



Due Diligence Services for Global Investment Agency to Assess the Business Case of Offshore Wind Plant Installations in India

Opportunity Assessment in Offshore Wind Value Chain

Offshore Wind Project- A know-how: Project Development- a 7-10 years long affair

Developing an off-shore wind power plant even for European countries involves unprecedented engineering and relentless co-ordination among various value chain players which usually extends for a span of 7-10 years. Hence, for country like India which is into a very nascent stage but indeed offers huge potential with nearly 7, 200 km coastal line, it will be even tough to establish these highly engineering exhaustive power plants. The entire Offshore wind plant (OSW) life cycle can be split in three major phases:

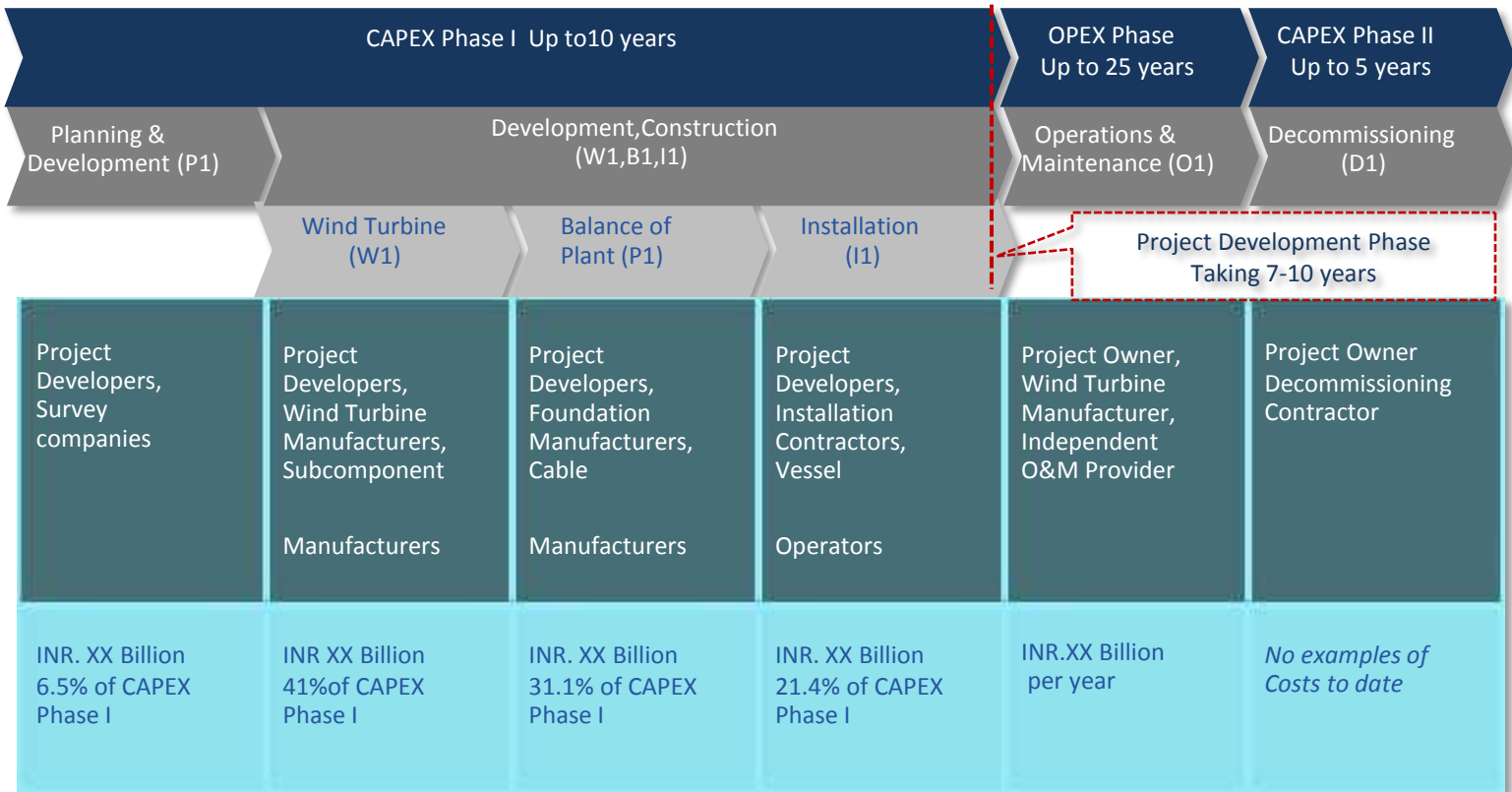
- *CAPEX Phase I*
- *OPEX Phase*
- *CAPEX Phase II*

