Philippines and the broader APAC region. Strengthening the institutional capacity of the ERC through increased human resources would help address regulatory needs in the growing renewables sector. Upskilling the Philippine Trade and Investment Centre (PTIC) posts to promote offshore wind and its supply chain, along with conducting roadshows in mature markets, could attract international developers and suppliers to the Philippines.

Recommendation 4: Industry competitive advantage mapping

The DTI and Board of Investments (BOI) can use this report as a foundation to attract more supply chain players, while the DTI's Industry Promotion Group (DTI-IPG) conducts a horizon scan for industries with transferable skills. Positioned at the centre of the APAC Offshore Wind Market, the Philippines can capitalise on its strategic location and the recently ratified Regional Comprehensive Economic Partnership (RCEP) to foster regional collaboration. This could create a stable, flexible supply chain for offshore wind components, ensuring that localisation policies balance job creation, supply chain development, and cost efficiency in line with regional strengths.

INTRODUCTION

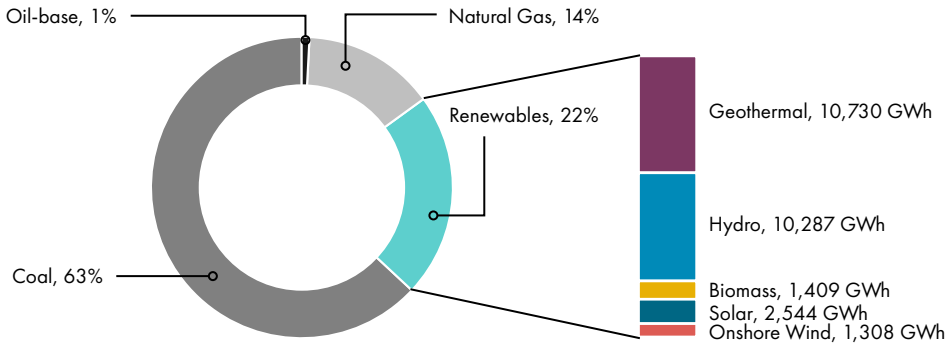
Introduction

The Philippine government is embracing offshore wind as a means to meet its fast-growing domestic demand and strategic sustainable economic development agenda while diversifying its energy mix to reduce reliance on coal imports. Through the Philippine Energy Plan (PEP) 2023-2050, the government aims to increase the share of renewables in its power generation mix from the current 22% to 35% by 2030, 50% by 2040, and more than 50% by 2050[1]. These targets are further backed by the Department of Energy (DOE)'s approval in August 2024 of 65 GW of offshore wind applications across the Luzon and Visayas island groups. More applications are being processed around two potential buildout scenarios:

1. Clean Energy Scenario (CES) 1: 19 GW of offshore wind operational capacity by 2050; or,
2. CES 2: 50 GW of offshore wind operational capacity by 2050.

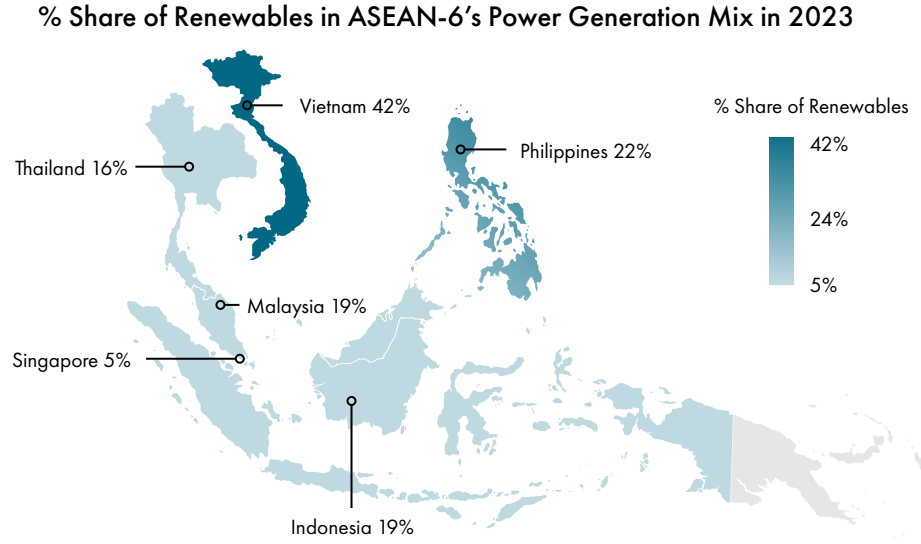
However, in the most recently published figures from DOE, renewables accounted for 22% of the overall power generation mix with generation more heavily skewed towards fossil fuel-based technologies such as coal, natural gas, and thermal (Figure 1). So far, there is no installed offshore wind in the Philippines and only 427 MW of onshore wind[2] with generation from renewables being predominantly driven by geothermal (9%), hydro (9%), solar (2%), and onshore wind (1%).

Figure 1: Philippines' 2023 power generation mix in GWh
Source: Department of Energy



Electricity demand in the Philippines is increasing and existing sources of electricity are not able to keep up with the government's commitment to scale up renewables (primarily wind and solar) and reduce reliance on imports of fossil fuels. According to the International Energy Agency (IEA), the Philippines is a net importer of energy, leaving the country exposed to energy price and supply fluctuations, undermining its energy security. The Philippines, together with Indonesia, saw a record-high reliance on coal generation in 2023, with coal contributing nearly 62% of annual electricity mix for both countries[3]. With renewables providing 22% of the overall energy mix of the Association of Southeast Asian Nations (ASEAN-6 countries), the Philippines is the second largest generator of renewable energy following Vietnam who generate 42% from renewables (Figure 2).

Figure 2: Percentage share of renewables in ASEAN-6's power generation mix in 2023
Source: Our World in Data



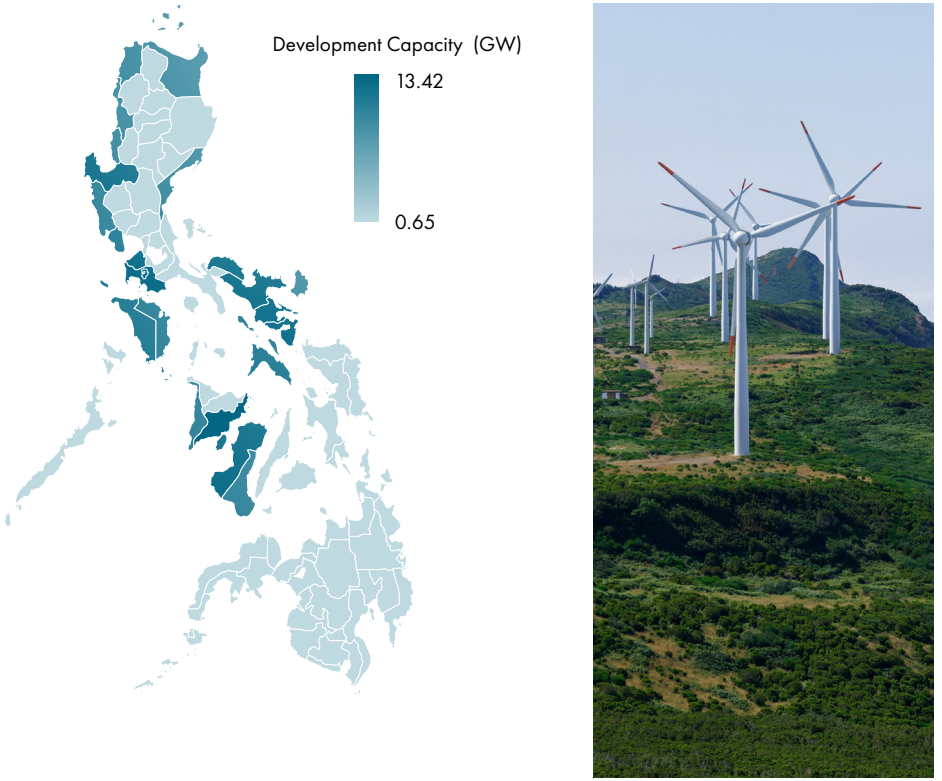
[1] Department of Energy. (2024). Philippine energy plan 2023-2050. https://doe.gov.ph/pep/philippine-energy-plan-2023-2050
[2] Department of Energy. (2024). 2023 power statistics. https://doe.gov.ph/sites/default/files/pdf/energy_statistics/01_Summar_2023.pdf
[3] Ember. (2024). Record coal generation share in Indonesia and the Philippines surpasses Poland and China. https://ember-climate.org/press-releases/record-coal-generation-share-in-indonesia-and-the-philippines-surpasses-poland-and-china/

The World Bank's Philippine Offshore Wind Roadmap estimates circa 178 GW of technical potential, of which 90% is suitable for floating offshore wind (i.e., deeper than 60 meters below sea level[4]). ERM's Global Renewable Infrastructure Projects (GRIP) database (as of August 2024) shows that the Philippines currently has 63 GW[5] of projects in various stages of development, scattered across Luzon and Visayas, two of the country's major island groups (Figure 3).

The Philippines is a trailblazer for Southeast Asia with respect to its history of liberal energy sector policies. The enactment of the Electric Power Industry Reform Act of 2001 (EPIRA) resulted in a restructuring of the entire Filipino power industry including privatization of the entire power generation industry and the establishment of a retail electricity market. EPIRA was a revolutionary policy that allowed increased private sector participation in the industry. Subsequently, the Renewable Energy Act of 2008 (RE Act) was the first of a kind for Southeast Asia, allowing the government to award lease areas to companies intending to industrialise the country's vast indigenous sources of energy. The RE Act introduced incentives for investors and policy mechanisms that have evolved with the industry. Some of the policy mechanisms that were introduced include the feed-in-tariff policy and imposition of renewable portfolio standards.

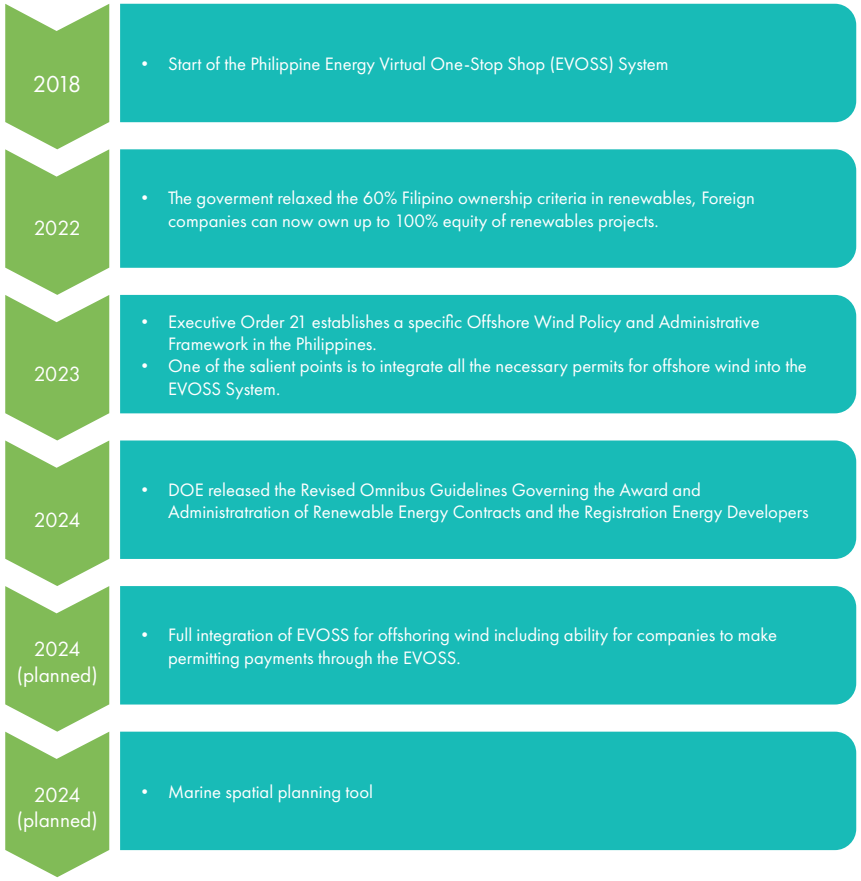
Given its very large offshore wind potential and strong political support for renewables, the Philippines has garnered interest from both established international developers and reputable local developers to jumpstart the country's offshore wind industry. The Philippines is considered by EY's Renewable Energy Country Attractiveness Index to be the most attractive renewables market of the ASEAN-6[6] and has the potential to be a major contributor to tripling renewables by 2030 targets.

Figure 3: Offshore wind capacity by sub regions
Source: ERM GRIP Database



[4] World Bank. (2022). Offshore wind roadmap for the Philippines. https://documents1.worldbank.org/curated/en/099225004192234223/pdf/P1750040b777da0c30935a0e2aa346f4e26.pdf
[5] The basis of the Philippine projects in ERM's GRIP database is from the list of approved Wind Energy Service Contracts that DOE publishes every quarter on its website which represents only a subset of the technical potential that may be developed over the next few decades.
[6] Ernst & Young. (2024). Renewable energy country attractiveness index (63rd ed.). https://www.ey.com/content/dam/ey-unified-site/ey-com/en-gl/insights/energy-resources/documents/ey-gl-recai-63-report-06-2024.pdf

Figure 4: Timeline of developments in policy support surrounding offshore wind in the Philippines



Policy Support

President Ferdinand Marcos, Jr. is setting offshore wind and the wider renewables sector high in his government's agenda. In November 2022, the government lifted the previous requirement for renewable energy projects to have 60% Filipino ownership - a significant milestone driven by the need to accelerate the roll-out of renewables in the Philippines. With this move, foreign companies can now own up to 100% of renewables projects from exploration, development, through to operation[7].

In 2023, President Marcos Jr. signed Executive Order 21 (EO21) which put into place the country's Offshore Wind Policy and Administrative Framework (OPAF)[8] that mandates a whole-of-government approach to delivering offshore wind projects. This policy requires that permitting agencies identify and integrate all necessary offshore wind development permits into the Philippines Energy Virtual One-Stop Shop (EVOSS) system, which was designed to create a smoother permitting process for developers.

The EVOSS System is an online platform that was set up in 2018 to integrate applications and permitting processes for power generation (regardless of technology), transmission, and distribution projects. All permitting agencies required for each power project will have to review and approve or disapprove through the system within a certain period. Payments for permitting agencies are also managed through the EVOSS to ensure that all transactions are transparent. Integration of offshore wind permitting into the EVOSS is ongoing but expected to be completed within 2024.

[7] UN Trade and Development. (2022). Philippines - Allows 100% foreign ownership in the renewable energy sector. https://investmentpolicy.unctad.org/investment-policy-monitor/measures/4130/philippines-allows-100-foreign-ownership-in-the-renewable-energy-sector
[8] Official Gazette of the Republic of the Philippines. (2023). Executive Order No. 21, s. 2023. https://www.officialgazette.gov.ph/2023/04/19/executive-order-no-21-s-2023/

On 25 June 2024, DOE released their *Revised Omnibus Guidelines Governing the Award and Administration of Renewable Energy Contracts and the Registration of Renewable Energy Developers* (DC2024-06-0018). The guidelines for awarding and maintaining an Offshore Wind Energy Service Contracts (OsWESC) are explained in more detail in the project development process section. By granting and awarding an OsWESC to a developer, the area indicated in the service contract will be exclusively leased by the government to the developer for an initial 25-year term starting after the award of the Certificate of Authority (COA) – see Figure 4 for more details.

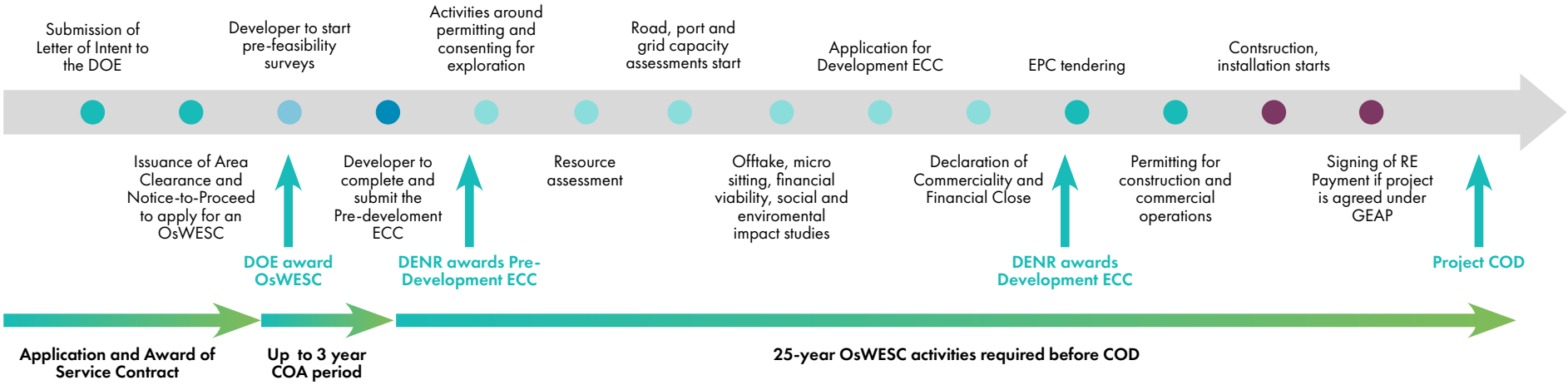
In early October 2024, the Department of Energy and the Department of Environment and Natural Resources signed a Memorandum of Agreement granting rights to use offshore areas covered by offshore wind energy service contracts, including auxiliary areas to accelerate the exploration, utilisation and development of offshore wind projects.

Another key government initiative is the marine spatial planning (MSP) tool which is expected to be published in 2024. This tool will identify any overlap between an offshore wind project site and a Marine Protected Area (MPA) and show how the overlapping area will be excluded from an OsWESC. The DOE announced that MPAs will be strictly designated as "no-go zones" for offshore wind development, including use as navigational channels[9]. We also expect to see a regulatory framework distinguishing areas across the country that are unsuitable for offshore wind development, under the National Integrated Protected Areas System (NIPAS).

Project Development Process

Renewable energy service contracts (regardless of technology) will have a 25-year initial term with the potential for a 25-year renewal, for a total of 50 years. All renewable energy developers are required to submit applications to the DOE for renewable energy service contracts, to gain site exclusivity and development rights for a permitted area. Site exclusivity is granted upon the award of the energy service contract, and valid for the duration of the up to 50-year service contract. The granting of site exclusivity upon award of the service contract is unique to the Philippines as for other offshore wind markets site exclusivity is only granted upon the award of the lease area after an auction round. An expected timeline for a Philippine offshore wind project is shown in Figure 5.

Figure 5: Indicative timeline of activities and permits pre-COD



[9] Velasco, M. (2024, August 16). DOE to ensure 'marine protected areas' are off-limits to offshore wind projects. Manila Bulletin. https://mb.com.ph/2024/8/16/doe-to-ensure-marine-protected-areas-are-off-limits-to-offshore-wind-projects

Upon award of the service contract, OsWESC holders will have a Certificate of Authority (COA), valid for up to 3 years, which gives them the authority to acquire permits and conduct surveys and other pre-feasibility activities. All of these activities need to be completed before the 25-year service contract term begins.

After the COA expires, developers will have an initial 5 years to complete the required works as shown in Table 1; however, this can be extended for a maximum of 2 years, subject to DOE approval. Once a site is proven to be commercially viable, developers can secure a Declaration of Commerciality and financial close. The balance of 25 years from the award of the service contract will be in both the construction and commercial operations stages and will range from 15 to 18 years depending on the speed of the development phase. The development timeline for an offshore wind project in mature markets like the United Kingdom typically ranges from 7 to 10 years, from development to COD.

Table 1. Gantt Chart Timeline of required activities after obtaining an OsWESC

ACTIVITIES	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Feasibility																				
1) Market Study																				
2) Technical Studies																				
Installation of Met Mast/LIDAR/SODAR																				
Wind data gathering, processing, analysis, and interpretation																				
System Impact Study																				
Identification of Production Area																				
Detailed Wind Farm Modelling																				
3) Management Study																				
Strategy of development and construction of project																				
Shortlisting of EPC, E&M, OE, and O&M																				
4) Social and Environmental Studies (Applicable Permits)																				
5) Financial Study																				
Financial Modelling																				
Financial Closing																				
Declaration of Commerciality or Non-Commerciality																				

To progress the development of the awarded offshore wind sites, the Department of Environment and Natural Resources (DENR) released the interim Environmental Compliance Certificate (ECC) Guidelines for Offshore Wind. An ECC is an essential permit for any renewables project certifying that a proposed project is compliant with existing environmental laws in the Philippines. The policy requires a two-tiered ECC specific to offshore wind.