These phases are derived typically basis the expenditures planned to be incurred on the development of an OSW plant. These phases are derived typically basis the expenditures planned to be incurred on the development of an OSW plant. To develop an easy understanding, we have assumed a generic OSW project of 500 MW to be developed (Refer Exhibit 01). The three phases highlighted above would entail the following details:

- ❑ *Capex Phase I: Initial capital investment encompassing planning and development, wind turbine procurement, balance of plant procurement and installation*
- ❑ *OPEX Phase: Operations and maintenance throughout the design life of the offshore wind farm. There are also recurring costs in relation to grid maintenance and lease.*
- ❑ *CAPEX Phase II: Decommissioning activities.*

Exhibit 01: Phase wise Expenses for a Typical OSW Plant of 500 MW

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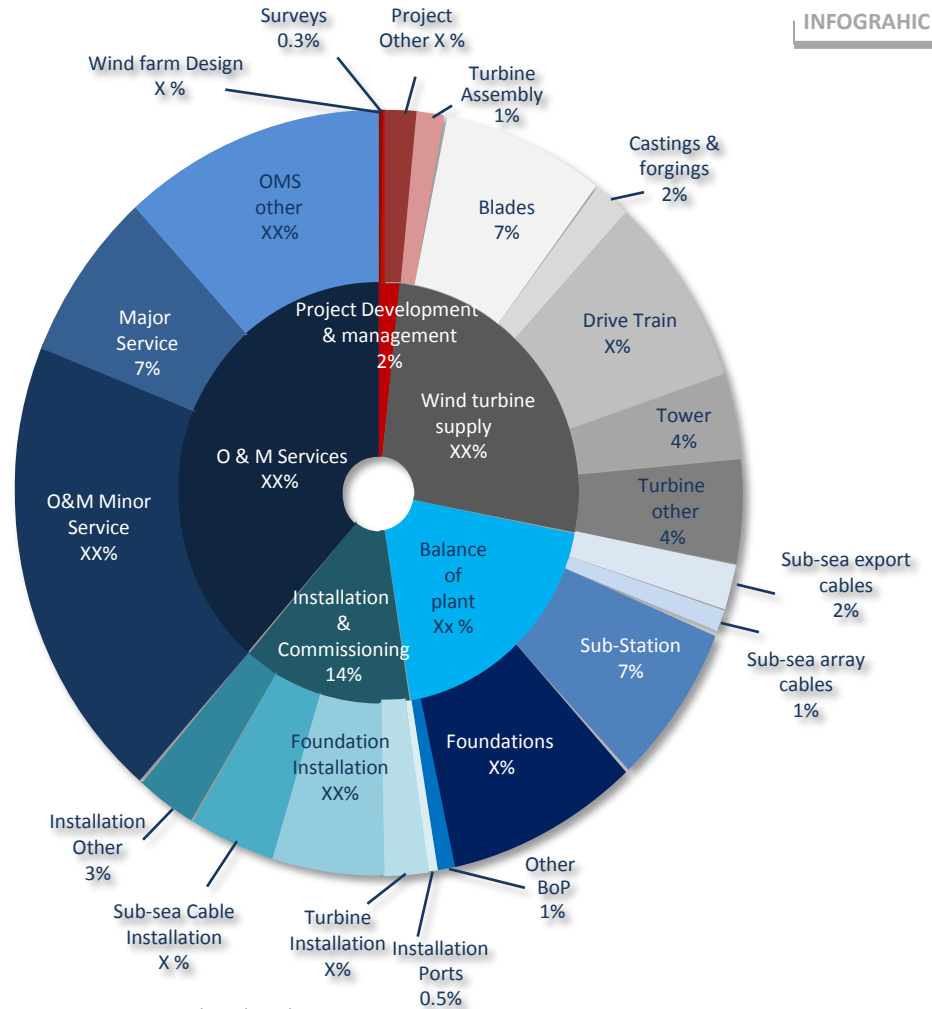
Source: enincon research