1. The pre-development Environmental Compliance Certificate (Pre-Dev ECC) stage is an initial approval phase required by the DENR to conduct preliminary activities. This stage allows developers to perform wind resource, geotechnical, and geophysical campaigns, among other required surveys to determine if a lease area is commercially viable.

2. Once deemed commercially viable, developers will be required to apply for a Development ECC which will include a full environmental impact assessment (EIA), stakeholder engagements, mobilisation of offshore and onshore works, and related activities.

A detailed process for this is expected to be released within 2024, and it will be integrated into the EVOSS System eventually.

Offtake Mechanisms

The Philippines has three main route-to-market programs including the Green Energy Auction Program (GEAP), the Green Energy Option Program (GEOP), the Retail Competition, and Open Access (RCOA). On top of these, distribution utilities in the Philippines are legally obligated to contract Power Purchase Agreements (PPAs) from renewables to meet the government-imposed Renewable Portfolio Standards.

GEAP is a competitive process for procurement of electricity supply, managed by the DOE. GEAP contracts are valid for 20 years with the winning tariffs fixed throughout. The Energy Regulatory Commission (ERC) sets the Green Energy Auction Reserve (GEAR) price which is the maximum price offered in PhP/kWh. It is suggested that offshore wind pricing for the Philippines will be within the range of PhP 10 to 16 per kWh.

The DOE is planning to release the rules for the first tranche of the GEAP for offshore wind in Q4 2024 including an 8-month lead time to submit bids[10]. The DOE is still determining the specific rules for the offshore wind GEAP, including the estimated capacity, but are considering proposals from industry stakeholders for allocating separate pilot projects for fixed-bottom and floating installations. DOE noted that this scheduling is still preliminary and the exact month for the first offshore wind GEAP is yet to be determined.

GEOP is a voluntary policy mechanism under RE Act that provides end-users the option to choose renewables over the default supply that their respective distribution utilities sources. The program allows renewable energy producers to supply consumers directly through Retail Electricity Suppliers (RES). Consumers, both residential and industrial, with an average monthly demand of at least 100 kW are eligible to opt for GEOP.

The third offtake option is the **RCOA** which allows power producers to directly supply to eligible consumers (500 kW and above) through RES companies. However, since GEOP has a lower barrier of entry, RCOA is mostly focused on traditional technologies such as thermal and natural gas.

[10] Velasco, M. (2024, September 4). DOE to provide 8-month lead time prior to auction for offshore wind projects. Manila Bulletin. https://mb.com.ph/2024/9/4/doe-to-provide-8-month-lead-time-prior-to-auction-for-offshore-wind-projects

B. Development Scenario

The three development scenarios presented in Table 2 offer insights into the future of the offshore wind industry in the Philippines. The development scenarios consider the potential trajectory of the 63 GW of offshore wind projects in development in the Philippines using both current data and a realistic assessment of technological and market conditions.

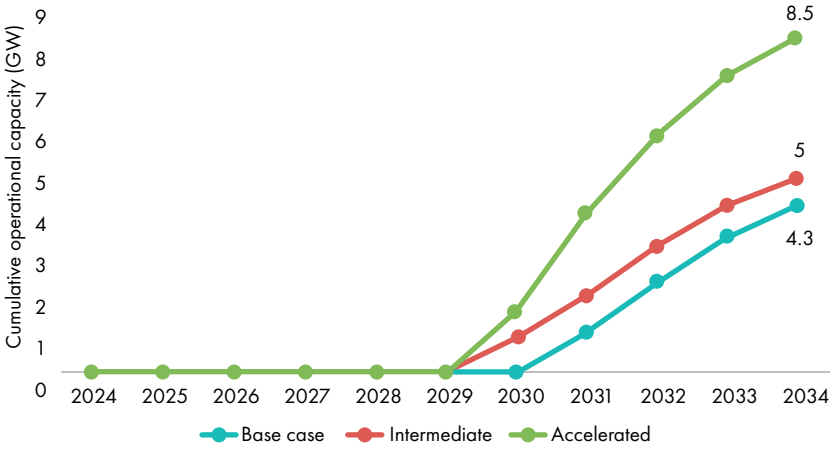
Table 2. Summary of Development Scenarios

	Base Case	Intermediate	Accelerated
Expected 2034 capacity (GW)	4.3	5	8.5
Grid and port infrastructure readiness	Ports ready by 2029; grid by 2030	Ports ready by 2028; grid by 2029	Ports ready by 2027; grid by 2028
Economic conditions	Persistent inflation, low economic growth, and high interest rates	Sustained inflation and interest rates; average economic growth	Low inflation, cheap interest rates, and high economic growth
Construction start	2029	2028	2028

Starting from the 65 GW development pipeline, ERM excluded zones more suitable to floating wind, as the technology's readiness level is relatively low compared with fixed-bottom solutions and widespread commercialisation particularly in the Philippines is unlikely to be achieved until the early 2030s. Similarly, ERM excluded projects with developers who have indicated that they are taking a conservative approach for its offshore wind. Overall, an estimated pipeline of up to 8.5 GW of fixed-bottom projects across the Philippines will be developed in an average timeline of 10 years. The projects that are included in the pipeline were determined based on a multitude of factors, including press releases about the development activities of some projects. Parameters for each of the scenarios are included to further justify the projected capacity. Central to the success of all three of the scenarios is the implementation of a comprehensive MSP framework.

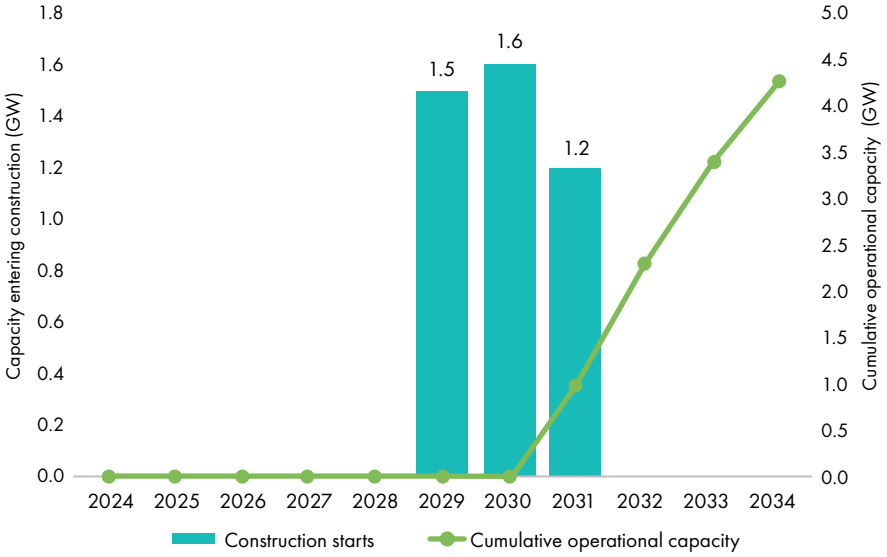
Figure 6 displays the three scenarios in terms of build out capacity. The scenarios are discussed in further detail in the sections below.

Figure 6: The three development scenarios cumulative operational build out capacity



Base Case Scenario

Figure 7: Base Case Scenario

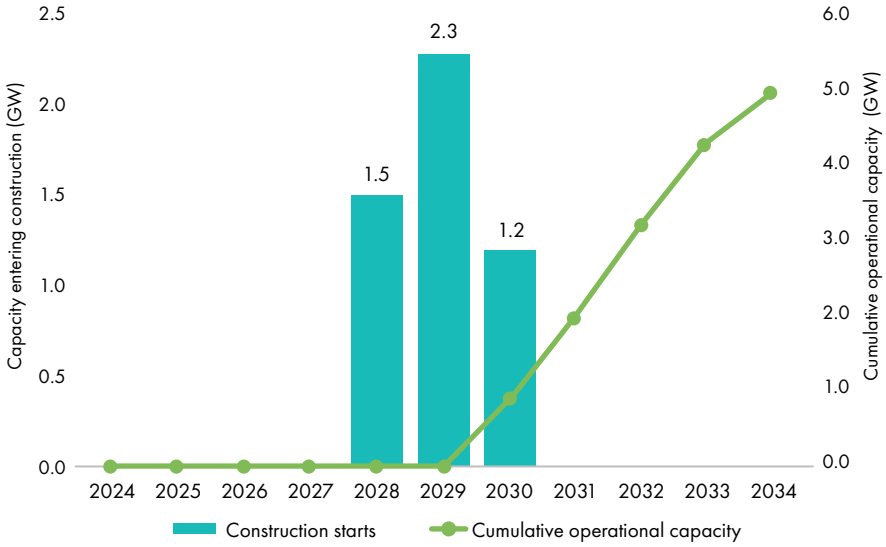


The Base Case Scenario (Figure 7) estimates that 4.3 GW of offshore wind capacity will achieve a commercial operation date (COD) within this decade. This represents the most conservative outlook of the three scenarios analysed. It assumes limited government policy improvements, low to mid-industry interest, and challenging economic conditions, including persistent inflation, low economic growth and high interest rates. Under this scenario, construction is expected to begin by 2029, with the first projects reaching commercial operation by 2031. Delays in MSP implementation could lead to challenges in obtaining site approvals and leases, potentially slowing down the project pipeline beyond this Base Case scenario.

In the base case scenario, the necessary port expansions to support offshore wind construction and operations are not expected to be completed until 2029. Local supply chains will primarily rely on imports mostly from the APAC Region, particularly from China on critical components such as towers, wind turbines, and installation services. Other aspects of the supply chain, particularly on the Development Expenditure (DevEx) phase, can be sourced locally as its readiness is more closely suited to offshore wind currently, as further explained in Section II. Given that critical components, particularly turbines will be imported from outside the Philippines, this scenario will adopt an open-door policy that will allow unrestricted technology sourcing from any country.

In terms of grid readiness, upgrades to accommodate the influx of offshore wind are projected to be completed around 2030.

Figure 8: Intermediate Scenario



Intermediate Scenario

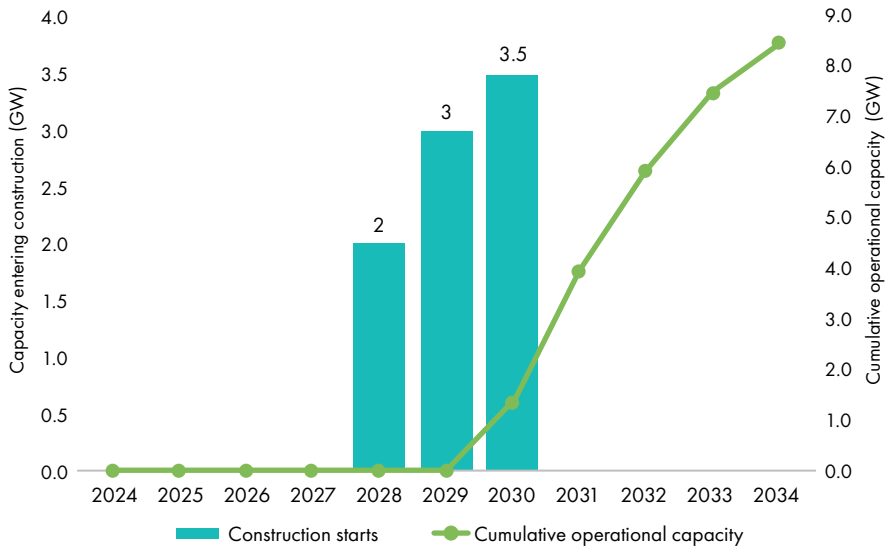
In the Intermediate Scenario (Figure 8), it is estimated that a 5 GW pipeline will come online within this decade. This scenario includes enhancements to government policies, moderate industry engagement, and average economic conditions.

The key difference between the intermediate scenario and the base case scenario is that projects in the former commence a year earlier, in 2028, with the first commercial date set for 2030 enabling an additional 700 MW to come online beyond those of the base case scenario.

As with the previous scenario, the local supply chain is expected to remain the same, apart from the necessary port upgrades for constructions and operations will be carried out until 2028 at the latest prior to the first offshore wind construction in the country. Necessary grid upgrades are expected to finish by 2029.

Accelerated Scenario

Figure 9: Accelerated Scenario



In the Accelerated Scenario (Figure 9), an estimated 8.5 GW of offshore wind capacity will be operational by 2034, representing the most optimistic outcome, with an aggressive pipeline. This scenario hinges on key policy advancements, including adoption of wide-spread regional collaboration which brings economic benefits from Philippine supply chain exports that enable relaxing of localisation requirements which could impact project build out rates. As in the Intermediate Scenario, construction is projected to commence in 2028, with commercial operations beginning in 2030 and continuing through 2034.

Crucial to the success of this scenario is the timely implementation of the Marine Spatial Planning (MSP) framework, which is to be fully developed and integrated by 2026. Compared to the Base Case Scenario, where slower policy implementation is assumed, the Accelerated Scenario demands faster action to streamline regulatory approvals and facilitate the leasing of offshore areas.

Additionally, port infrastructure and grid upgrades are essential enablers of this scenario. Port facilities are to be expanded and modernised to accommodate the construction, assembly, and maintenance of large-scale offshore wind components. In this scenario, port readiness is required by 2027 to support the 2028 construction start date. The development of specialised ports will allow for more efficient project execution and reduce logistical bottlenecks. In contrast, the Base Case Scenario anticipates port readiness only by 2029, in line with its slower development pace.

Similarly, significant upgrades to the national grid are necessary to integrate the increased offshore wind capacity. In the Accelerated Scenario, grid enhancements are to be completed by 2028, allowing sufficient time for testing and commissioning prior to the influx of offshore-generated electricity. These upgrades will be more advanced and extensive than those expected in the Base Case scenario, where grid improvements are scheduled for completion closer to 2030. By prioritising grid capacity expansion and interconnection upgrades earlier in the process, the Accelerated Scenario ensures that the infrastructure will be in place to handle the increased load from offshore wind projects as they come online.

Furthermore, investment in the domestic supply chain is paramount to this scenario and maximising overall economic benefit to the Philippine supply chain. As offshore wind installation accelerates in APAC, the Philippines are well positioned to supply the region with skilled workers, shipbuilding, and cables and steels anchoring on the country's significant critical minerals reserves. This will enable the country to reduce bottlenecks, improve project economics, and accelerate installation of their own offshore wind pipeline using the best available combination of local and domestic suppliers. A robust domestic supply chain will not only enhance the viability of projects, but also position the country as a competitive player in the global offshore wind market.

Section II maps out the Philippine supply chain and provides insights into where these future investments may be best placed.

MAPPING OF PHILIPPINES SUPPLY CHAIN AND GAP ANALYSIS

Mapping of Philippines Supply Chain and Gap Analysis

A. Supply Chain and Gap Analysis Methodology

As the scale of offshore wind installation increases in the Philippines, so does the need for a more mature and prepared supply chain. To understand the level of investment and planning required for each of the development scenarios presented in Section B, ERM has conducted a comprehensive mapping of the domestic supply chain including the following key industry groups, listed below, as well as leading APAC companies active or interested in the Philippine offshore wind market.

- The Philippine Chamber of Commerce and Industry (PCCI),
- Federation of Philippine Industries (FPI),
- Philippine Constructors Association (PCA),
- Philippine Iron and Steel Institute (PISI), and
- Philippine Steel Rolling Mills Association (PSRMA).

The categorisation process begins with classifying companies according to the expenditure period (i.e., DevEx, CapEx, and OpEx). Next, suppliers are grouped based on the components they service the particular service offering (see Appendix B – Breakdown of for full detail.) Finally, suppliers are classified according to their track record across a variety of relevant fields as shown in Figure 10. Where a supplier can offer multiple services, they have been given multiple categorisations. Suppliers have been categorised according to Figure 10.

Figure 10: Methodology for supplier classification

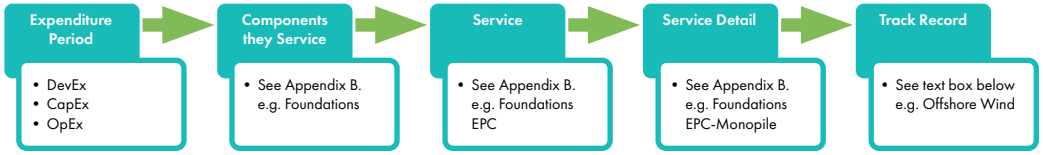


Figure 11: Categories for the track record classifications

Track record categorisation
• Offshore Wind - Companies involved in one or more offshore wind projects. • Onshore Wind - Companies active in onshore wind. • Oil & Gas (O&G) - Companies active in the O&G sector. • Marine - Companies with other marine industry experience. • Steel Manufacturing - Companies with steel manufacturing experience. • Cement Manufacturing - Companies with cement manufacturing experience. • Shipbuilding - Companies with shipbuilding experience. • Logistics and heavy transport - Companies with logistics and heavy transport experience. • Transmission and cable manufacturers - Companies with transmission and cable manufacturing experience. • Mining - Companies with mining experience. • Power and infrastructure - Companies with power and infrastructure experience. • Finance – Companies with project finance experience. • Environmental services - Companies that specialise in environmental services.

The aim of this analysis is to evaluate the capabilities and readiness of Philippine suppliers to service the offshore wind industry. The readiness of suppliers has been categorised according to Table 10.

Table 3. Readiness rating definition

Readiness	Description
High	Capabilities are directly transferable - all relevant equipment, facilities, personnel and vessels are present. The company has existing facilities and experience in related sectors requiring minimal investment to adapt to offshore wind projects.
Moderate	Some capabilities are transferable but require investment or redevelopment, such as acquiring new equipment, vessels, or personnel. The company has varying degrees of applicability and experience in related sectors and needs further investment or restructuring.
Low	Limited capabilities due to missing requirements for relevant equipment, facilities, personnel and vessels. Significant restructuring is needed to transition into the offshore wind industry.

Case Study: Creation of the Teesside and Humber supply chain hub

The Teesside and the Humber regions in the UK have transformed into significant hubs for the offshore wind supply chain. Teesside and the Humber are two of the world's most prominent offshore wind clusters. Combined the regions have more than 486 hectares of dedicated manufacturing space.

This transition has been driven by a combination of geographical advantages, policy support, investment in infrastructure, and collaboration between public and private sectors. The development of these regions provides valuable insights into how strategic planning and investment can create thriving industrial clusters. Some of the strategic drivers are expanded on below.

Strategic drivers

UK Government's commitment to offshore wind: By 2030, the UK government plans to quadruple offshore wind capacity by backing innovations and investing to bring jobs and growth to the nation's ports and coastal regions. The 60 GW offshore wind target could help bring £20 billion of private investment into renewable energy.

Proximity to wind farms: Both regions are near multiple offshore wind farms in the North Sea.

Policy and government support: Comprehensive renewable energy policies and financial incentives, such as subsidies and grants, have been pivotal. Local government initiatives have actively attracted investment and facilitated project development.

Port upgrades: Significant investments in port facilities to meet the specific needs of the offshore wind industry. There are two new offshore wind deep-water installation ports which will create opportunities for Tier 2 and 3 suppliers and component. It also created opportunities for companies in the marine sector, including inspection and maintenance services, geophysical and geotechnical surveys, security operations, cargo delivery, and crew transfers.

Industrial clusters: Formation of industrial clusters that consolidate manufacturers, suppliers, and service providers, enhancing synergy and efficiency.

Education and research: The region has 3 universities with highly trained graduates in the renewable energy field, and 5 world class research organisations. The offshore wind supply chain in the region offers 15,205 direct jobs and 10,888 indirect jobs. Supporting the growth of the supply chain are several world class research facilities, such as: The Offshore Renewable Energy Catapult, Aura Innovation Centre, Materials Processing Institute, Teesside University – Centre for Sustainable Engineering and Durham Energy Institute – Wind Energy Group. It is also the base of two research groups with interests in sustainable energy, power systems, and industrial digitalisation and systems intelligence.

B. Overview of the Philippine Offshore Wind Supply Chain Capability

A qualitative assessment of the Philippines offshore wind supply chain was conducted using public information from 107 companies with a presence in the Philippines and an additional 51 companies actively servicing the offshore wind industry in the APAC region.

The Philippines has multiple operating onshore wind farms and associated companies with transferable skills coming from electrical systems, grid connection, Front End Engineering Design (FEED), commissioning and testing, and condition monitoring e.g., SGS Philippines. However, companies that supply services such as foundation Engineering, Procurement, Construction, and Installation (EPCI), cable installation, and ground surveys will have limited transferable skills to the offshore wind industry due to the significant difference between the requirements of an onshore and offshore wind farm. Companies that have been identified to have transferable skills from onshore wind in the Philippines have been included in the supply chain categorisation.