Parametric Opportunity Mapping

As per the different phases highlighted in the previous section, there exists significant opportunity for all likely participants in the OSW project life cycle. To develop the opportunity size for the associated value chain players, typical cost bifurcation is shown in Exhibit 2. The value chain players for which the opportunity mapping shall be done are:

- ✓ Project Developers
- ✓ OEM Supplier
- ✓ Electrical Infra Provider
- ✓ EPC Companies
- ✓ Power Distribution Companies
- ✓ Transmission Infra Provider
- ✓ Port & Marine Authorities
- ✓ Logistics Provider

Exhibit 02 Cost Structure Split for OSW Plant



Source: ENINCON Research and Analysis

Opportunity Screening Criteria

The opportunity scale and relative matrix for OSW value chain participants as highlighted in the previous section can be screened basis few selected criterion which would be applicable in Indian context. There would be multitude of opportunities existent for the value chain participants to either use their direct capabilities or adapt the capabilities as per the applications as desired in the development of OSW plant and its life cycle. The criterion selected for mapping the opportunity tune are listed as below:-

- ✓ ***OSW Project Market Value***
- ✓ ***OSW Sector Expertise***
- ✓ ***Potential to Reduce Cost of Energy***
- ✓ ***Barriers to Entry***

All the value chain players would be screened basis the set of listed criterion and a cumulative result of this screening shall be utilised to derive tune of opportunities for each participant. The screening criterion are elaborated as below:

✓ ***OSW Project Market Value:*** In India, the potential to develop the OSW projects is recognized as 100 GW. However, it will be safe to assume that in near future the country will not experience any magnanimous capacity additions and is likely to add capacities on pilot basis. Although for recognising the tune of opportunities, we have considered an OSW plant of 500 MW capacity. Basis the expenditure on the project the opportunity size is determined .

The figures utilised here in are absolute values and is liable to vary as per the core competencies of the market participants. Therefore, it is recommended that each market participant apply their own judgement before assessing the relative market value.

✓ ***OSW Sector Expertise:*** This criteria represents an assessment of the degree of overlap between the requirement of OSW plant which can be seen as opportunity area w.r.t the expertise in terms of participating in the development of the plant

✓ ***Potential to Reduce Cost of Energy:*** The potential to reduce CAPEX and OPEX through utilisation of OSW development expertise will also have an associated opportunity galore, since the associated cost of OSW development will be very high in India.

✓ **Barriers to Entry:** This criterion determines the level of competition and level of investments. For the value chain players if the barriers to entry is less then the opportunity associated will be high.

For recognising the allied tune of opportunity, we have followed a three-tier colour code mechanism which indicates the scale of opportunity.

Exhibit 03 Opportunity Screening Criteria as per Value Chain Participants

TABULAR

OSW Project Market Value	₹	Low opportunity tune if market value accounts for less than 1% of CAPEX or less than 2% of OPEX	₹	Average opportunity tune if the market value accounts between 1% to 5% of CAPEX and between 2% to 10% of OPEX	₹	High opportunity tune if the market value accounts for more than 5% of CAPEX and or for more than 10% of OPEX
OSW Sector Expertise	₹	Low opportunity tune if the OSW service provider is a new entrant in the market	₹	Average opportunity tune if the OSW service provider is having up to 5 years of experience no extended scope capability	₹	High opportunity tune if the OSW service provider is having more than 5 years of experience and desired extended scope capability
Potential to Reduce Cost of Energy	₹	Low opportunity tune if the potential to reduce cost of energy is up to 0.5%	₹	Average opportunity tune if the potential to reduce cost of energy is between 0.5% to 1%	₹	High opportunity tune if the potential to reduce cost of energy is more than 1%
Barriers to Entry	₹	Low opportunity tune if in the Indian OSW market five or more players are active and high investment tune is required under the same and long lead time is required	₹	Average opportunity tune if in the Indian OSW market there are five or more active players and investment tune required is average with medium lead time	₹	High opportunity tune if in the Indian OSW market there are five or more active players and investment tune required is low with short lead time

Opportunity Ranking System
 A three tier color coded ranking system has been followed in determining the associated tune of opportunities for the participants of the value chain. The color scheme and opportunity tune is shown as in right hand side of this section.