There are several other potentially relevant industries that the Philippines has capabilities in with the potential for transferability to the offshore wind sector. These industries include Engineering, Procurement, Construction (EPC) contractors, steel, cement, shipbuilding, logistics, transmission systems, and cables. Suppliers with a presence in the Philippines have been identified as either having or having the potential to deliver DevEx, CapEx or Operational Expenditure (OpEx) work packages as differentiated using the readiness rankings as explained in Table 4.

The initial mapping focused on fixed and floating offshore wind suppliers, identifying a Philippine presence in 64 of the 96 detailed service categories that were analysed (Appendix B). It is important to note that presence does not correlate with market share but could be an indication of opportunities. Figure 12 shows that the Philippine supply chain already offers services across DevEx services (83%), CapEx services (59%), and all OpEx services (100%). It is important to note that these percentages do not necessarily imply that Philippine suppliers will fulfil that exact proportion of requirements. Rather, it signifies the potential contribution across various service categories.

Figure 12: Package coverage in each expenditure phase.

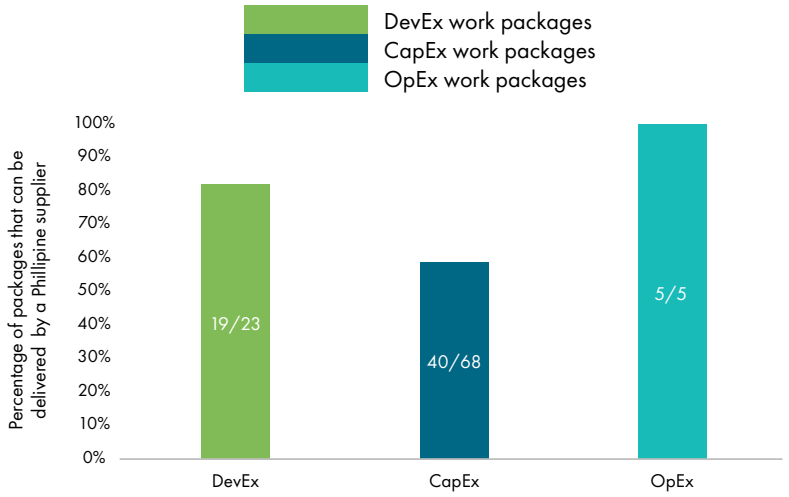


Figure 12 shows how services in the development and operations phases of a project exhibit better coverage. One reason for this is the increased transferability of these services from other industries. For instance, services like surveys and asset management can be readily adapted to offshore wind projects. Conversely, construction services often necessitate significant investments in manufacturing facilities to supply the specialised components required for offshore wind farms.

A more detailed breakdown of service offerings is provided later in this report, where the readiness ratings of each supplier are evaluated. Furthermore, we will analyse the extent to which each service is adequately covered, considering the forecasted number of upcoming projects as when parallel projects are being developed or constructed simultaneously, multiple suppliers will be required impacting available supplier coverage.

Procurement Strategies

The offshore wind industry employs various procurement strategies. The main three types of procurement strategies are depicted in Figure 13: Major EPCI procurement strategy. Recently, there has been a noticeable shift towards multi-contracting, as it often proves to be more cost-effective. However, this strategy generally involves higher risks and increased complexity, making it more attractive to experienced developers. In contrast, less experienced developers typically opt for major EPCI or mini EPCI strategies, which offer a more manageable risk profile.

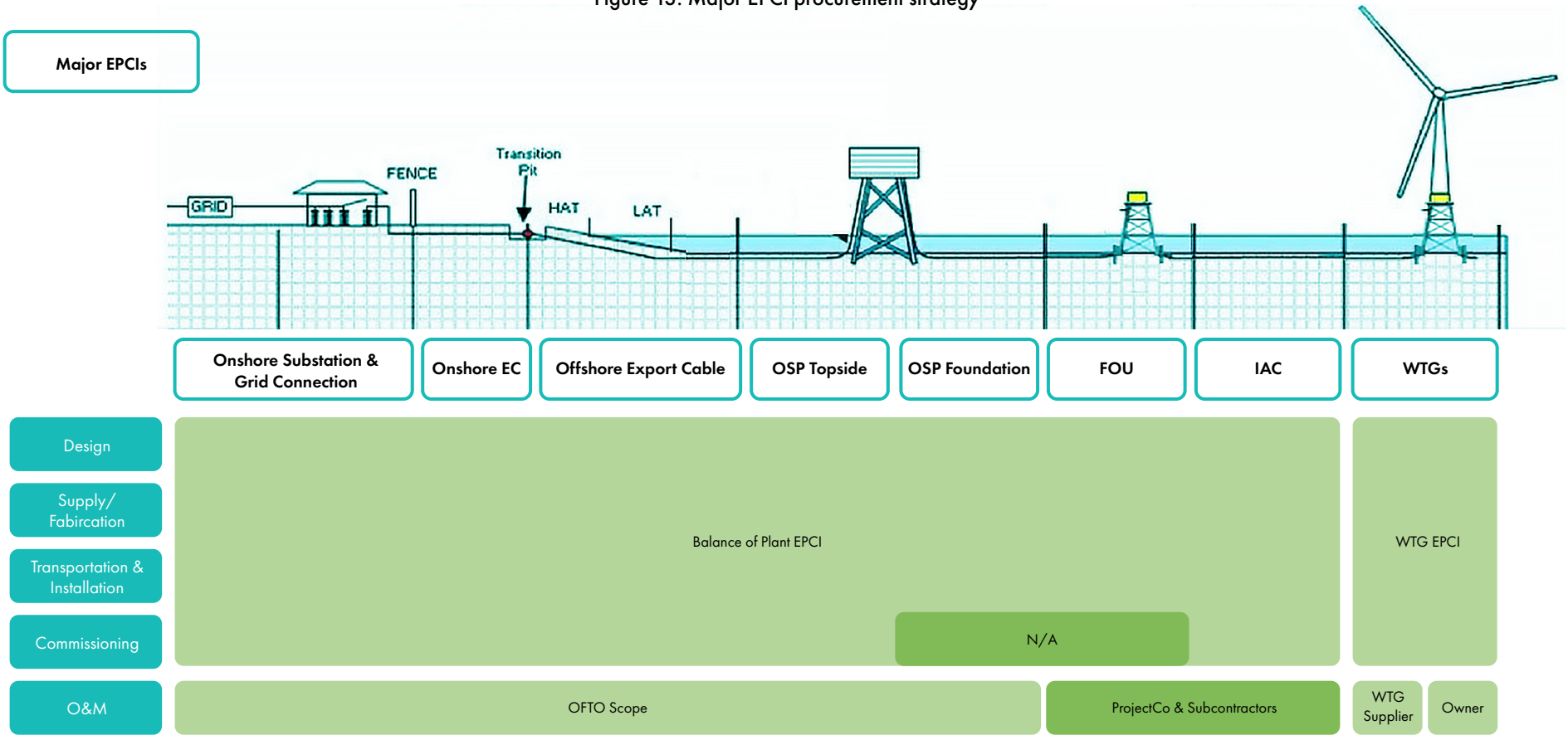
Major EPCI Strategy

The major EPCI procurement strategy assumes two main EPCI contractors, one for turbines and one for the rest of the balance of plant (BoP). In some instances, the BoP EPCI contractor is also in charge of the turbine installation but alternately the turbine supplier can offer an all-inclusive/turnkey contract, subcontracting BoP works. See Figure 13 for a breakdown.

Examples of leading global EPCI contractors include:

- **DEME Offshore**
- **Jan De Nul**
- **Fred. Olsen Windcarrier / Fred. Olsen Renewables**
- **Van Oord**
- **Aker Solutions (FOW)**

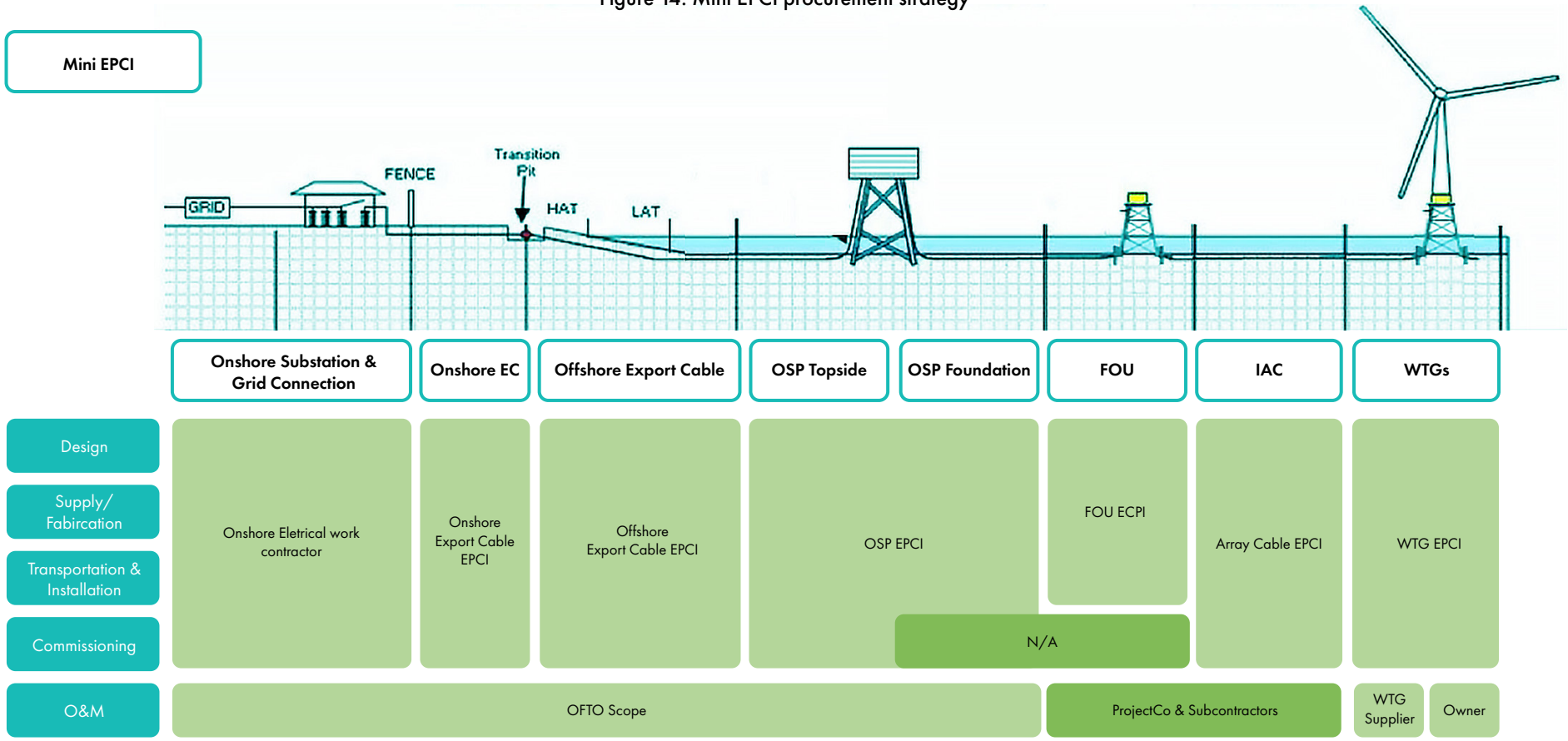
Figure 13: Major EPCI procurement strategy



Mini EPCI Strategy

The mini EPCI procurement strategy assumes that each major construction package is delivered by a different contractor. Typically, this strategy would resemble grouping of packages such as turbine supply & installation, export cable supply & installation, substation supply & installation, etc. In some instances, vessel supply to support installation may be managed for all packages by the project developer. See Figure 14 for a breakdown of this strategy.

Figure 14: Mini EPCI procurement strategy

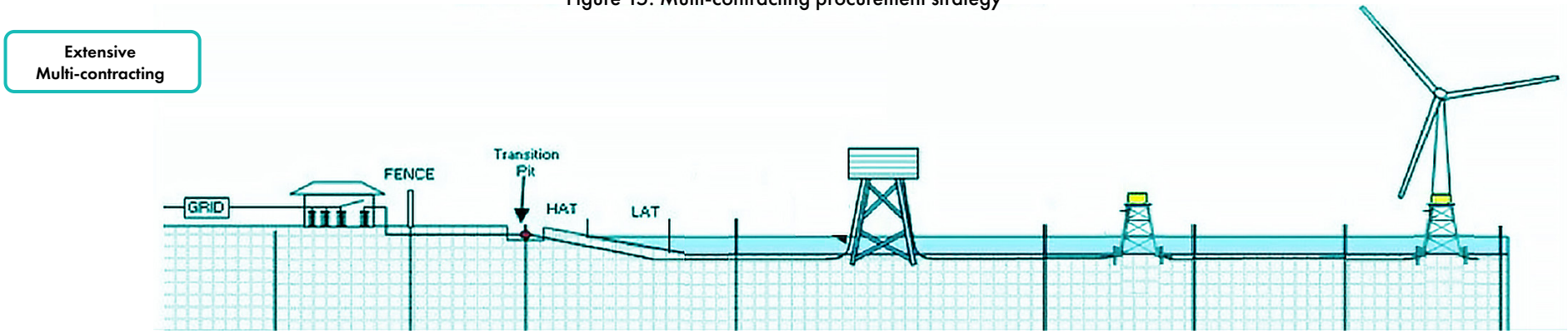


Multi-contracting Strategy

Multi-contracting assumes that major construction packages are broken down with supply and installation of equipment and assets delivered by different contractors. See Figure 15 for a breakdown of this strategy. The multi-contracting strategy can vary largely in form, with examples such as:

- Multiple key package suppliers with a single transport and installation (T&I) contractor.
- Multiple key package suppliers with different T&I contractors per package.
- Multiple contractors for the same package (e.g., two monopile (MP) providers).
- Split of the design and supply of packages (e.g., different foundation designers and foundation supplier).

Figure 15: Multi-contracting procurement strategy



Summary of Findings

ERM has flagged in Table 5 several currently missing component suppliers and the subset of that group which are unlikely to be domestically scalable in the future. These findings have been categorised using the Red, Amber, Green (RAG) assessment criteria outlined in Table 4 which highlight the high, medium, and low capabilities of the given component supply. The key opportunities are then highlighted in Table 5.

Table 4. RAG assessment criteria

Rating	Description
	The Philippines supply chain can cover the service area for a minimum of one commercial-scale offshore wind project at a time.
	There are Philippine companies that can supply parts of the service but are not the main contractor. Still relies on the global supply chain.
	There are no Philippine companies that are positioned to supply the service without the assistance of the global supply chain.

Table 5. Summary of supply chain status

Service	Component	Current Status	Potential Future Status
Development		There are several Filipino suppliers which can provide development services; however, the whole of the service cannot be covered currently.	Companies have been identified which could pivot into offshore wind in time. Development services are easier for suppliers to transfer into due to there being limited new investment needed in heavy equipment or new facilities.
EPC	Turbines	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the EPC of turbines. However, to achieve each scenario the global supply chain would still be required to import the missed domestic supply.
	Foundations	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the EPC of turbine foundations. However, to achieve each scenario the global supply chain would still be required.
EPC	Cables	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the EPC of cables. There are transferable capabilities in the current cable manufacturers in the Philippines to the offshore wind industry. However, to achieve each scenario the global supply chain would still be required.
	Offshore Substation (OSS) Topsides & Foundations	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the EPC of OSS topsides & foundations. However, to achieve each scenario the global supply chain would still be required.
Installation	Turbines	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the installation of turbines. However, to achieve each scenario the global supply chain would still be required.
	BoP	No suppliers currently provide this service.	There have been suppliers identified which with the right investment and support could build up the supply chain for the installation of BoP. However, to achieve each scenario the global supply chain would still be required.

Service	Component	Current Status	Potential Future Status
Floating specific		No suppliers currently provide this service.	The steel and cement industry in the Philippines has the potential to pivot into providing elements to the floating foundation structure. Additionally, the marine industry can pivot into providing anchors and mooring lines.
Operations		No suppliers currently provide this service.	A number of suppliers have been identified with the ability to diversify into providing services for the operation of an offshore wind farm. The operational lifetime of a wind farm is 20-30 years which provides assurance to suppliers that there is a sufficient business case to move into these services and time to upskill its existing operations.

Key opportunities identified:

Filipino companies have a significant opportunity to capture much of the market share in the development phase of offshore wind projects, as **development services** typically require minimal investment and have low barriers to market entry.

The Philippines has strong **steel manufacturing** capabilities which could be transitioned into producing secondary steel components with investment into the relevant equipment and training programmes.

The **cement industry** can position themselves to service floating substructures. Despite the lack of immediate demand, the industry can prepare for future offshore wind projects.

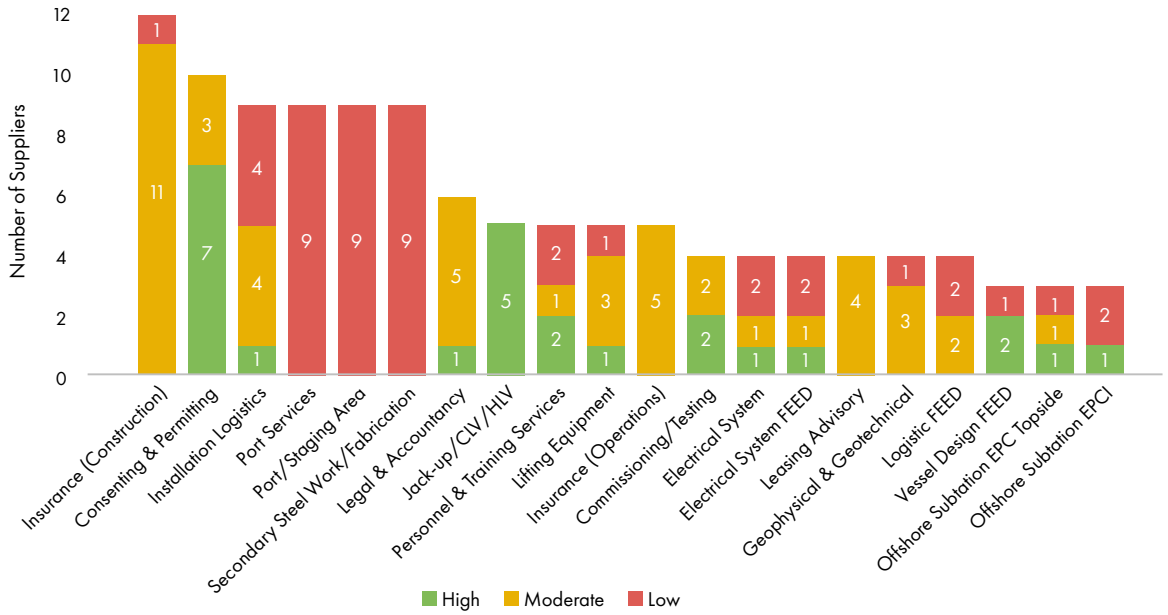
With investment and training the existing **shipbuilding** industry in the Philippines can expand its services into offshore wind.

Expanding the services of **marine training centres**, tailoring it towards offshore wind can help open a multitude of opportunities in the Philippine supply chain, particularly developing the Filipino workforce.

C. Key Strengths of the Philippine Supply Chain

The supplier coverage in the Philippines is shown in Figure 16. Top 20 ranking of service coverage by number of suppliers in the Philippines split by readiness ranking. The graph displays the top 20 services in terms of the highest number of identified suppliers across all three expenditure periods. The suppliers are categorised based on their readiness rating which provides an idea of how well the supplier is positioned to service the industry.

Figure 16: Top 20 ranking of service coverage by number of suppliers in the Philippines split by readiness ranking



Construction insurance comes first in terms of the number of suppliers due to the multitude of companies in the Philippines with capabilities in a wide range of industries including renewables and maritime industries which are transferable to offshore wind. The readiness of the majority of these services has been rated at moderate due to the lack of direct experience in offshore wind however with the right investment in experienced professionals and training, these companies will be primed to service the offshore wind industry.

Coming in second is consenting and permitting, reflecting the strong consulting industry in the Philippines. A number of the identified companies that offer consenting and permitting services in the Philippines are headquartered in other countries but have an office in the Philippines, an example of which is Jacobs which is headquartered in the United States but has an office in Manila.

Ports and staging areas for installation services, along with port services for operations and maintenance, were ranked jointly fourth along with secondary steelwork and fabrication. This study includes the ten ports identified by DOE and the Asian Development Bank (ADB) for offshore wind development.

Currently, all these ports receive low readiness rankings due to the current inability to service the offshore wind industry. Ports are crucial to realising offshore wind projects, representing a significant opportunity for the Philippine supply chain to enhance its capabilities. Early investment in these identified ports can optimise their offerings.