	Relatively low opportunity Tune
	Average Opportunity Tune
	High Opportunity Tune

Source: enincon research & analysis

Opportunity Matrix as per Services & Products

For developing this section we have considered two phases namely :-

✓ **CAPEX Phase:-** This would comprise of Project Developers, EPC Companies, OEM Providers, Electrical Infra Providers, Transmission Infra Companies, DISCOMS and Port & Marine Authorities.

✓ **OPEX Phase:-** This would comprise of DISCOMS, Port & Marine Authorities, O&M Service Providers and Logistics Providers.

The level of opportunity associated with scorecard as per the screening criteria is depicted in following section for each stake holder.

P1. Project Developers:- The level of opportunity associated as per the listed services and products by projects developers and score card is as depicted in Exhibit 04.

Exhibit 04: Opportunity Tune & Score Card as per Products & Services of Project Developers

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Opportunity Tune as per Products & Services of Project Developers				Final Scorecard as per Screening Criteria for Project Developers		
Products and Services	Proportion of total CAPEX	CAPEX for a Generic 500 MW OSW Plant	Relative Opportunity			
Development Services (P1.1)	XX%	INR. XXXX Million	High Opportunity Tune	OSW Project Market Value	The development services account for 3.5% of total CAPEX amounting to INR. 5400 Million	
Environmental Surveys (P1.2)	0.6%	INR. XXX Million	Average Opportunity Tune	OSW Sector Expertise	In India, as a country there are host of developers which have expertise in developing onshore wind plant which can be transformed for OSW plant as well	
Met Station (P1.3)	X%	INR. XXX Million	Average Opportunity Tune	Potential to reduce Cost of Energy	Through project developers the potential to reduce cost of energy is greater than 0.5%	
Geophysical Surveys (P1.4)	0.4%	INR. XXX Million	Average Opportunity Tune	Barriers to Entry	Investments required in this segment is low and very few companies in India can offer a full range of services	
Geotechnical Surveys (P1.5)	1.4%	INR. XXXX Million	Average Opportunity Tune	Final Result	There exists excellent potential in this segment of value chain	
FEED (P1.6)	X%	INR. XXX Million	Relatively Low Opportunity Tune			
Total	6.5%	INR. XX Billion				

Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Source: enincon research & analysis

01. OEM Suppliers:- The level of opportunity associated as per the listed services and products by OEM suppliers and final score card is as shown in Exhibit 05

Exhibit 05: Opportunity Tune & Score Card as per Products & Services of OEM Suppliers

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Opportunity Tune as per Products & Services of OEM Suppliers				Final Scorecard as per Screening Criteria for OEM Suppliers	
Products and Services	Proportion of total CAPEX	CAPEX for a Generic 500 MW OSW Plant	Relative Opportunity		
Nacelle Bed Plate (O1.1)	X %	INR. XXXX Million	High Opportunity Tune	OSW Project Market Value	The OEM Supply services account for 26% of total CAPEX amounting to INR. 43 Billion
Yaw systems (O1.2)	2%	INR. XXXX Million	Average Opportunity Tune	OSW Sector Expertise	In India, as a country there are host of OEM suppliers which have supplied in developing onshore wind plant which can be transformed for OSW plant as well
Drive Train (O1.3)	x%	INR. XXXX Million	High Opportunity Tune	Potential to reduce Cost of Energy	Through project developers the potential to reduce cost of energy is greater than 1%
Rotor Systems (O1.4)	2%	INR. XXXX Million	Average Opportunity Tune	Barriers to Entry	Investments required in this segment is high and host of companies in India can offer a full range of services
Power Conversions (O1.5)	2%	INR. XXX Million	Average Opportunity Tune	Final Result	There exists exploitable potential in this segment of value chain
Tower (O1.6)	x%	INR. XXX Million	High Opportunity Tune		
Transition Piece (O1.7)	0.6%	INR. XXX Million	Average Opportunity Tune		
Support Structure (O1.8)	X %	INR. XXXX Million	High Opportunity Tune		
Additional Components(O1.9)	0.4%	INR. XXX Million	Relatively Low Opportunity Tune		
Total	30%	INR. XXX Billion	High Opportunity Tune		

Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Source: enincon research & analysis

E1. Electrical Infra Provider:- The level of opportunity associated as per the listed services and products by Electrical Infra Provider and score card is as depicted in Exhibit 06.