The high position of secondary steelwork and fabrication reflects the strong steel industry in the Philippines. Secondary steel refers to elements that fit on the main structural elements which enable functions such as access to the turbine and protection for ancillary components. The steel industry in the Philippines requires investment and incentive to pivot into offshore wind. This is discussed in the section titled *Steel*. Therefore, all steel manufacturers have been rated as having low readiness, however, this does not negate the potential of the Philippine steel industry to service offshore wind. Instead, it highlights the necessity for investments that will enable current suppliers to adapt and meet the specific requirements of offshore wind infrastructure. Serial production is a key characteristic of secondary steel manufacture for offshore wind which differs from steel manufacture for more traditional offshore installations such as oil platforms. To facilitate serial manufacture, production cells are required to be set up within the facility with workshop space dedicated to different secondary steel components. This requires investment and incentive from the company to make these changes.

The existing shipbuilding industry in the Philippines can expand its services into offshore wind. This expansion will require investment and workforce training, forming strategic partnerships with international offshore wind developers and shipbuilding companies can facilitate technology transfer and best practices. Joint ventures can also open up new markets and opportunities for growth. Expansion of the shipbuilding industry will come hand in hand with the development of port infrastructure which is discussed in the construction section of this report.

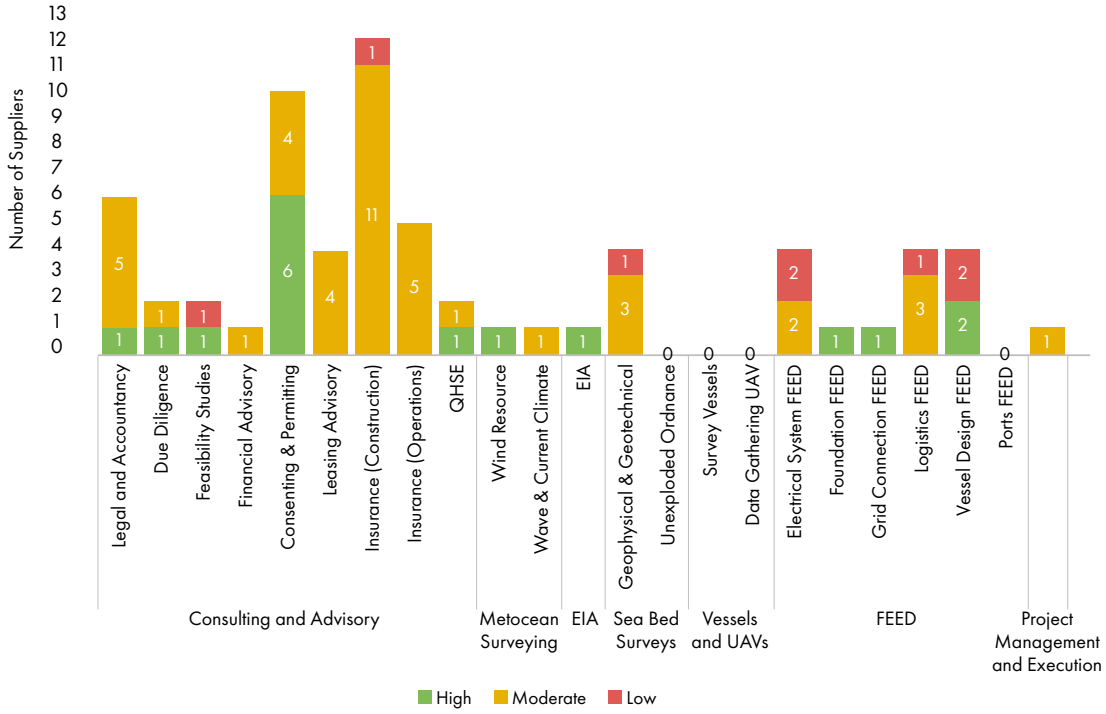
Marine training centres represent a significant opportunity for the Philippine offshore wind supply chain. Training is crucial for the growth of all supply chain aspects. The existing Norwegian Training Centre in Manila is particularly beneficial for the expansion of the Filipino supply chain into offshore wind. By leveraging the resources and expertise of established training centres like the Norwegian Training Center, the Philippines can strengthen its position in the local and global offshore wind market. Please refer to the section titled Skilled for further commentary on this subject.

D. Development

The development phase is an area of the supply chain where developers look to maximise their use of the local supply chain. Most packages do not require heavy investment to have the necessary capability, meaning that barriers to market entry are low. This results in a high density of domestic companies supplying services in the development phase. Philippine companies have the opportunity here to be able to occupy the majority of the market share.

The Philippines supply chain has coverage of 19 out of 23 packages in the development phase, which typically fall outside the standard offshore wind contracting structure. The number of companies in the development expenditure phase is large in comparison to the other phases. This is a result of most services not requiring specialist equipment or large-scale investment. Therefore, companies with experience in related industries are more easily able to pivot to offshore wind.

Figure 17: Number of suppliers in the Philippines with the potential to deliver DevEx services categorised by readiness ranking.



Construction insurance, consenting, and permitting were identified above as the top two services covered by the Philippines supply chain as a whole. Figure 17 demonstrates the strength of these services. Operations insurance and legal and accountancy have also been recognised as strong sectors covered by the Philippines.

Large consultancies in the Philippines with a track record in the development of large infrastructure projects will likely have capabilities across multiple development services. These companies are able to diversify their offerings and provide a significant proportion of the nine categories of consulting and advisory services. Notable companies poised to capitalise on this opportunity include SGS, Black & Veatch, and Blue Water Shipping.

Four service areas have been identified as having gaps in coverage: unexploded ordinance (UXO), survey vessels, data-gathering Unmanned Aerial Vehicles (UAVs), and Port FEED. While it is important to note that the list of suppliers may not have been exhaustive, the presence of gaps suggests a lack of coverage in these services, as indicated by the absence of certain companies in the initial compilation of suppliers.

These identified gaps highlight areas within the Philippine supply chain that could be strengthened, particularly in the case of Port FEED. Unlike the other three services, Port FEED does not require specialised equipment, making it a feasible area for enhancement. However, addressing the gaps in unexploded ordinance, survey vessels, and data-gathering UAVs would necessitate investment in specialised equipment. By bolstering these areas, the Philippines' supply chain can better meet the needs of offshore wind projects in its development stage.

Figure 18: Development services track record and key suppliers.

Track Record of Filipino Suppliers

Track Record	Supplier Count	Transferability of Track Record
Environmental Services	9	High
Finance	17	Moderate
Logistics and Heavy Transport	4	Moderate
Marine	5	Moderate
Mining	1	Low
O&G	1	Moderate
Offshore Wind	3	N/A
Power and Infrastructure	7	Low
Shipbuilding	1	Moderate

Key Suppliers with a presence in the Philippines

AUSTAL

BLACK & VEATCH

SGS

BLUE WATER SHIPPING

NIRAS

TMF GROUP

Key Suppliers headquatered in the Philippines

KAJIMA PHILIPPINES INC.

As expressed in Figure 18, the transferability of development services is made more feasible due to the limited requirement for specialist equipment, investment and long lead times to scale up. This is particularly evident in the environmental services industry as companies that are set up with these capabilities currently can easily pivot into offshore wind.

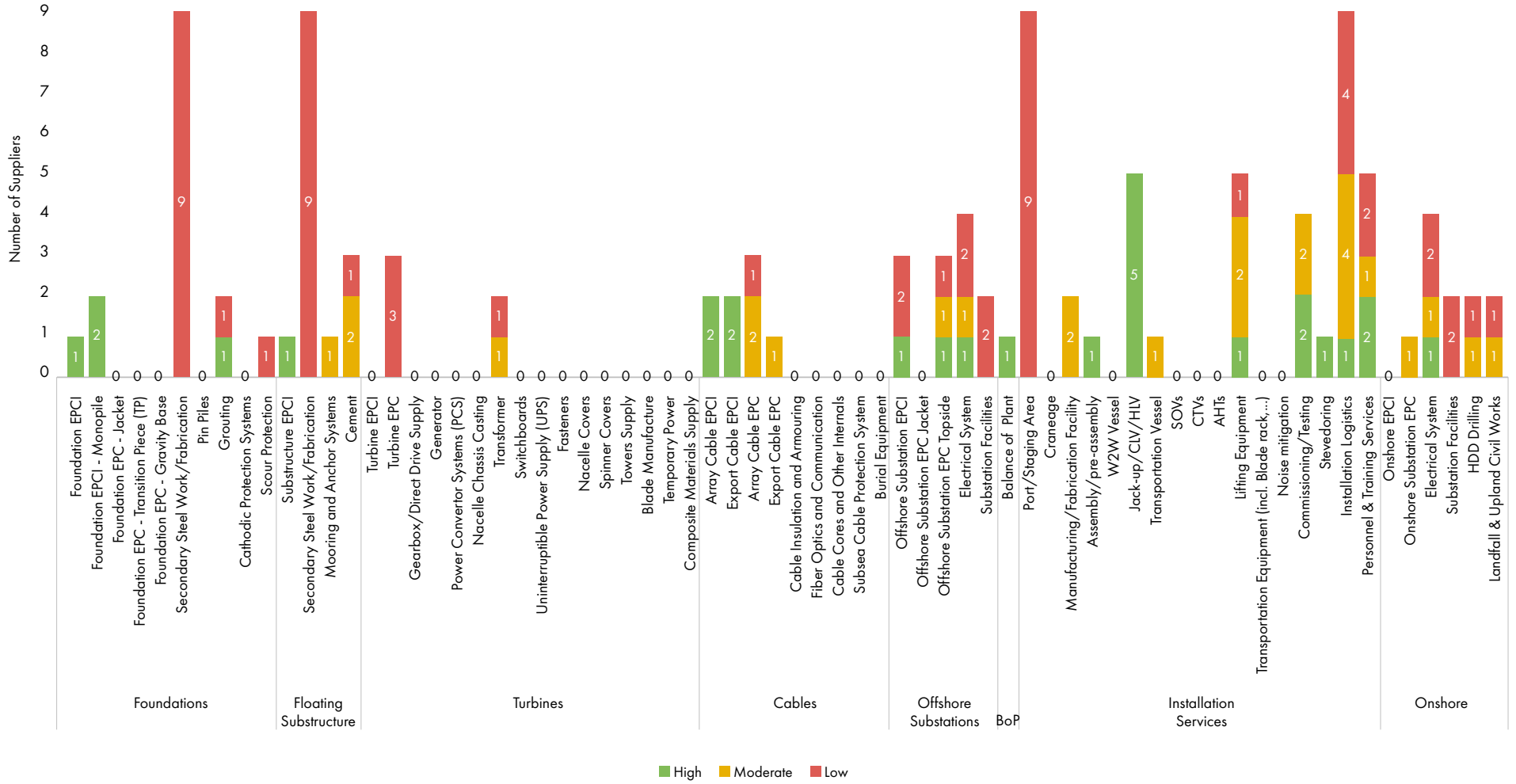
The key suppliers that have been identified in the development services and have a high readiness rating are shown to the right of Figure 18. Notably, SGS Philippines is the country's leading provider of certification, testing, and inspection. It has been identified for its ability to provide the following services: due diligence, wind resources, Quality, Health, Safety, and Environment (QHSE), Environmental Impact Assessment (EIA), and feasibility studies. It is well-positioned to expand its offerings into the offshore wind industry.

E. Construction

During the CapEx phase, the Philippine supply chain is strongest in secondary steelwork and fabrication. There are very limited suppliers for big-ticket items, such as tier 1 contractors associated with turbines and BoP.

Figure 19 shows the coverage of the CapEx services by the Philippines supply chain.

Figure 19. Number of suppliers in the Philippines with the potential to deliver CapEx services categorised by readiness ranking.



Turbine Original Equipment Manufacturers (OEMs)

Siemens Gamesa Renewable Energy (SGRE) and Vestas, renowned global turbine manufacturers, have presence in the Philippines as both have an established footprint in the country's onshore wind sector, having supplied turbines for several onshore wind projects across the country. Their local presence includes service and operational support, bolstering onshore wind project performance and maintenance capabilities in the Philippines. Enercon, a third major turbine company, currently focuses on producing onshore turbines and does not offer offshore wind turbines in its product lineup. Despite this presence, low readiness ratings were assigned to all three due to the lack of local manufacturing facilities. GE Vernova, another leading offshore OEM, currently has no presence in the Philippines.

It is also worth noting that the Chinese turbine manufacturer, Mingyang Smart Energy Group, is one of the largest suppliers in the APAC region. Although it has a very limited presence in the Philippines currently, this could change as the Philippines offshore wind market matures. Vena Energy awarded it the contract to supply two onshore wind projects in the Philippines with a combined capacity of 306 MW with its turbines[11]. This marked Mingyang's official entry into the Philippine market.

Chinese turbine OEMs, particularly Mingyang, have the potential to play a significant role in the Philippines offshore wind market due to their cost-competitiveness and strategic geographic proximity. The positioning of Chinese manufacturing facilities in the Philippines offers logistical benefits over European turbine OEMs, such as shorter transit distances, which can lower transportation costs and reduce delivery times. This is advantageous during both the construction and operational phases of offshore wind projects, potentially leading to quicker response times for maintenance and repairs. Additionally, Mingyang has significant experience with 'typhoon resistant' turbines due to the prevalence of typhoon conditions across the Chinese home market. This could make them even more competitive in the Philippines market.

Operational onshore wind farms in the Philippines typically use turbines supplied either by SGRE or Vestas. However, some of the new onshore wind farms that are currently in development awarded supply contracts to either Mingyang, Envision, or Goldwind. See Table 6 for a breakdown of projects. We see that the offshore wind turbine market will be supplied by the same players mentioned, with Chinese OEMs will supply the initial offshore wind projects followed by SGRE or Vestas as the Philippine offshore wind market matures. Our consultations have indicated that established developers in the country and international players are in advanced discussions with some Chinese OEMs to supply their first projects in the Philippines.

While existing offshore wind projects in the Philippines are generally located in nearshore environments, the modifications required to adapt onshore turbines for nearshore deployment will be on a case-to-case basis. However, this is not to say the Philippines offshore wind market will exclusively rely on modified onshore turbines.

[11] RENews.biz. Mingyang scoops 306MW Philippines turbine deal, 2023. https://renews.biz/85735/mingyang-scoops-306mw-philippines-turbine-deal/

Table 6. Onshore Wind Turbines in the Philippines

Onshore Wind Turbines in the Philippines				
Wind Farms	**Capacity (MW)**	**Turbine Supplier**	**Developer**	**Status**
Bangui Bay Wind Farm Phase 1	33	Vestas	ACEN Corp.	Commercial Operations
Bangui Bay Wind Farm Phase 2	18.9	SGRE	ACEN Corp.	Commercial Operations
Caparispisan Wind Farm Phase 1	81	SGRE	ACEN Corp.	Commercial Operations
Pagudpud Wind Farm Phase 1	80	SGRE	ACEN Corp.	Commercial Operations
Burgos Wind Farm	150	Vestas	Energy Development Corp.	Commercial Operations
Pililia Wind Farm	54	SGRE	Alternergy and Vena Energy	Commercial Operations
San Lorenzo Wind Farm	54	SGRE	ACEN Corp.	Commercial Operations
Nabas Wind Farm Phase 1	36	SGRE	PetroGreen Energy Corp.	Commercial Operations
Puerto Galera Wind Farm Phase 1	16	SGRE	Berkeley Energy	Commercial Operations
Talim Wind Farm	212.50	Mingyang	Vena Energy	Development Phase
Sembrano Wind Farm	93.75	Mingyang	Vena Energy	Development Phase
Pagudpud Wind Farm Phase 2	80	SGRE	ACEN Corp.	Development Phase
Caparispisan Wind Farm Phase 2	70	SGRE	ACEN Corp.	Development Phase
Nabas Wind Farm Phase 2	14	Vestas	PetroGreen Energy Corp.	Development Phase
Alabat Island Wind Farm	62.4	Envision	Alternergy Group	Development Phase
Tanay Wind Farm	99.4	Envision	Alternergy Group	Development Phase
Kalayaan 2 Wind Farm	100.08	Goldwind	The Blue Circle	Development Phase

Services related to certain areas of the construction of an offshore wind farm such as turbine installation, require highly specialised skills and equipment, leading to a narrower pool of available suppliers compared to more general services. This makes construction services more difficult to be covered by the Philippine local supply chain when compared to development services.

Construction Firms

The Philippines has a robust construction industry, evidenced by the involvement of major local construction companies in various government infrastructure projects under the national development program. According to the Contractor's License Law (RA 4566), all contractors—including those in engineering, trade, electrical, and mechanical fields, as well as sub- and specialty contractors—must secure a Philippine Contractors Accreditation Board (PCAB) license to conduct business in the Philippines, regardless of nationality.

Large EPC firms in the Philippines are categorised by PCAB as either "Quadruple A" (AAAA) or "Triple A" (AAA). Quadruple A status is the highest classification, with construction firms must meet a stringent set of requirements, including companies that must be organised under Philippine law (up to 100% foreign ownership) and have a minimum equity of P1 billion or US$17 million. Triple A status is the next highest accreditation with firms needing to meet a minimum equity of P180 million ($3 million). There are 71 firms with Quadruple A accreditation and 654 firms classified as Triple A. It is common practice for local EPC firms to be subcontracted by international EPCs, especially for large projects. See Table 7 for key local EPC Contractors and the notable projects it has worked on.

Additionally, some EPC firms specialising in the construction of transmission and distribution assets are accredited by the country's transmission network provider, the National Grid Corporation of the Philippines (NGCP), as well as major distribution utilities such as Meralco and the Visayan Electric Company.

Table 7. Key Local Suppliers – EPC Contractors

Key Local Suppliers – EPC Contractors		
Company	**Notable Projects**	**Remarks**
EEI Corp.	• 36 MW Nabas Wind Farm • Maibarara Geothermal Power Plant	EEI is owned by the Yuchengco Group. Both Nabas and Maibarara are power projects of the conglomerate through its subsidiary PetroEnergy.
First Balfour, Inc.	• 150 MW Burgos Wind Farm	First Balfour is the sister company of First Gen Corp. and Energy Development Corp. which owns the Burgos Wind Farm.
JGC Philippines, Inc.	• AboitizPower Bugallon Solar Power project • Sarangani Energy Corp. Sarangani coal-fired Power project	JGC is the largest EPC firm in the Philippines and specialises primarily in LNG plants and oil refineries.
Sta. Clara International Corp.	• 16 MW Puerto Galera Wind Farm • 54 MW Pililia Wind Farm • 54 MW San Lorenzo Wind Farm	Sta. Clara typically enters into consortiums with turbine suppliers and developers for the wind farms it constructed.

Steel

The Philippines typically imports its steel from the ASEAN region, however, the number of local steel manufacturing firms doubled over the last 10 years. Aside from ASEAN, the Philippines also imports its steel requirements from China, Japan, Korea, Russia, and Taiwan. While this is the case, the Philippine Tariff Commission, the government agency that regulates import tariffs, said that the local steel industry has already adjusted to the competition of imported steel products, as safeguard measures on steel angle bars were lifted in May 2021.

The number of local steel manufacturing firms more than doubled, from 10 companies in 2009, to 21 in 2021. The commission added that the local steel manufacturers maintained their dominant position and expanded their production and sales, making $116 million in annual sales from 2014 to 2019. The major domestic steel manufacturers are: SteelAsia Manufacturing Corp., Maxima Steel Mills Corp., Cathay Metal Corp., and Cathay Pacific Steel Corp.

Secondary steel manufacturing facilities require specialised equipment including computer numerical control (CNC) cutters, roll forming machines, lifting equipment, induction pipe bending machines, and welding equipment, among others. Typically, secondary steel is integrated into the primary steel structure, forming a part of the Balance of Plant (BoP).

Manufacturers typically procure standard steel forms like box sections, tubulars, and plates to fabricate these components. Traditionally, Tier 1 fabricators have been the primary purchasers of secondary steel. However, there's a growing trend for developers and EPC(I) contractors to procure secondary steel directly.

Most secondary steel components are relatively easy to transport, except for larger items like platforms. This flexibility allows for manufacturing facilities for smaller subcomponents to be placed in various locations. Larger platform fabrication facilities are often situated at shipyards or other sites with convenient water access.

Filipino steel manufacturers such as Cathay Pacific Steel, Grandspan Development Corporation, and Maxima Steel Mills can adapt to provide secondary steel for offshore wind projects through strategic approaches such as investment in the specialised equipment and skills development and training programs for the existing workforce, using learnings from industry leaders such as Smulders and ABB.

Cement

Meanwhile, the local cement market is mostly made up of foreign-owned firms. Cement demand in the Philippines significantly increased due to the massive infrastructure program of the government. Data from January 2024 shows that local cement firms can only produce up to 53 million tons per annum (Mta) of cement, while the demand is around 34.5 Mta. The local market is mostly composed of foreign-owned firms, comprising almost 70% of the cement supply. Up to 15% is imported and the remaining is shared amongst Filipino-owned cement firms. While cement is not among the most in-demand services for the offshore wind industry, it plays a crucial role in the construction of floating foundation substructures. Offshore wind projects utilising floating technology are not predicted to enter construction within the next 10 years therefore limiting the near-term demand for cement in offshore wind applications. However, for completeness, the study has included the most prominent Filipino cement companies in our analysis.

Cement companies such as Big Boss Cement, Cemex Philippines, and Eagle Cement, are poised to supply the Philippines' floating offshore wind industry with strong offerings to support materials in floating substructure manufacturing.

Cable Protection

Array and export cables need protection and accessories, and there are three main types of cable protection: vertebrae bend restrictors, dynamic bend stiffeners, and cable sleeves/abrasion protection. These components are primarily made from gravity-moulded polyurethane. This represents an untapped potential for the Philippines supply chain, as cable protection system suppliers often use local suppliers for subcomponents. Cable protection equipment is typically purchased by the cable supplier. Companies in the Philippines that provide cable services, such as Philflex and Phelps Dodge, could diversify into these services.

Mooring and Anchoring

The Philippines also has capacity to supply mooring and anchoring systems, for example Gosea Marine. The technologies used in the floating oil and gas industry overlap with those used in the floating offshore wind industry, presenting an opportunity for companies to capitalise on familiar technologies within the floating wind supply chain.

Manufacturing mooring components such as drag anchors, driven piles, and suction piles requires steel plates, which could benefit the Philippines' thriving steel industry. Additionally, gravity anchors, constructed by forming concrete around a steel rebar framework, present an opportunity for the Philippine cement industry to enter the floating offshore wind market.

Mooring chains are made from individual lengths of bar stock, offering another opportunity for local steel manufacturers. Furthermore, various steel components, known as mooring jewellery, are used to connect sections of mooring lines. These components are typically produced through forging or plate welding, again leveraging the Philippines' steel manufacturing capabilities.

Ports

Ports play a crucial role throughout the lifecycle of an offshore wind project. In the construction phase, a port can provide space for storing large components like blades and towers. Ports serve as assembly areas and facilitate the loading of components onto installation vessels. Despite having numerous ports across the country due to its archipelagic geography, ports in the Philippines are not yet capable of offshore wind deployment. Some ports in the Philippines, particularly for ports near floating sites such as Northern Luzon and Southern Mindoro areas, are deep enough to support floating sites.

However, the DOE already identified an initial ten ports that can serve the offshore wind industry; if necessary, upgrades are undertaken, as seen in Figure 20. These identified ports will primarily be used for marshalling activities.

The factors that influenced the selection of the ports for redevelopment to offshore wind (covering manufacturing, marshalling, and O&M ports) were based on:

a) Number of interested developers
b) Locations of OsWESCs within 120 NM
c) Number of interested developers that are considered as "frontrunners"
d) Potential capacity (in MW)
e) Port ownership (i.e. government-owned or privately-owned)
f) Port expansion potential
g) Existing port activities

Figure 20. Ports identified for redevelopment under the ADB Pre-Feasibility Study.

The DOE, with a grant from the ADB, is currently undertaking a pre-feasibility study that will identify the necessary upgrades needed to facilitate the readiness for offshore wind of the identified ports. The expected outcomes from the said study are identification of priority ports and an associated action plan outlining necessary upgrades and how to enhance the government's capacity for offshore wind port planning. As of this writing, the study is still being underway but expected to be published by the end of 2024. One of the identified ports, the Philippine National Oil Company – Energy Supply Base (PNOC-ESB) port in Bauan, Batangas, is receiving proposals from private parties to finance the necessary upgrades to make the port offshore wind suitable. Moreover, the Department of Transportation (DOTr) is exploring the possibility of financing certain upgrades through public-private partnerships, given that each port would need as much as US$80 million to redevelop for offshore wind.

In addition to the three ports studied in the ADB Pre-Feasibility work, another 4 have been recommended to be funded by the Cabinet Economic Development Group, chaired by the Office of the Special Assistant to the President for Investment and Economic Affairs.

1. Port of Currimao (to support Northern Luzon sites)
2. Port of Capinpin (to support sites within Manila Bay)
3. Port of San Juan (to support sites in offshore Batangas and Quezon, and the area of Northern Mindoro)
4. Port of Tabaco (to support sites across the Bicol Region)
5. Port of Bulalacao (to support sites in the Southern Mindoro area and sites in the north / northwestern section of Panay Island)
6. Port of Pulupandan (to support sites in the Guimaras Strait and Negros Island)
7. Port of Lavezares (to support Northern Samar sites and complement Port of Tabaco)

Recently, the Philippine Ports Authority committed to DOE that they will work on the engineering designs and repurpose three key ports for offshore wind[12]:

1. **Port of Currimao, Ilocos Norte** – the port is close to 13 OsWESCs, most of which are floating sites. It can support up to 9.5 GW worth of projects, with 3 projects already advancing the development phase.
2. **Port of Batangas** – located near 29 OsWESCs, a mix of fixed and floating sites. The port can service up to 24.3 GW of offshore wind projects. 6 projects are progressing as of this time.
3. **Port of Jose Panganiban, Camarines Norte** – near 14 OsWESCs, mostly fixed-bottom sites. The port can potentially serve up to 8.15 GW, with 2 projects pushing forward its development activities.

[12] Power Philippines. (2024, September 23). DOE, PPA to strengthen offshore wind by upgrading port infrastructure. Retrieved from https://powerphilippines.com/doe-ppa-to-strengthen-offshore-wind-by-upgrading-port-infrastructure/

The indicative timeline that the DOE put forward for the redevelopment of ports for offshore wind is outlined below (Figure 21):

Figure 21: Indicative timeline for the development of offshore wind ports.

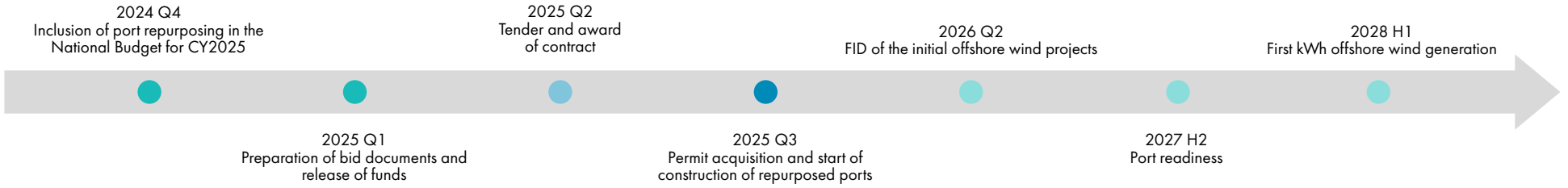


Figure 22: Construction services track record and key suppliers.

Track Record of Filipino Suppliers

Track Record	Supplier Count	Transferability of Track Record
Cement Manufacturing	3	Low
Logistics and Heavy Transport	9	Moderate
Marine	15	Moderate
Mining	1	Low
O&G	2	Moderate
Offshore Wind	15	N/A
Onshore Wind	2	High
Power and Infrastructure	13	Moderate
Shipbuilding	1	Moderate
Steel Manufacturing	8	Moderate
Transmission and Cable Manufacturers	1	Moderate

Key Suppliers with a presence in the Philippines

Ravago

sapura energy

BLUE WATER SHIPPING

HYUNDAI HEAVY INDUSTRIES CO.,LTD.

Keppel

Key Suppliers headquatered in the Philippines

CTSI Consolidated Training Systems Incorporated

KAJIMA PHILIPPINES INC.

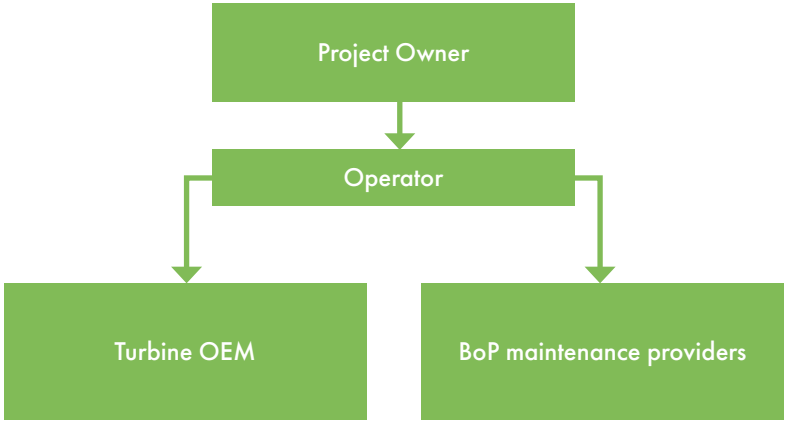
First Philec

SMCC Philippines, Inc.
SUMITOMO MITSUI CONSTRUCTION CO. GROUP

F. Operations and Maintenance

The standard structure for Operations and Maintenance (O&M) services is depicted in Figure 23.

Figure 23: Standard structure during project operation.



The O&M strategy of a project is typically broken down into three periods:

- **Operational years 1 to 5:** During the initial operational period, components are typically covered with a five-year warranty that covers any defects.
- **Operational years 6 to 15:** Once the initial warranties expire, the developers typically enter into an Operation and Maintenance Agreement (OMA). These agreements usually span 10 years. More experienced developers such as Ørsted internalise a large part of the O&M scope.
- **Operational years 16+:** Due to the maturity of the offshore wind industry there is limited data on the standard practices after the expiry of an OMA contract. However, typical assumptions are extended OMAs or new OMA contracts or an in-house O&M team takes over.

The scope of O&M can be divided into fixed fee services and variable fee services. This analysis focuses solely on fixed fee services. Variable fee services, encompasses breakdowns, repairs, major overhauls, and component exchanges, were not included.

Figure 24 illustrates the distribution of supplier coverage across operations services based on their readiness rating number of Philippine suppliers. O&M is an area of the supply chain where the Philippines can draw on its experience in other energy industries. Additionally, the Philippines has a reasonably strong port infrastructure and capability to provide vessel services. All ports will require investment to ready them for the needs of the offshore wind industry. Companies providing remote monitoring systems and with a track record in the traditional power industry are well-placed to transition to the offshore wind industry.

The owner of the offshore wind farm normally oversees the site operation activities. The offshore wind farm operator will establish the O&M port facility during the construction phase. Vessels that are required during the operational phase operate from local ports.

Figure 24: Number of suppliers in the Philippines with the potential to deliver OpEx services categorised by readiness ranking.

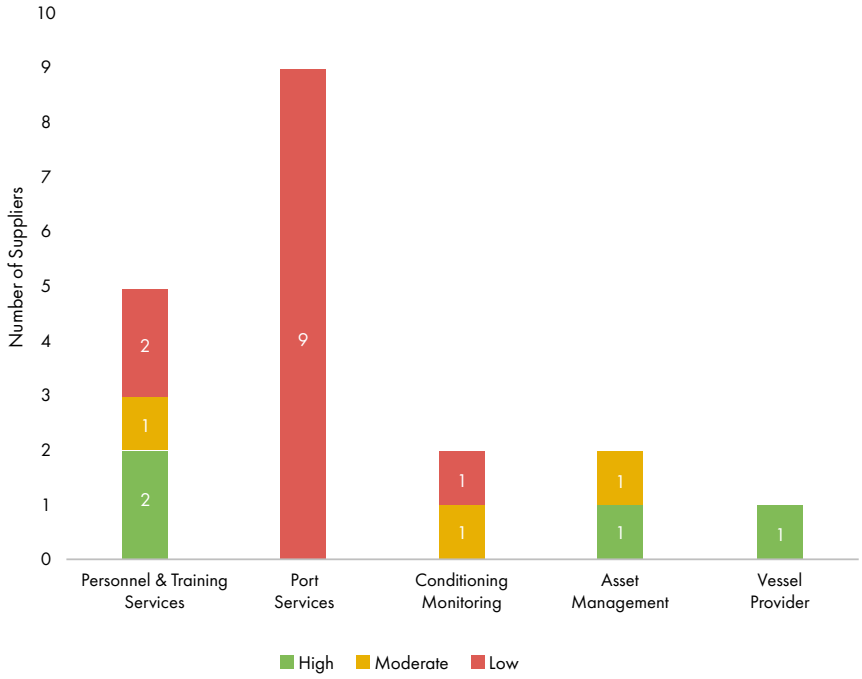


Figure 25: Operation services track record and key suppliers.

Track Record of Filipino Suppliers

Track Record	Supplier Count	Transferability of Track Record
Marine	14	Moderate
Offshore Wind	1	N/A
Onshore Wind	2	High
Power and Infrastructure	1	Moderate
Shipbuilding	1	Moderate

Key Suppliers with a presence in the Philippines

AUSTAL

NTC NORWEGIAN TRAINING CENTER

SWIRE

Key Suppliers headquatered in the Philippines

CTSI Consolidated Training Systems Incorporated

The Norwegian Training Center (NTC) was an initiative of the Norwegian Maritime Foundation of the Philippines (NMFPI) and was established by the Norwegian Shipowners' Association (NSA). Consolidated Training Systems is a skills and training provider and is the first and largest training provider in the Philippines for Global Wind Organisation (GWO) Standard courses for the Wind Turbine Renewable Energy Industry. Both companies are well-positioned to service the trained personnel to operate and maintain a wind farm. Training ensures that O&M personnel are qualified to perform their project roles effectively and safely.

Crew Transfer Vessels (CTVs) facilitate the transport of technicians and contractors from the onshore O&M base to wind turbine sites and substations. Vessel operators in the Philippines are well-positioned to service the offshore wind industry with CTVs. CTVs are typically Class I passenger ships.

Service Operation Vessels (SOV) provide an offshore O&M base, with staff working from the vessel for two to four weeks at sea. Due to the bathymetry in the Philippines, the early offshore wind projects are typically close to shore and not far from operational ports and would not take long to reach by boat therefore it is unlikely that SOVs will be required for projects in the Philippines on day-to-day basis, except for major refit.

Port requirements are not as intensive for operations as they are for the construction phase. If there is an investment in the port facilities outlined in the construction section above, then these same ports will be able to facilitate operations services. Many support vessels active during the operational phase will operate from local ports. Developers usually lease quayside facilities long-term from port infrastructure owners. To minimise transfer times and reduce the risk of weather-related delays, developers prefer using the nearest port that meets their specifications. This positions existing Philippine ports well to provide these services to the offshore wind industry.

G. CapEx Breakdown by Package

A high-level assessment of a typical CapEx breakdown for offshore wind projects has been conducted, alongside an assessment of the consequent investment potential associated with the Development Scenarios outlined in this report. It should be noted that offshore wind CapEx values and overall breakdowns are inherently project- and market-specific, therefore further analysis would be required to assess the breakdown for a specific project in the Philippines.

CapEx in the Context of the Levelised Cost of Energy (LCoE)

CapEx is the largest contributor to the LCoE of an offshore wind project (the lifetime average cost for the energy produced). LCoE is a useful tool for communicating normalised lifetime costs across different projects and technologies.

The LCoE formula is as follows:

$$\text{LCoE} = \text{NPV}\left(\frac{\text{Sum of lifetime costs}}{\text{Sum of lifetime energy}}\right)$$

$$\text{LCoE} = \text{NPV}\left(\frac{\text{DevEx, CapEx, OpEx, AbEx}}{\text{Lifetime generation}}\right)$$

Where: *NPV*=Net Present Value, *DevEx*=Development Expenditure, *CapEx*=Capital Expenditure, *OpEx*=Operating Expenses, *AbEx*= Abandonment Expenditure.

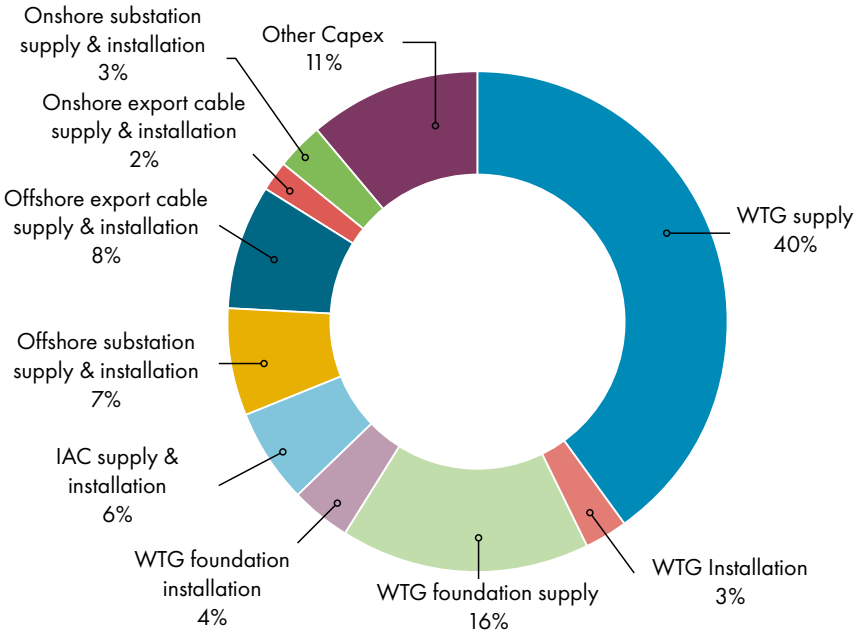
The key components of the divisor in the LCoE formula generally have the following contributions to the LCoE value (with financing costs integrated):

- **DevEx:** 5 - 10%
- **CapEx:** 70% - 80%
- **OpEx:** 15% - 30%
- **AbEx:** 1% - 5%

Typical CapEx Breakdown and Domestic Market Sizing

Figure 26 shows a generalised CapEx breakdown for an offshore wind project, derived from real project data throughout Europe and North America. While the breakdown is likely to vary by project and location in the Philippines, this is useful to build understanding on the potential market size for each package.

Figure 26: Generalised CapEx Breakdown for an Offshore Wind Project[13]

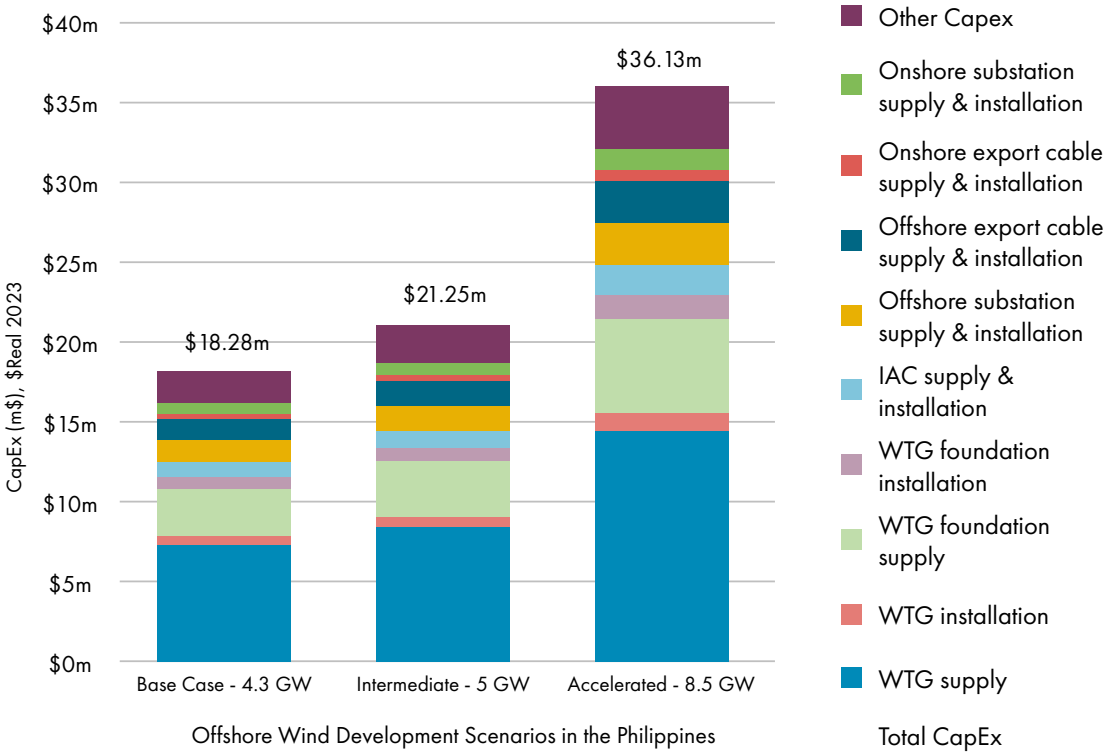


Extrapolating this breakdown, and assuming a typical total CapEx/MW (aligned with existing European and North American projects with an uplift applied for the nascent Philippine market equating to a total of 4,265 k$/MW[14]), it is expected that CapEx in line with the breakdown in Figure 26 will be required for the Development Scenarios (see Figure 27 for each Development Scenario). This provides an indication of the potential opportunity for domestic suppliers as, although a significant quantity of components will likely be imported from developed offshore wind markets (including China), domestic suppliers will have the key benefit of proximity to projects. It should be noted that this is a high level, representative CapEx estimate.