Exhibit 06: Opportunity Tune & Score Card as per Products & Services of Electrical Infra Providers

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Opportunity Tune as per Products & Services of Electrical Infra Providers			
Products and Services	Proportion of total CAPEX	CAPEX for a Generic 500 MW OSW Plant	Relative Opportunity
Array Cable (E1.1)	1.9%	INR. XXXX Million	Relatively Low Opportunity Tune
Export Cable (E1.2)	Xx %	INR. XXXX Million	Average Opportunity Tune
Off-Shore Substation (E1.3)	X %	INR. XXXX Million	High Opportunity Tune
On shore Substation (E1.4)	2.5%	INR. XXXX Million	Relatively Low Opportunity Tune
Total	Xx 2%	INR. XX Billion	High Opportunity Tune

Final Scorecard as per Screening Criteria for Electrical Infra Providers		
OSW Project Market Value	The Electrical Infra Providers account for 14% of total CAPEX amounting to INR. 22 Billion	High Opportunity Tune
OSW Sector Expertise	In India, as a country there are host of Electrical Infra Providers which have supplied in developing onshore wind plant which can be transformed for OSW plant as well	Average Opportunity Tune
Potential to reduce Cost of Energy	Through project developers the potential to reduce cost of energy is greater than 1%	High Opportunity Tune
Barriers to Entry	Investments required in this segment is high and very few companies in India can offer a full range of services	Relatively Low Opportunity Tune
Final Result	There exists excellent potential in this segment of value chain	High Opportunity Tune

Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Source: enincon research & analysis

EP1. EPC Companies:- The level of opportunity associated as per the listed services and products by EPC Companies and final score card is shown in Exhibit 07.

Exhibit 07: Opportunity Tune & Score Card as per Products & Services by EPC Companies

ANALYTICAL

Opportunity Tune as per Products & Services of EPC Companies				Final Scorecard as per Screening Criteria for EPC Companies	
Products and Services	Proportion of total CAPEX	CAPEX for a Generic 500 MW OSW Plant	Relative Opportunity		
Support Structure Installation (EP1.1)	6.2%	INR. XXX Million		OSW Project Market Value	The EPC Companies account for 21% of total CAPEX amounting to INR. 33.7 Billion
Turbine Installation (EP1.2)	X %	INR. XXX Million		OSW Sector Expertise	In India, as a country there are host of EPC Companies which served for developing onshore wind plant which can be transformed for OSW plant as well
Array Cable Lay (EP1.3)	3.7%	INR. XXX Million		Potential to reduce Cost of Energy	Through project developers the potential to reduce cost of energy is greater than 1%
Export Cable Lay (EP1.4)	Xx %	INR. XXX Million		Barriers to Entry	Investments required in this segment is high and host of companies in India can offer a full range of services
Off shore Substation Installation (EP1.5)	0.9%	INR. XXX Million		Final Result	There exists excellent potential in this segment of value chain
Construction on Port (EP1.6)	1.1%	INR. XXXX Million			
On shore Substation Installation (EP1.7)	0.6%	INR. XXX Million			
Total	XX%	INR. 33.72 Billion			

Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Source: enincon research & analysis

OP1. OPEX Utilising Value Chain Providers:- The level of opportunity associated basis per annum as per the listed services and products by Discoms, Transmission Service Provider and Port & Marine authorities and final score card are shown in Exhibit 08

Exhibit 08: Opportunity Tune & Score Card as per Products & Services for OPEX utilising Value Chain Providers

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Opportunity Tune as per Products & Services of OPEX Utilising Value Chain Providers			
Products and Services	Proportion of total OPEX	OPEX for a Generic 500 MW OSW Plant	Relative Opportunity
Replacement of Equipment (OP1.1)	Xx %	INR. XXX Million/Year	High Opportunity Tune
Personnel Transfer (OP1.2)	9%	INR. XXX Million/Year	Average Opportunity Tune
Skilled Technicians (OP1.3)	X %	INR. XXX Million/Year	Average Opportunity Tune
Installation/Repair Vessels (OP1.4)	6%	INR. XXX Million/Year	Average Opportunity Tune
O&M Ports (OP1.5)	5%	INR. XXX Million/Year	Average Opportunity Tune
Grid Maintenance & Other Cost (OP1.6)	Xx %	INR. XXX Million/Year	High Opportunity Tune
Total	100%	INR. X Billion/Year	

Final Scorecard as per Screening Criteria for OPEX Utilising Value Chain Providers		
OSW Project Market Value		Replacement of Equipments account for 51% which is equivalent to INR. 2040 Million/Year
OSW Expertise	Sector	In India, as a country there are host of service providers in this category which served for O&M of onshore wind plant which can be transformed for OSW plant as well
Potential to reduce Cost of Energy		Through project developers the potential to reduce cost of energy is greater than 1%
Barriers to Entry		Investments required in this segment is low and host of companies in India can offer a full range of services
Final Result		There exists excellent potential in this segment of value chain

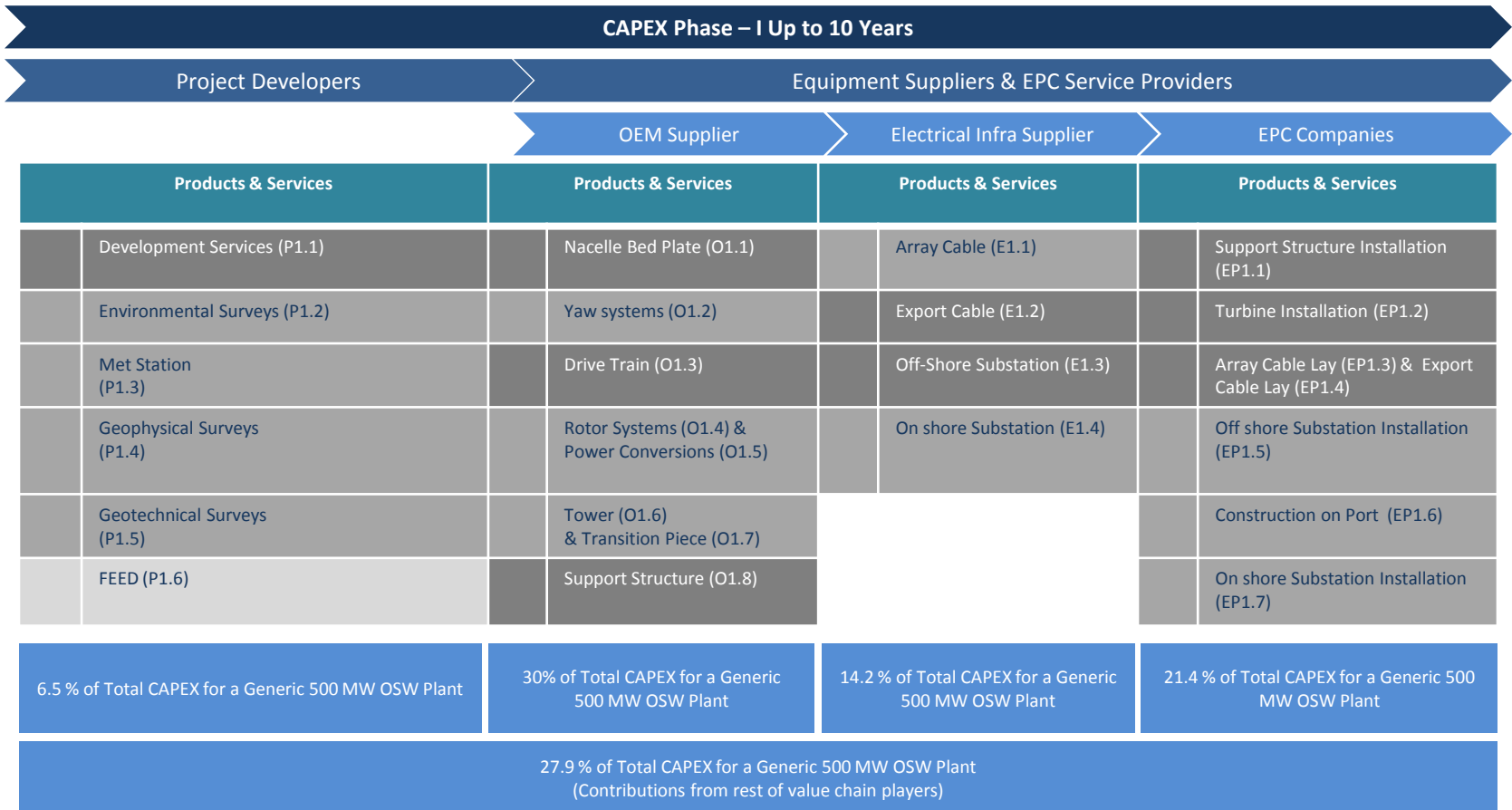
Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Source: enincon research & analysis