[13] 'Other CapEx' includes insurance, management, operations base.
[14] Economies of scale associated with higher buildout scenarios have not been incorporated in this analysis, as this highly sensitive to project-specific parameters

Most CapEx components will be imported into the Philippines for the first offshore wind projects constituting a significant portion of the LCoE. It will be key that a realistic and balanced tariff ceiling for the first offshore wind GEAP will consider and accommodate the existing realities in the Philippine market. Having a realistic tariff ceiling will also incentivise local supply chain development as this will demonstrate the country's commitment to realising its planned offshore wind projects. Moreover, a realistic tariff ceiling and maintaining an open-door trade policy without technology sourcing restrictions will allow the Philippines to attract major supply chain players and export supply chain strengths regardless of country of origin ensuring future offshore wind projects are price competitive and resilient to potential supply chain bottlenecks.

Figure 27: CapEx Required by Package for the Development Scenarios.



ADDRESSING GAPS THROUGH PARTNERSHIPS, MARKET LEARNING, & SUPPLY CHAIN SCENARIO PLANNING

Addressing Gaps Through Partnerships, Market Learning, & Supply Chain Scenario Planning

As identified in the previous chapter, the Philippines has several industries that could potentially serve a future offshore wind industry, both locally and regionally. To recall, these are EPC contractors, steel, cement, shipbuilding, logistics, transmission & cable manufacturers, and the wider seafaring industry (including marine training centres). Our consultations with industry stakeholders are unanimous in the fact that the strong potential for the Philippines to develop a robust offshore wind supply chain are the **shipbuilding industry; skilled workers; and critical minerals focusing on transmission cables and steel manufacturing.**

Figure 28 below shows an indicative timeline for when these supply chain components will be required for the offshore wind sector to enable local sourcing. Steel and cement will be essential not only for offshore wind construction but also for port infrastructure. Vessels for surveys and site preparation are needed by 2025, while vessels for foundation installation, turbine installation, and cable laying will be required during the construction phase, which developers aim to begin by 2026/2027. This timeline highlights the need for the industry to start upgrading capabilities as early as 2025.

Figure 28: Indicative timelines of when the supply chain components are needed

	2025	2026	2027	2028
Steel and Cement	✔			
Shipbuilding/Vessels	✔			
Skilled Workforce		✔		
Cables			✔	
Development Services	✔			

A. Shipbuilding Industry

The Philippines is the fourth largest ship producer in the world since 2010. In 2023, United Nations Trade and Development (UNCTAD) data shows that the country produced 805,938 gross tonnage (GT) or 1.25% of the total built ships globally – with China, Japan, and South Korea accounting for 61,142,930 GT or 94.46% of the global production[15]. Collectively, the Philippines has around 124 shipyards as of end-2022[16] and collectively employs around 48,000 employees[17]. The shipbuilding industry in the Philippines can produce both small vessels for the domestic market and large vessels for the international market. In addition, the country is a supplier of naval defence equipment to armed forces around the globe. While foreign-owned shipyards are focused mostly on the production of shipping vessels, domestic shipyards are specialised in repairs and maintenance. The government is increasing its investment to further develop the local-owned shipyards and be as competitive as the big players. Some of the government investments include state-backed loans, equity investments, and incentives for local sea transportation firms to acquire vessels constructed by local-owned shipyards.

Table 8. MARINA Registered and Licensed Shipyards in 2022.[18]

Classification	Number of Shipyards	Capacity Limitation
Class A	7	Shipyards with the capability to construct and repair vessels with a minimum length of at least 130 metres.
Class B	19	Shipyards with the capability to construct and repair vessels with a length between 81 and 129 metres.
Class C	98	Shipyards with the capability to construct and repair vessels with a maximum length of 80 metres.

[15] United Nations Conference on Trade and Development. (2024). Ships built by country of building, annual. https://unctadstat.unctad.org/datacentre/dataviewer/US.ShipBuilding
[16] Maritime Industry Authority. (2022). Philippine shipbuilding and ship repair situation report 2022. https://marina.gov.ph/books/philippine-shipbuilding-and-ship-repair-situation-report-2022/
[17] Department of Trade and Industry. (2017). Philippines in the shipbuilding global value chain. https://industry.gov.ph/wp-content/uploads/2017/11/DTI-Policy-Brief-2017-08-The-Philippines-in-the-Shipbuilding-Global-Value-Chain.pdf
[18] Maritime Industry Authority. (2022). Philippine shipbuilding and ship repair situation report 2022. https://marina.gov.ph/books/philippine-shipbuilding-and-ship-repair-situation-report-2022/

Following the shipyard classification of MARINA, this study will limit the scope to only cover 4 Class A shipyards across the Philippines, as the scale and technology needed for offshore wind vessels is different compared to the other vessels that the Philippines currently manufactures. Class A shipyards are dominated mostly by foreign firms with local subsidiaries which will have the technological and financial capabilities to upskill their manufacturing skills for offshore wind.

The bankruptcy and subsequent closure of the Hanjin Subic Shipyard last 2020 left a mark on the country's shipbuilding industry. However, the closure of Hanjin Shipyard provided an opportunity for the country to court new locators for the property. In March 2022, the Philippine Government announced that American private equity firm Cerberus Capital would be taking over the former Hanjin Shipyard and will be renamed Agila Subic Multi-Use Facilities (Agila Subic).

This development would be soon followed by the announcement of HD Korea Shipbuilding & Offshore Engineering (HD KSOE), the world's largest shipbuilding firm, that it will establish its first overseas base inside Agila Subic and support the budding floating offshore wind market of the Philippines. The lease agreement between Cerberus and HD KSOE was signed in front of President Bongbong Marcos last 14 May 2024. HD KSOE aims for its Subic facility to manufacture offshore wind floating platforms and shipbuilding modules. This new facility will allow the generation of up to 10,000 new jobs over the next 3 to 5 years and it is expected to be operational by the next 12 to 18 months. The company is expected to invest at least $550 million in the next decade and take advantage of the country's geographical location being in the centre of the APAC Offshore Wind Market. The facility will also support other APAC offshore wind markets, particularly Australia, India, Japan, Taiwan, and Vietnam.

Case Study: Austal Philippines – Cebu Shipyard

It is perhaps an unknown fact, which was also a surprising fact to Filipino developers, that the Philippines already manufactures offshore wind vessels for export to the United Kingdom, the second-largest offshore wind market in the world. UK-based Turbine Transfers Limited ordered 8 CTVs, all of which were constructed in its Cebu Shipyard in Balamban, Cebu. These CTVs were constructed between 2011 and 2014 and have been deployed ever since across European offshore wind markets. Turbine Transfers' 8 CTVs were sold in 2019 to the Denmark-based Northern Offshore Services.

Austal offers three types of CTVs: Wind Express 21; Wind Express 27; and Wind Express TRI SWATH 27.

Wind Express 21

Hull type: Catamaran
Length: 21.30m
Capacity: 3 crew + 12 wind farm personnel
Deck cargo: 5.0 tonnes
Speed: 28 knots

Wind Express 27

Hull type: Catamaran
Length: 26.50m
Capacity: 3 crew + 12 wind farm personnel
Deck cargo: 10.0 tonnes
Speed: 27 knots

Wind Express TRI SWATH 27

Hull type: Trimaran
Length: 26.50m
Capacity: 3 crew + 12 wind farm personnel
Deck cargo: 4.5 tonnes
Speed: 25 knots

Photos from: Austal Philippines website

Case Study: Seatrium Philippines

Seatrium Subic Shipyard, formerly known as Keppel Subic Shipyard, was tasked to fabricate the Depression Compression Platform (DCP) for the Malampaya Natural Gas Field Phase 3 project, the first offshore platform to be designed and built completely in the Philippines. The Strike Steel Ceremony happened on 7 December 2012 with the fabrication completed by early 2015. The DCP was deployed to Malampaya in February 2015.

Aside from the construction of the DCP for Malampaya Phase 3, Seatrium was able to construct floating crane barges in its Philippine shipyards that were exported to Indonesia. As a shipbuilding company, Seatrium also manufactures products specifically for offshore wind, including the construction of HVAC substation for Hornsea 2 Offshore Wind Farm; HVDC Converter Platform for the Sofia Offshore Wind Farm; and the firm is also manufacturing wind turbine installation vessels (WTIVs), including the Jones Act-compliant WTIV for Dominion Energy being constructed in Seatrium's Texas shipyard and Maersk's first WTIV being manufactured in Singapore.

Photos from: Austal Philippines website

B. Skilled Workers

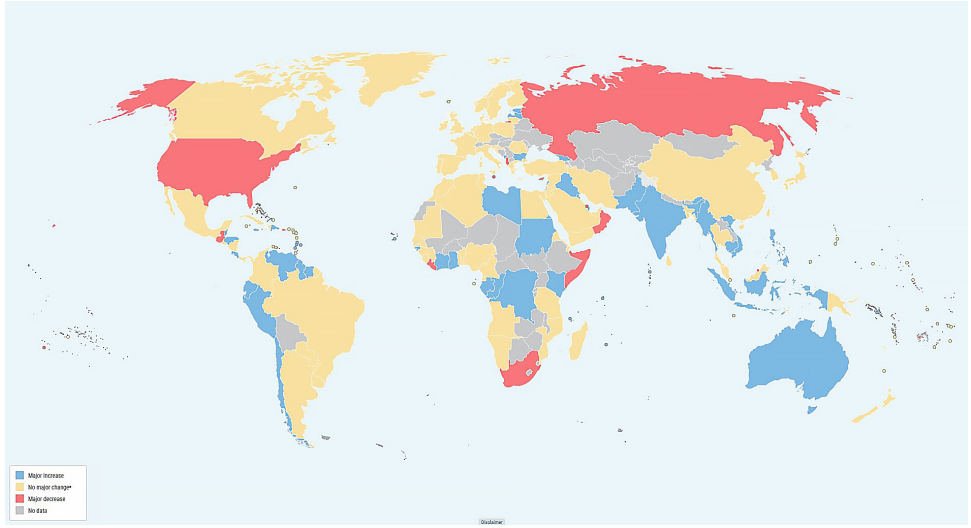
Filipino skilled workers are sought after around the world – a testament to this is around 12 million Filipinos are living overseas; of which, around 1.963 million Overseas Filipino Workers, the term used for temporary migrant workers working in foreign countries, are deployed as of 2022. Filipino seafarers, engineers, consultants, technicians, nurses, doctors, and the like are sought after by global organisations due to their dedication, craftsmanship, and English language capabilities.

The economic contributions of Filipino migrant workers to the country's Gross Domestic Product (GDP) are significant. In 2023, $33.49 billion of cash remittances came into the Philippines, or 7.67% of the country's GDP. Filipino seafarers alone contributed around $6.85 billion or 1.57% of its GDP[19]. The significant remittances that all Filipino migrant workers bring in year-on-year is the reason why they are dubbed as the ''new heroes'' of the Philippines.

One of the country's main skill sets is seafaring. It is estimated that at least 30% of global seafarers are from the Philippines[20]. Historically, Filipinos and the seafaring industry are intricately linked. Given the nature of the Philippines as an archipelagic country, trading was done via sea routes with their neighbours in China, Southeast Asia, and the Arab World. The Manila – Acapulco Galleon Trade between the Philippines and Mexico, during the Spanish Era, further strengthened the current seafaring industry in the Philippines.

According to the Department of Migrant Workers (DMW), Filipino seafarers are often sought after by the industry. A handful of Filipino seafarers are already known to be employed by offshore wind installation companies that have installed offshore wind across the sites in Taiwan, the North Sea, and offshore of the Scottish Highlands. UK-based firm ERSG is one of the crewing agents that are known to hire Filipino seafarers to be deployed to offshore wind farms across Europe[21]. The prospects of the Philippines to further cement its reputation as one of the market leaders globally in the seafaring and maritime sector is evidenced by a major increase in its Liner Shipping Connectivity Index (LSCI) score. LSCI shows how markets are connected to global shipping networks based on the status of their maritime transport sector (Figure 29). The higher the score, the more abundant opportunities available in the seafaring and maritime sector.

Figure 29: Liner Shipping Connectivity Index - Annual change in liner shipping connectivity, 2023 (percentage) from Q1 2022 to Q1 2023.
Source: NES Fircroft; UNCTAD



[19] Bangko Sentral ng Pilipinas. (2024). Overseas Filipinos' cash remittances. https://www.bsp.gov.ph/Statistics/External/ofw2.aspx
[20] GMA Integrated News. (2024). PH inclusion in IMO 'white list' a global validation of Filipino seafarers — DMW. https://www.gmanetwork.com/news/pinoyabroad/dispatch/908190/philippines-imo-dmw-filipino-seafarers/story/
[21] UK Parliament. (2022). Immigration policy and seafarer jobs. https://edm.parliament.uk/early-day-motion/60420/immigration-policy-and-seafarer-jobs

It is projected that Filipino seafarers alone can fill up to 9,800 of the workforce demand in offshore wind projects in the Philippines up to 2040[22]. Filipino seafarers can easily meet the demand for offshore wind skilled workers, but necessary upskilling will be required, particularly on the installation of blades offshore and the surrounding health & safety training needed. Moreover, there are a handful of Filipino skilled workers who are experts in offshore wind at this moment – some are working for offshore wind developers or consulting firms engaged in offshore wind. Aside from seafarers, the other skills that the Philippines already has that are essential for offshore wind development are:

- **Engineers:** the presence of Filipino engineers in global companies specialising in mechanical, civil, and electrical engineering subfields is critical for the design, construction, and operations & maintenance of offshore wind infrastructure, including offshore transmission.
- **Project managers and support staff:** the skills required for project managers and their support staff are highly complex and wide-ranging from finance & accounting to engineering, technical, environmental, etc., and are critical to the delivery of large-scale offshore wind projects.

Industry consultations have reiterated the need for more Filipino skilled workers to work in the rapidly growing renewables industry in the country. Developers, in particular, are struggling to attract talent from the existing limited renewables workforce in the Philippines given how complex the industry requirements are. The competition for human resources in the country is high, with developers and others competing for a limited pool of qualified workers.

To fill in the demand for skilled workers, some European countries are partnering with the Philippine Government to bridge the gap between the current workforce and the necessary upskilling required. The Embassy of Denmark in the Philippines and the Philippine Government launched the Jobs4RE Initiative; whilst the Royal Norwegian Embassy in Manila is facilitating a dialogue between the Norwegian Training Centre in Manila and the Norwegian Shipowners' Association in Oslo to provide the necessary training for Filipinos to equip them with the skills needed for offshore wind.

Jobs4RE Initiative

The Jobs4RE Initiative aims to fast-track the training and upskilling of the workforce for the entire renewables industry by expanding, promoting, and recognising global certificates that will foster a flexible labour pool for renewables projects. The Global Wind Workforce Outlook 2023-2027 estimates that more than 570,000 technicians are needed to install, operate, and maintain the global wind assets by 2027, over 74,000 technicians of which are solely just for offshore wind[23]. The Jobs4RE Initiative is spearheaded by the Danish and Philippine governments, with support from GWEC, the International Renewable Energy Agency (IRENA), and the Global Wind Organisation (GWO). The Philippines was chosen to be the target country of the initiative as the country has traditionally provided skilled workers in technical areas such as aviation, oil & gas, shipping, and power & renewables.

The Jobs4RE Initiative will initially target the skillset required for the wind industry, particularly on the specific needs of the offshore wind, and eventually expand to cover solar technology as well. Jobs4RE aims to expand on technical areas on which GWO is not able to certify currently, given that GWO is focused on issuing global certifications on safety courses for the wind industry. The wind industry aims to provide the skills that they need to drive project development forward – the more in-demand skills that the initiative will be looking at include engineering, ports, wind resource assessment, etc. The initiative will build on the existing certification programs in the wind industry, aligning in-demand roles with established training standards, thereby ensuring globally recognised validation of technical and operational skills. Jobs4RE's main goal is to have a global talent pool of renewables experts that can easily be called upon to be deployed to other markets outside their home market.

Norwegian Training Initiative

The Norwegian Embassy in Manila is pioneering a program that will enable workforce training and upskill Filipino seafarers with the requirements for the offshore wind industry. A partnership between the Norwegian Training Centre (NTC) in Manila and the Norwegian Shipowner's Association (NSA) in Oslo is in the works to ensure that the Philippines will be able to produce the right personnel needed for offshore wind deployment. NSA has provided several Filipinos scholarships and employed their graduates on the ships owned by their members, while the NTC has already produced around 6,000 cadets that were posted on Norwegian ships as well. NSA founded NTC in the Philippines in 1990, and since then, the agency has produced over 200,000 Filipino and foreign seafarers.

Aside from these efforts, NTC is also in collaboration with Fred. Olsen Windcarrier to train their Filipino students for offshore wind deployment. The Brave Tern, Fred. Olsen Windcarrier's 132-m long jack-up vessel is being used by NTC's students to learn more about offshore wind turbine installations.

[22] Crismundo, K. (2023, October 6). PH seafarers can fill 9.8K workforce demand in offshore wind projects. Philippine News Agency. https://www.pna.gov.ph/articles/1211272

[23] Global Wind Energy Council & Global Wind Organisation. (2023). Global wind workforce outlook 2023-2027. https://gwec.net/wp-content/uploads/2023/10/Global-Wind-Workforce-Outlook-2023_Final.pdf

NTC also has advanced simulation facilities in the Philippines that will enable students to experience realistic simulations of the harsh weather conditions in an offshore wind farm and offshore crane operations during the installation of wind turbines at sea.

Mitsui O.S.K. Lines (MOL) and Manila-based Magsaysay Group, one of the country's largest shipping firms, have an established partnership in the Philippines since 1997. This partnership enabled Filipino seafarers to be deployed to ships owned by MOL. Since then, MOL and the Magsaysay Group have established several business ventures that provide identification and upskilling of Filipino labour for Japanese firms:

- **MM Empower:** a global HR consulting firm that will identify solutions to hire Filipino skilled workers for Japanese companies in areas including power generation and construction, with a mandate to expand to other business areas in the future depending on the potential needs.
- **MOL Magsaysay Maritime Academy:** a higher educational institution that offers programs in Marine Engineering and Marine Transportation aiming to produce globally competitive maritime professionals for deployment elsewhere.

In our industry engagement, this robust partnership between MOL and the Magsaysay Group was identified that can potentially expand to the offshore wind sector, which will allow the training of Filipino skilled workers who could potentially be crew members for MOL-operated vessels for offshore wind deployment within the Philippines and the wider APAC region.

The Technical Education and Skills Development Authority (TESDA), the government agency in-charge of technical and vocational education and training, and the Commission on Higher Education (CHED) have significant roles to play in upskilling the Filipino workforce for future deployment to offshore wind, capitalising on their existing capabilities and skills. President Marcos Jr. is urging offshore wind suppliers, such as HD KSOE, to partner up with TESDA and CHED to create programs that will develop the Filipino workforce, particularly for offshore wind and the wider renewables space.[24]

[24] Bajo, A. F. (2024, May 14). Marcos urges HD Hyundai: Partner with CHED, TESDA to develop Pinoy workforce. GMA Integrated News. https://www.gmanetwork.com/news/money/companies/906760/marcos-urges-hd-hyundai-partner-with-ched-tesda-to-develop-pinoy-workforce/story/

However, despite the strong capability of Filipino skilled workers that could potentially transition to the local offshore wind industry, the main issue is to incentivise them and move them back to the Philippines. An understanding within the industry and the government could be established that the perception of Filipino skilled labour as "cheap" could shift to quality workers that are paid competitively. See Table 9 for a breakdown of annual average salary estimates in the Philippines.

Table 9. Annual Average Salary Estimates in the Philippines (in Philippine Pesos)

Job Title	10th Percentile	25th Percentile	ERI Survey Mean	75th Percentile	90th Percentile
Project Manager	945,579	1,151,206	1,377,059	1,787,430	2,147,051
Wind Energy Project Manager	415,498	509,811	613,401	799,265	962,143
Marine Operations Manager	529,797	645,008	771,551	1,001,477	1,202,968
Wind Energy Engineer	477,787	591,512	716,423	937,084	1,130,457
Electrical Engineer	609,641	755,511	915,728	1,197,777	1,444,945
Geotechnical Engineer	415,137	507,377	608,690	791,605	951,898
Design Engineer	584,780	723,244	875,329	1,143,840	1,379,145
Marine Engineer	574,584	710,634	860,066	1,123,896	1,355,098
Marine Systems Engineer	402,489	490,488	587,144	762,115	915,449
Electrical Technician	352,887	427,572	509,602	658,918	789,768
Hydraulic Technician	232,974	283,091	338,138	438,482	526,417
Mechanical Technician	332,851	404,454	483,100	626,462	752,095
Wind Turbine Technician	239,639	280,713	325,826	408,263	480,504
Marine Technician	200,082	233,157	269,486	335,647	393,626
Wind Instrument Repairer	247,981	293,854	344,240	436,928	518,154

Source: NES Fircroft; Economic Research Institute

Our consultations with NES Fircroft's Philippine team highlighted that for international companies in the Philippines to attract foreign talent (including Filipino skilled workers), they often offer generous compensation packages that include:

1. Expatriate benefits: include housing allowance, relocation assistance, educational benefits for their children, and home leave flights.
2. Higher salaries: significantly higher salaries than local market rates – sometimes even matching with international rates for some roles.
3. Career development opportunities: opportunities for talent to work on exciting projects and gain experience in a rapidly growing industry.

C. Critical Minerals

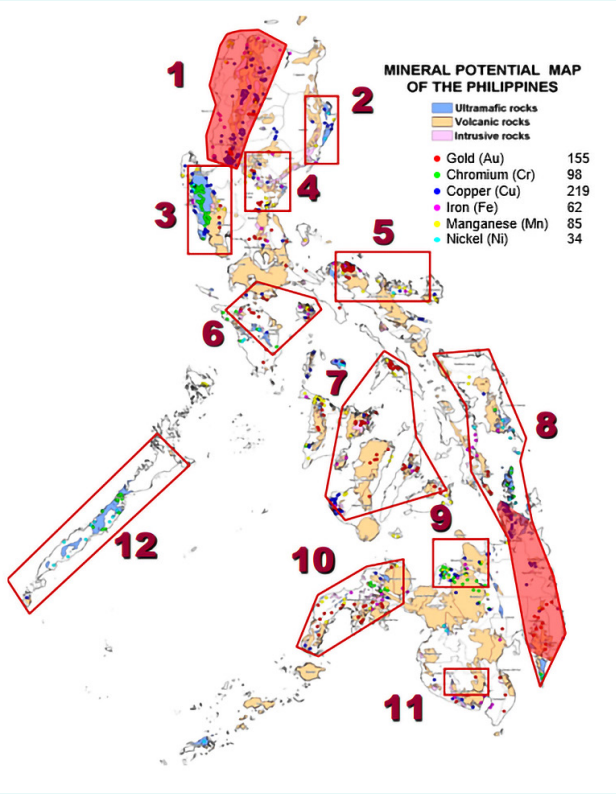
Discussions on how the Philippines can further develop its production of steel or transmission cables, requires an in-depth understanding of the wider critical minerals sector and its role on how it can further upskill its manufacturing capabilities. As the world needs to triple up its renewables capacity to ensure we meet our climate and net-zero targets, there is a need to ramp up the production of critical minerals to support the increase in renewables. ERM's Sustainability Institute views critical minerals and rare earth elements (REE) as two of the important materials needed to accelerate renewables adoption globally.[25] The IEA forecasts that a clean energy future will require 3.5 times the current supply of critical minerals.[26] In Southeast Asia alone, the ASEAN Centre for Energy (ACE) sees that the demand for critical minerals will follow an upward trajectory, parallel to the 7th Edition of ASEAN Energy Outlook (AEO7) projection of the added renewable energy capacity of 41.5% by 2025.[27]

The Philippines, among a few other Southeast Asian countries, will have a crucial role in ramping up the production of critical minerals. The country hosts the fifth-largest mineral reserves globally, with an estimated amount of $1 trillion in untapped reserves. The country's deposits include gold, chromite, aluminium, iron ore, nickel for batteries or steel, and copper which can be applied for transmission cables or solar panels.[28] Aside from this, the Philippines also has an identified cobalt reserve.[29] However, only 5% of the country's reserves are being explored, and only 3% are covered by mining contracts from DENR.[30] The country's vast untapped reserves are a huge opportunity to further develop its critical minerals sector and its downstream value chain, including the production of transmission cables and steel to support the requirements for offshore wind and the wider renewables sector.

President Ferdinand Marcos, Jr. signified that Manila was keen to expand beyond critical minerals extraction to also service the wider value chain down to processing and manufacturing.[31] Through the Board of Investments (BOI), the Marcos Jr. administration is spearheading the initiative to position the Philippines as a hub for green metals and minerals (Figure 30) processing in its trade missions abroad. There is recognition too from the government to streamline the entire value chain, particularly connecting with the upstream industry of the critical minerals sector. An agreement between Washington and Manila to develop the country's critical minerals sector and position its goal of becoming a key player in the global clean energy value chain is also underway[32]. As such, the Philippines intends to have the minerals processed locally to supply the local requirements or export higher-value materials.[33] The establishment of the Leyte Ecological Industrial Zone (LEIZ) signifies this economical push as the Philippines aim for this special economic zone to be a hub to agglomerate the activities of mining and processing the critical minerals. Furthermore, to spur the growth of the critical minerals sector, the government has lifted the ban on new mineral agreements, and the ban on open pit mining, on top of the menu of fiscal and non-fiscal incentives that mining companies can take advantage of.

[25] ERM Sustainability Institute. (2023). Renewable(s) resilience: Four steps to bolster renewable energy supply chain. https://www.erm.com/insights/renewables-conundrums---four-steps-to-bolster-renewable-energy-supply-chains/
[26] International Energy Agency. (2023). Critical minerals market review. https://www.iea.org/reports/critical-minerals-market-review-2023
[27] ASEAN Centre for Energy. (2024). Critical minerals as the "new gold" in ASEAN energy transition. https://aseanenergy.org/post/critical-minerals-as-the-new-gold-in-asean-energy-transition/
[28] Algo, J. (2024, February 29). Just transition for energy minerals is critical for the Philippines. Rappler https://www.rappler.com/voices/imho/opinion-just-transition-energy-minerals-critical-for-philippines/
[29] Phoumin, H. (2024). Southeast Asia's potential in critical minerals. The Strategist. https://www.aspistrategist.org.au/southeast-asias-potential-in-critical-minerals/
[30] Australian Trade and Investment Commission (Austrade). (2023). Mining in the Philippines: A new chapter. https://www.austrade.gov.au/en/news-and-analysis/analysis/mining-in-the-philippines-a-new-chapter#:~:text='The%20Philippines%20is%20one%20of,are%20covered%20by%20mining%20contracts.
[31] Ho, J. (2023, September). Philippines wants to leverage on its critical minerals. https://www.argusmedia.com/en/news-and-insights/latest-market-news/2446301-philippines-wants-to-leverage-on-its-critical-minerals
[32] U.S. Embassy in the Philippines. (2023, September). Partnership launched to implement U.S.-funded Php280 million program for Philippine critical minerals sector. https://ph.usembassy.gov/partnership-launched-to-implement-u-s-funded-php280-million-program-for-philippine-critical-minerals-sector/
[33] Board of Investments. (2024). BOI drives PH's positioning as a hub for green metals and mineral processing at PDAC 2024. https://boi.gov.ph/boi-drives-phs-positioning-as-a-hub-for-green-metals-and-mineral-processing-at-pdac-2024/

Figure 30: Mineral Potential Map in the Philippines
Source: Department of Environment and Natural Resources



1. **Luzon Central Cordillera**
   Au, Cu, Fe, Mn
2. **Northern Sierra Madre**
   Cr, Ni, Cu
3. **Zambales**
   Cr, Ni, Co, Pt, Cu, Au
4. **Vizcaya-Aurora**
   Cu, Au
5. **Bicol**
   Au, Fe, Cu
6. **Southern Tagalog**
   Cu, Au, Ni, Co
7. **Central Visayas**
   Cu, Au, Mn
8. **Samar-Eastern Mindanao**
   Au, Cu, Fe, Cr, Ni, Co, Pt, Mn
9. **North Central Mindanao**
   Cr, Cu, Au
10. **Zamboanga Peninsula**
    Au, Cu, Cr, Fe
11. **Southern Mindoro**
    Cu, Au
12. **Palawan**
    Cr, Ni, Co, Pt, Au,
    Rare Eath Elements

Transmission & Cable Manufacturers

The Philippines has around 4 billion MT of copper reserves, the fourth largest in the world. Copper wire is one of the main products that the country produces. The demand for copper products produced by the country is sought-after globally, particularly in electronics and automotive parts manufacturing. Copper wires produced in the Philippines are also used by transmission and distribution networks in-country. Several cable manufacturers in the Philippines, such as Philflex, Amwire, and Phelps Dodge, will greatly benefit from the government's push for offshore wind as developers would be able to source some of its requirements locally. Leading cable companies in the offshore wind industry could consider forming Joint Venture (JV) with a local Filipino cable manufacturer as a strategic entry point into the market.

Establishing a JV provides international firms with critical access to local manufacturing facilities, a skilled workforce, and market insights. This approach has proven successful in other APAC markets, such as in 2023, when NKT entered into a JV agreement with Taiwanese cable manufacturer Walsin Lihwa[34].

To further develop the wider copper industry; position the country as a supplier of higher-value copper products, including transmission & cable manufacturing; and realise the government's vision of establishing a fully-integrated copper industry, the conceptualisation of LEIZ (Figure 31) was originally intended to achieve these objectives by hosting clusters of copper and copper-related industries anchored on the existing copper smelting operations of the Philippine Associated Smelting and Refining (PASAR) Corporation.[35] However, there is a push on the government's part to expand beyond the original objective of LEIZ to service a fully-integrated copper industry. LEIZ is now being marketed by BOI as an area where locators can move in to service the wider renewables supply chain in the region, including offshore wind.

Figure 31: Leyte Ecological Industrial Zone location map
Source: Palafox Associates

[34] NKT. (2023, February 24). NKT will sign joint venture agreement to support construction of the first offshore cable factory in Taiwan. Retrieved from https://nkt.widen.net/content/bfe2upmpff/pdf/Joint_Venture_Taiwan_Investor_News_Final.pdf?u=gj0n1y
[35] Manila Bulletin. (2023, September 20). BOI identified site for PH's copper manufacturing. https://mb.com.ph/2023/9/20/boi-cntwg-implement-leiz-master-plan

Steel Manufacturing

The Philippine Iron & Steel Institute (PISI) views that the country will see an uptick in steel demand, fuelled by the government's aggressive infrastructure development push. However, 70% of its long product requirements and almost all its flat steel needs are imported due to the absence of domestic flat steel rolling mills.[36] Our consultations with BOI show that the Philippines is actively attracting foreign investors to set up domestic steel manufacturing facilities in the country to support both the infrastructure and renewables sectors.

Local steel manufacturing capabilities in the Philippines are not yet sufficient to the requirements of offshore wind. The country's steel manufacturing industry still needs to significantly upskill for the requirements of offshore wind, there is a strong recognition from the government that the development of its steel manufacturing industry would be able to position the country's potential to contribute to the wider global renewables (including offshore wind) supply chain through exporting refined or finished products needed to major APAC markets.

Our consultations with BOI and DTI, reveal that they are in advanced conversations with several local and international investors that will integrate the production of one aspect offshore wind supply chain from nickel production, processing, and refinement to steel manufacturing to the production of offshore wind towers in the Philippines. An assembly line of sorts, composed of different locators from the wider value chain in the manufacturing of towers in the Philippines could serve as a model globally on how countries with rich mineral deposits can further develop the potential byproducts of those minerals locally. Dajin Offshore expressed its interest in setting up a manufacturing base in the Philippines due to their confidence in the market, as the company has exported around $25 million of wind energy products and services to the country in 2022 alone.[37] It is a possibility that if Dajin's potential investment materialises, the BOI would partner them up with local steel suppliers in the country to explore the possibility of sourcing some of Dajin's requirements locally.

SteelAsia is constructing five new steel plants across the country that aims to produce new steel products such as wire rods, billets, sections, and sheet piles that the Philippines currently imports.[38] The country's largest steel manufacturer aims that its new plants will have applications in infrastructure, construction, and other various steel-intensive manufacturing industries, which can potentially include requirements for offshore wind.

Another potential steel manufacturer that the Philippines can look into is Maryland-based Crystal Steel Fabricators, which has a steel manufacturing facility located in Caloocan City inside Metro Manila. Crystal Steel Fabricators was tapped by Ørsted to construct Maryland's first offshore wind steel fabrication centre in Federalsburg, Maryland. Ørsted's investment into Crystal Steel will generate around $70 million of supply agreements for Crystal Steel. This facility will support the development of the Skipjack Offshore Wind Project in Maryland.[39] This market learning from the U.S. might allow the Philippine operations of Crystal Steel to expand its capabilities to offshore wind as well and support the projects in-country and potentially in the wider APAC region.

[36] South East Asia Iron and Steel Institute. (2024). Philippines eyes growth in steel consumption. https://www.seaisi.org/details/24478?type=news-rooms

[37] Dajin Offshore. (2023). Renewable roundtable meeting with Philippine President Ferdinand R. Marcos Jr. https://www.dajin.cn/html/news/2023/0112/42.html

[38] Desiderio, L. (2024, July 25). SteelAsia spending P82 billion for new plants. The Philippine Star. https://www.philstar.com/business/2024/07/25/2372669/steelasia-spending-p82-billion-new-plants

[39] Ørsted. (2021). Ørsted selects Maryland's Crystal Steel Fabricators for major offshore wind steel fabrication center. https://us.orsted.com/news-archive/2021/10/orsted-selects-marylands-crystal-steel-fabricators-for-major-offshore-wind-steel-fabrication-center

CONCLUSION AND RECOMMENDATIONS

Conclusion and Recommendations

The Philippines has a strong potential for supplying and exporting vessels, skilled workers, and the critical minerals needed to drive forward offshore wind. However, for the Philippines to fully capitalise on these offshore wind opportunities, some enhancements on existing policies could be explored further. President Marcos Jr.s' EO21, a whole-of-government approach has been institutionalised by streamlining processes and expediting the approval of required permits needed to remove unnecessary delays and support project delivery.

We recognise that for the development of initial offshore wind projects in the country, a majority of foreign supply will be required. This is an opportune time for the government and business to co-develop the future capabilities of the Philippine industries identified in this study and scale up the local supply chain.

The government is already doing its best to address these challenges such as establishing an ease of doing business policy through the ''green lanes'' for strategic investments. However, a specific industrial strategy for the wider renewables supply chain can be crafted to ensure that the country will be able to capture the arising opportunities that come with the push to increase the renewables capacity in the Philippines.

A systematic approach to institutionalise policies that ensure timely implementation and sustainability of the offshore wind industry could be implemented. In order to create this systematic approach, various departments, ministries, and agencies could consider these policy enhancements as outlined in Table 10 below.

Table 10. Summary of Recommendations

Supply Chain Recommendation Themes	Office of the President	Congress	DOE	ERC	NGCP	DTI	BOI	DOST	DOLE	TESDA	CHED
Establish clear regulatory frameworks, streamlined permitting process and institutionalize inter agency coordinating processes to ensure efficient project execution and industry growth											
• Setting a realistic, and long-term offshore wind pipeline			■	■							
• Transmission capacity is guaranteed upon the Auction award			■	■							
• Ensuring policy continuity between different administrations	■		■	■	■	■					
• Establishment of an Inter-ministerial Special Task Force for Offshore Wind	■		■	■	■	■	■	■	■	■	■
• Establish competitive GEAR Prices while balancing consumer protection			■	■							

Supply Chain Recommendation Themes	Office of the President	Congress	DOE	ERC	NGCP	DTI	BOI	DOST	DOLE	TESDA	CHED
Implement industry incentives and risk mitigation measures to attract investment, reduce financial uncertainty, and encourage local manufacturing and innovation within the offshore wind supply chain											
• Promotion of retail electricity option to supply chain manufacturers											
• Establishment of Infrastructure Projects of National Importance											
• Exploring opportunities for supply chain companies to access export incentives while serving the domestic market											
Prioritize workforce development and government capability building by investing in specialized training programs, fostering industry-academia partnerships, and strengthening institutional expertise to support the long-term growth and sustainability of the offshore wind supply chain											
• Balik-Scientist Program as an immediate solution for Filipino skilled workers in offshore wind											
• Creation of a long-term program to attract Filipino skilled workers abroad to move back home											
• Upskilling of local talent to offshore wind requirements											
• Strengthening of institutional capacity of ERC											
• Upskilling of PTIC posts to promote offshore wind and its supply chain											
Conduct comprehensive industry competitive advantage mapping and actively disseminate information to stakeholders, highlighting key opportunities, strengths, and gaps to drive strategic investments and foster collaboration across the offshore wind supply chain											
• Targeted pitches to the offshore wind supply chain											
• DTI-IPG to consider wider Philippine industries and industries with transferrable skills											

Theme 1: Clear Regulatory Framework and Streamlined Permitting Process

1. **Setting a realistic, and long-term offshore wind pipeline** – DOE and ERC can work together to establish a long-term installation pipeline (between 10 to 15 years) that will allow developers and suppliers to forecast the country's supply chain needs. The pipeline can be incorporated into the Philippine Energy Plan (PEP) to send strong signals to attract foreign investments in the local supply chain and technology development. The requirements for expanding offshore wind ports can be incorporated into the PEP as well.

2. **Transmission capacity is guaranteed with the Auction award** –Department of Energy (DOE) and the National Grid Corporation of the Philippines (NGCP) can consider guaranteeing transmission capacity for projects upon winning an auction, following the example of other leading countries in offshore wind development. Such a policy would increase investor confidence and help accelerate project timelines, aligning with the nation's renewable energy targets. NGCP could capture OFW development needs by formally incorporating anticipated offshore wind projects into their annual Transmission Development Plan, ensuring grid readiness as these projects move from planning to implementation. This proactive approach would create a clear roadmap for grid infrastructure investments, supporting the successful integration of offshore wind into the national energy mix.

3. **Ensuring policy continuity between different administrations** – The government can provide confidence to investors that offshore wind development and its corresponding supply chain improvements will be prioritised as national interests instead of administration's interests. The government can explore the possibility to set up institutional mechanisms to insulate the established pipeline of offshore wind projects such as listing these targets in the Nationally Determined Contributions targets.

4. **Establish an Inter Ministerial Task Force for Offshore Wind** – Create a special, interministerial task force for offshore wind as part of the Cabinet can be explored. This special task force can be attached to the National Economic and Development Authority (NEDA), the government's socio-economic planning agency, to steer the growth of the offshore wind industry, including local supply chain. Some of the initial members of the proposed special task force can include the DOE, DTI, DENR, and the Department of Labor and Employment (DOLE). Other relevant departments, government agencies, or other stakeholders can be included, as deemed appropriate. The special task force will be headed by an Executive Director (with a preference on a technocrat or government career official to ensure continuity with succeeding governments) and provided with sufficient budget and highly technical staff. The budgetary requirements for this special task force can be justified by estimating the economic value of the offshore wind industry not just in the Philippines but from the wider APAC region in terms of the supply chain potential.

   Private sector representation can also be explored to provide additional continuity and stability despite the single 6-year presidential term. It can be patterned on how the National Renewable Energy Board (NREB) is structured that allows private sector representation, and membership to the task force can be on a staggered basis to ensure continuity between administrations.

   By having this special task force, it shows that the government is committed to develop the country's offshore wind capabilities and expand the supply chain. The formation of the special task force will also ensure that the existing gains in the country's offshore wind policy will continue beyond each presidential term.

5. **Establish competitive GEAR prices while balancing consumer protection** – ERC can explore benchmarking auction prices in comparable markets with the Philippines to feed into the future Green Energy Auction Reserve (GEAR) prices. This will allow ERC to be agile with the regional and global market trends that will feed into how each GEAR pricing will look for subsequent GEAP rounds. Moreover, the regulator can explore the possibility of establishing benchmark rates for new and emerging technologies for future GEAP rounds or power supply contracts, as GEAR prices will be one of the major determinants to supply chain movements. Our consultations with developers showed that in their talks/negotiations with suppliers, the main consideration for suppliers will be the GEAR prices for offshore wind.