Final Opportunity Matrix – CAPEX Phase – I Utilising Players

Exhibit 09: Final Opportunity Matrix – CAPEX Phase – I Utilising Players

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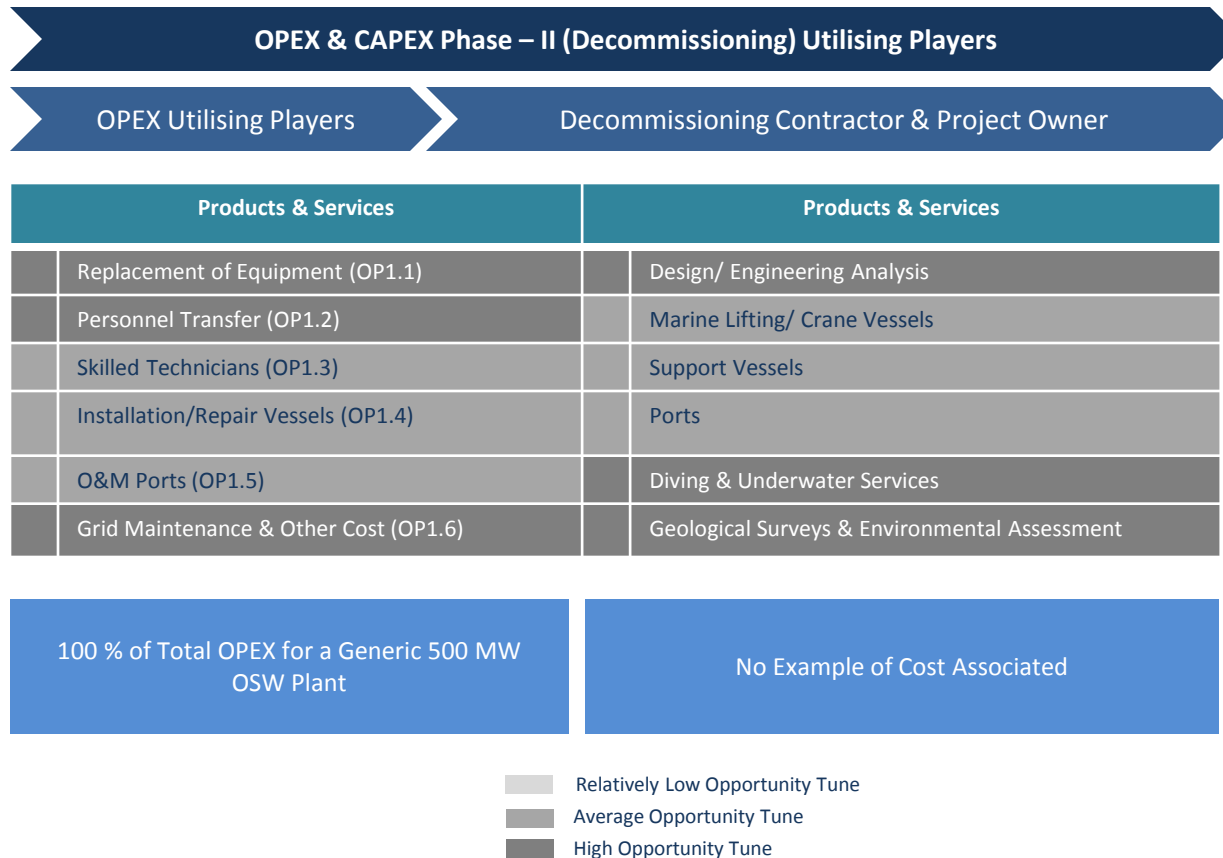
Source: enincon research & analysis

Relatively Low Opportunity Tune
 Average Opportunity Tune
 High Opportunity Tune

Final Opportunity Matrix – CAPEX Phase – I Utilising Players

Exhibit 10: Final Opportunity Matrix – CAP OPEX & CAPEX Phase – II (Decommissioning) Utilising Players

ANALYTICAL



Source: enincon research & analysis