Theme 2: Industry Incentives and Risk Mitigation

1. **Promotion of retail electricity option to supply chain manufacturers** – The DTI, BOI, and DOE can be proactive in promoting the current electricity options, wherein manufacturers have the choice to choose their own energy suppliers, regardless of source, which is particularly beneficial for those with higher electricity demands eligible for retail energy contracts. Given the Philippines' substantial renewable energy capacity, this option not only incentivizes manufacturers to source renewable energy but also provides a strategic advantage for exporting goods to the EU without incurring taxes from the Carbon Border Adjustment Mechanism (CBAM).

2. **Prioritise offshore wind related energy projects as an Infrastructure Projects of National Importance** – The government can explore the possibility of enhancing the existing Energy Projects of National Significance (EPNS), an existing policy that streamlines the permits needed for an energy project, to an Infrastructure Projects of National Importance (IPNI). The existing EPNS framework allows certain energy projects (covering generation, transmission, or other projects to ensure grid reliability, stability, and security) to facilitate fast-tracked approval of permits within a 30-day period, with an ''automatic approval'' provision if no decision was made by a permitting agency. A minimum capital investment of at least PhP 3.5 billion ($62.8 million) for an energy project to be considered under the EPNS framework.

   IPNI on the other hand could include other industries such as steel companies, transmission cable manufacturers, shipbuilding facilities, precast facilities, and other relevant industries that the Philippines can host to support not just offshore wind projects, but other renewables and infrastructure projects. The proposed expanded framework will adopt the same parameters imposed under the EPNS framework. The difference is that, IPNI is listed as a law which ensures continuity.

3. **Exploring opportunities for supply chain companies to access export incentives while serving the domestic market** – DTI could look into modifying current regulations to enable both existing and prospective supply chain companies in the offshore wind sector to benefit from the incentives available to exporters, even while catering to the domestic market. This adjustment would ensure that domestic offshore wind projects can source their materials locally, while also allowing companies to take advantage of incentives for products intended for export.

Theme 3: Workforce Development and Capacity-building

1. **Balik-Scientist Program as an immediate term solution for Filipino skilled workers in offshore wind** – DOE and the Department of Science and Technology (DOST) may consider in exploring the usage of the Balik Scientist Program or other DOST programs to incentivise Filipino skilled workers overseas to move back to the Philippines and support the development of the offshore wind industry in the immediate term. Our consultations suggest that some Philippine-based companies in other industries, such as chemicals, have already been using this program to attract highly-technical Filipino skilled workers overseas to move back to their country.

2. **Creation of a long-term program to attract Filipino skilled workers abroad to move back home** – The government can explore programs that will attract Filipino professionals abroad to move back home and support the Philippine economy. This program could be in the form of financial incentives such as a lower tax bracket or a fixed tax bracket for a set number of years, tax exemption on importation of personal items abroad, easier immigration requirements for the Filipino's foreign spouse and children, etc. The Philippine Government can benchmark with Malaysia's Returning Expert Programme (REP) which allows Malaysian professionals abroad to move back to their country and support its economic development. By having this program, the country can build the necessary skills needed to support development of not just its offshore wind industry, but other industries as well.

3. **Upskilling of local talent to offshore wind requirements** – TESDA and CHED can work with DOE, DTI, and DOLE in identifying the needs for the wider offshore wind industry and local supply chain. TESDA and CHED can spearhead the creation and marketing of technical programs and courses that will attract Filipino students that are keen to enter the offshore wind sector. TESDA can explore collaborations with other APAC Offshore Wind Markets that can complement and supplement the needs of the wider APAC region. While CHED can partner with the academe and key universities across the country to work on specialised courses and/or degrees to offer university students a future career in offshore wind development. These programs will ensure a steady stream of quality workforce to service the requirements of both the Philippines and the wider APAC region.

4. **Strengthening of institutional capacity of ERC** – The institutional capacity of ERC can be strengthened such that the institution will have sufficient human resources to address the growing renewables industry. Funding can be sourced from the regulatory fees and penalties that ERC is imposing to the energy industry. The expansion of ERC's organisation will ensure that the regulator can address future regulatory gaps in the growing renewables industry. The current discussions in the Philippine Congress in strengthening ERC's institutional capacity through EPIRA amendments is already sending a good signal.

5. **Upskilling of PTIC posts to promote offshore wind and its supply chain** – DTI's representative offices in the country's foreign missions, the Philippine Trade and Investment Centre (PTIC), should be upskilled in promoting market fundamentals of the Philippines. DTI and DOE could conduct an "Offshore Wind 101" including its supply chain map for DTI's Foreign Trade Service Corps to ensure that trade missions will have a high-level understanding on how offshore wind is different compared to other renewables technologies. This will also allow the PTIC posts to target potential offshore wind suppliers to set up operations in the Philippines. DTI and DOE can also create roadshows in mature offshore wind markets to target offshore wind developers, offshore wind suppliers, and the wider industries supporting it, similar to how the Philippine Government did their Feed-in-Tariff Roadshows during the early 2010s.

Theme 4: Industry Competitive Advantage Mapping

1. **Targeted pitches to the offshore wind supply chain** – The DTI and BOI may wish to use this report as a preliminary ''industrial strategy'' for the Philippines to attract more supply chain players that will drive forward the offshore wind supply chain. The government could focus on the strengths of the existing industries in-country that can be upskilled for the requirements of the offshore wind industry and at the same time, target complementary industries that will drive the offshore wind supply chain forward.
2. **DTI-IPG to consider wider Philippine industries and industries with transferable skills** – The DTI Industry Development and Investment Promotion Group (IPG) could conduct horizon scan on other industries in the Philippines that might have transferable skills to the offshore wind supply chain. The likelihood of finding other local talents that could be transferred to expand the country's supply chain capacity for offshore wind will also be present.

With the strategic location of the Philippines at the centre of the APAC Offshore Wind Market, DOE, DTI, and relevant government agencies could further explore the possibility to position the Philippines as a supply chain hub within their strongest and most competitive industries. Regional collaboration has been proven in Europe and the APAC region can apply market learnings from this. To further unlock the opportunities for the Philippines as a regional supplier, an open trade policy within and between regions could be in place.

A positive development is that the Philippines has ratified its accession to the Regional Comprehensive Economic Partnership (RCEP) in February 2023[40]. RCEP is an ASEAN-led free trade agreement (FTA) that consolidates the existing individual FTAs between ASEAN and its dialogue partners of Australia, China, Japan, New Zealand, and South Korea. Exploring on how RCEP and the other FTAs between ASEAN and Australia, China, Japan, and South Korea can be used as a framework to enable regional collaboration among the APAC offshore wind markets of Australia, China, Japan, Philippines, South Korea, and Vietnam and ensure stable supply chain of critical offshore wind components in the region. Moreover, by supporting each APAC offshore wind market in enhancing their capacity to deliver at scale; ensuring flexible access to needed materials, components, and services; and complementing the supply chain strengths of each country will further achieve a robust regional supply chain in the APAC region. Furthermore, localization policies for APAC offshore wind markets should be realistic, leveraging local market strengths to create a balanced approach that supports job creation, strengthens the supply chain, and maintains cost-effectiveness in offshore wind energy production.

The Philippines is already on track in unlocking its offshore wind potential through the significant gains that the current administration of President Marcos Jr. implemented since taking office on 30 June 2022. The recommendations that are set here are policy enhancements of existing policies that can be tailored for the exponential growth of the country's renewables industry, especially offshore wind.

[40] Venzon, C. (2023, February 22). Philippines ratifies RCEP trade deal after shift by Marcos. Nikkei Asia. https://asia.nikkei.com/Economy/Trade/Philippines-ratifies-RCEP-trade-deal-after-shift-by-Marcos

APPENDICES

Appendix A – Terminology and Acronyms

AbEx	Abandonment Expenditure
ACE	ASEAN Centre for Energy
ADB	Asian Development Bank
APAC	Asia-Pacific
ASEAN	Association of Southeast Asian Nations
BOI	Board of Investments
BoP	Balance of Plant
CapEx	Capital Expenditure
CBAM	Carbon Border Adjustment Mechanism
CES	Clean Energy Scenario
CHED	Commission on Higher Education
CLV	Cargo Load Vessel
CNC	Computer Numerical Control
COA	Certificate of Authority
COD	Commercial Operation Date
CTV	Crew Transfer Vessel
DCP	Depression Compression Platform
DENR	Department of Environment and Natural Resources
DevEx	Development Expenditure
DMW	Department of Migrant Workers
DOE	Department of Energy
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOTr	Department of Transportation
DTI	Department of Trade and Industry
DTI-IPG	Industry Development and Investment Promotions Group
E&M	Electrical and Mechanical
ECC	Environmental Compliance Certificate
EO	Executive Order
EPC	Engineering, Procurement, and construction

EPCI	Engineering, Procurement, Construction, and Installation
EPIRA	Electric Power Industry Reform Act of 2001
EPNS	Energy Project of National Significance
ERC	Energy Regulatory Commission
ERM	Environmental Resources Management
EVOSS	Energy Virtual One-Stop Shop
FEED	Front End Engineering Design
FPI	Federation of Philippine Industries
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GEAP	Green Energy Auction Program
GEAR	Green Energy Auction Reserve
GEOP	Green Energy Option Program
GRIP	Global Renewable Infrastructure Projects Database
GW	Gigawatt

GWEC	Global Wind Energy Council
GWh	Gigawatt-hour
GWO	Global Wind Organisation
HD KSOE	HD Korea Shipbuilding & Offshore Engineering
HLV	Heavy Lift Vessel
IDSI	Industrial Digitalisation and Systems Intelligence
IEA	International Energy Agency
IEMOP	Independent Electric Market Operator of the Philippines
IRENA	International Renewable Energy Agency
JV	Joint Venture
LCoE	Levelised Cost of Energy
LEIZ	the Leyte Ecological Industrial Zone
LNGC	Liquefied Natural Gas Carrier
LSCI	Liner Shipping Connectivity Index
OE	Owner's Engineer

MARINA	Maritime Industry Authority
MSP	Marine Spatial Planning
MT	Metric Tonne
Mta	Million tons per annum
MW	Megawatt
NEDA	National Economic and Development Authority
NGCP	National Grid Corporation of the Philippines
NIPAS	National Integrated Protected Areas System
NMFPI	Norwegian Maritime Foundation of the Philippines
NREB	National Renewable Energy Board
NSA	Norwegian Shipowners' Association
NTC	Norwegian Training Center
O&G	Oil & Gas
O&M	Operations & maintenance
OEM	Original Equipment Manufacturer

OFW	Offshore Wind
OMA	Operation and Maintenance Agreement
OPAF	Offshore Wind Policy and Administrative Framework
OpEx	Operational Expenditure
OSS	Offshore Substations
OsWESC	Offshore Wind Energy Service Contract
PASAR	Philippine Associated Smelting and Refining Corporation
PCA	Philippine Constructors Association
PCAB	Philippine Contractors Accreditation Board
PCCI	Philippine Chamber of Commerce and Industry
PEMC	Philippine Electricity Market Corporation
PEP	Philippine Energy Plan
PEZA	Philippine Economic Zone Authority
PhP	Philippine pesos
PISI	Philippine Iron and Steel Institute

PNOC	Philippine National Oil Company
PNOC-ESB	PNOC – Energy Supply Base
PPA	Power Purchase Agreements
PSRMA	Philippine Steel Rolling Mills Association
PTIC	Philippine Trade and Investment Center
QHSE	Quality, Health, Safety, and Environment
RAG	Red, Amber, Green
RCEP	Regional Comprehensive Economic Partnership
RCOA	Retail Competition and Open Access
RE	Renewable Energy
RE Act	Renewable Energy Act of 2008
RECAI	Renewable Energy Country Attractiveness Index
REE	Rare Earth Elements
REP	Returning Expert Programme
RES	Retail Electricity Suppliers

RESC	Renewable Energy Service Contracts
SGRE	Siemens Gamesa Renewable Energy
SOV	Service Operation Vessel
T&I	Transportation & Installation
TDP	Transmission Development Plan
TESDA	Technical Education and Skills Development Authority
WTG	Wind Turbine Generator
UAV	Unmanned Aerial Vehicle
UNCTAD	United Nations Trade and Development
WESM	Wholesale Electricity Spot Market
WTIV	Wind Turbine Installation Vessel

Appendix B – Breakdown of Service Offerings

Expenditure Period	Category	Service	Service Detail
DevEx	Consulting and Advisory	Consulting and Advisory Service	Legal and Accountancy
			Due Diligence
			Feasibility studies
			Financial advisory
			Consenting and Permitting
			Leasing advisory
			Insurance (Construction)
			Insurance (Operations)
			QHSE
	Meteorological and Oceanographic Surveying	Meteorological and Oceanographic Surveying Service	Wind resource
			Wave & current climate
	Environmental Surveys	Environmental Impact Assessment	Environmental Impact Assessment
	Sea Bed Surveys	Geophysical and Geotechnical	Geophysical and Geotechnical
		Unexploded Ordnance	Unexploded Ordnance
	Vessels and UAVs	Survey vessels	Survey vessels
		Data gathering UAV	Data gathering UAV

Expenditure Period	Category	Service	Service Detail
DevEx	FEED	Electrical system FEED	Electrical system FEED
		Foundation FEED	Foundation FEED
		Grid connection FEED	Grid connection FEED
		Logistics FEED	Logistics FEED
		Vessel design FEED	Vessel design FEED
		Ports FEED	Ports FEED
	Project Management and Execution Service	Project Management and Execution Service	Project Management and Execution Service
CapEx	Foundations	Foundation EPCI	Foundation EPCI
		Foundation EPC	Foundation EPC - Monopile
			Foundation EPC - Jacket
			Foundation EPC - Transition Piece (TP)
			Foundation EPC - Gravity Base
		Foundation Supply Services	Secondary steel work / fabrication
			Pin Piles
		Foundation Installation Services	Grouting
			Cathodic protection systems
			Scour protection
	Floating Substructure	Substructure EPCI	Substructure EPCI
		Substructure Supply Services	Secondary steel work / fabrication
			Mooring and anchor systems
			Cement

Expenditure Period	Category	Service	Service Detail
CapEx	Turbines	Turbine EPCI	Turbine EPCI
		Turbine EPC	Turbine EPC
		Turbine Supply Services	Gearbox/direct drive supply
			Generator
			Power Convertor Systems (PCS)
			Nacelle chassis casting
			Transformer
			Switchboards
			Uninterruptible Power Supply (UPS)
			Fasteners
			Nacelle covers
			Spinner covers
			Towers supply
			Blade manufacture
			Temporary Power
			Composite materials supply

Expenditure Period	Category	Service	Service Detail
CapEx	Cables	Array Cable EPCI	Array Cable EPCI
		Export Cable EPCI	Export Cable EPCI
		Array Cable EPC	Array Cable EPC
		Export Cable EPC	Export Cable EPC
		Cable Supply Services	Cable insulation and armouring
			Fibre optics and communication
			Cable cores and other internals
		Cable Installation Services	Subsea cable protection systems
			Burial Equipment
	Offshore Substations	Offshore Substation EPCI	Offshore Substation EPCI
		Offshore Substation EPC Jacket	Offshore Substation EPC Jacket
		Offshore Substation EPC Topside	Offshore Substation EPC Topside
		Offshore Substation Supply Services	Electrical system
			Substation facilities
	Balance of Plant	Balance of Plant	Balance of Plant

Expenditure Period	Category	Service	Service Detail
CapEx	Installation Services	Ports and Harbours	Port / staging area
			Craneage
			Manufacturing / fabrication facility
			Assembly / pre-assembly
		Transportation and Installation Services	W2W vessel
			Jack-up / CLV/ HLV
			Transportation vessel
			SOVs
			CTVs
			AHTs
			Lifting Equipment
			Transportation Equipment (incl. blade rack, turbine stands)
			Noise mitigation
			Commissioning / testing
			Stevedoring
			Installation Logistics
		Personnel and Training Services	Personnel and Training Services

Expenditure Period	Category	Service	Service Detail
OpEx	Onshore	Onshore EPCI	Onshore EPCI
		Onshore Substation EPC	Onshore Substation EPC
		Onshore Substation Supply Services	Electrical system
			Substation facilities
		Onshore Export Cable Installation Services	HDD Drilling
			Landfall & Upland Civil Works
	Operations and Maintenance	Asset Management	Asset Management
		Condition Monitoring	Condition Monitoring
		Vessel Providers OM	Vessel Providers OM
		Port Services	Port Services
		Personnel and Training Services	Personnel and Training Services

Appendix C – Major Shipyards in the Philippines

Seatrium Subic Shipyard Subic Bay Freeport Zone, Subic, Zambales		
Shipyard facilities	**Specification (Length x Breadth x Depth)**	**Capacity / Type**
Graving dock	550m x 65m x 12m	550,000 DWT
Quay/Wharf/Berth/Waterfront (Length/Draft)	C Quay: 279m	Water depth: 9.0m
	E1 Quay: 351m	Water depth: 8.5m
	E2 Quay: 312m	Water depth: 9.0m
Building berth	240m x 26m	
Total yard area	71.82 ha.	
Country of origin	Singapore	
Key services	• Drydocking clean energy liquified natural gas carriers (LNGC) & marine vessels repairs • Conversion upgrades & modifications • New building topside module & fabrication • Renewable energy & wind farm foundations	
Key products	• Completed the Depletion Compression Platform with Topside Module for the Malampaya Phase 3 project • Construction of offshore oil rigs section, aft hull section, tanker barges, landing crafts, asphalt carriers, etc. • Conversion to a Floating Production Storage & Offloading (FPSO) vessels with extensive internal tank coating and steelworks • Graving dock & grand assembly area with a Goliath Gantry Crane with a lifting capacity of up to 1,500 tonnes – the largest in the Philippines • Repair and conversion of super tankers, including the conversion of a single-hull tanker to double-hull • Repair and upgrades of LNGC vessels	

Seatrium Batangas Shipyard Bauan-Mabini Road, Bauan, Batangas		
Shipyard facilities	**Specification (Length x Breadth x Depth)**	**Capacity / Type**
Graving dock	200m x 38m	40,000 DWT (equipped with 2 docks arms)
Shiplift platform	175m x 28m	6,000 DWT
Quay/Wharf/Berth/Waterfront (Length/Draft)	Berth 1: 166m	5,000 DWT
	Berth 2: 166m	4,000 DWT
	Berth 3: 166m	4,000 DWT
	Berth 4: 166m	4,000 DWT
	Berth 5: 105m	4,000 DWT
	Berth 6: 105m	3,500 DWT
	Berth 7: 60m	3,500 DWT
	Pier 1: 175m	Water depth: 8.0m
	Pier 2: 145m	Water depth: 8.0m
	Pier 3: 65m	Water depth: 8.0m
	Pier 2: 155m	Water depth: 8.0m
Total yard area	34 ha.	
Country of origin	Singapore	
Key services	Repair, conversion, and newbuilding	
Key products	• Construction of offshore oil rigs section, aft hull section, tanker barges, landing crafts, asphalt carriers, etc. • Extensive repair works on a range of vessels including offshore support vessels, ocean support vessels, multi-purpose barges, dredgers, tugs, bulk and container vessels, etc.	

Austal Cebu Shipyard West Cebu Industrial Park, Balamban, Cebu		
Shipyard facilities	**Specification (Length x Breadth x Depth)**	**Capacity / Type**
Floating dock	120m x 38m x 28m	10,000 tonnes docking capacity
Slipway	124m x 20m	628 DWT
Quay/Wharf/Berth/Waterfront (Length/Draft)	145m wharf	Depth: 4m to 5.5m
Undercover workshop area	10 undercover workshop areas (up to 120m x 80m x 28m)	
Total yard area	54.3 ha.	
Country of origin	Australia	
Design capability	Full range of in-house capability	
Key services	Shipbuilding, ship repair with full range of in-house capabilities such as: fabrication, welding, HVAC, electrical, mechanical, piping, design	
Key products	New build ships: offshore wind / oil & gas support vessels, high-speed ferries, military & law enforcement vessels	

Tsuneishi Heavy Industries West Cebu Industrial Park, Balamban, Cebu		
Shipyard facilities	**Specification (Length x Breadth x Depth)**	**Capacity / Type**
Building dock	450m x 60m x 11.5m	4 x 300 tonnes Jib crane
		1 x 120 tonnes floating crane
		1 x 1,300 tonnes floating crane
Repair dock	139.5m x 24.5m x 11m	8,500 tonnes
Building berth	No. 1: 215m x 34m	2 x 200 tonnes Jib crane
	No. 2: 250m x 41m	4 x 200 tonnes Jib crane
Slipway/Launchway	100,000 tonnes	
Total yard area	147 hectares	
Country of origin	Japan	
Key service	Newbuilding / repair	
Key products	Mostly focused on bulk carriers and container vessels.	

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