EU-India Clean Energy and Climate Partnership Virtual Roundtable on Offshore Wind focusing on Indian Offshore Port Infrastructure

Delegation of The European Union to India

Offshore Wind: Key Port Infrastructure Lessons from FOWPI

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

Background

- The offshore port assessment carried out under FOWPI study- **"Supply Chain, Port Infrastructure and Logistics Study for offshore wind farm development in Gujarat and Tamil Nadu[1]"** provides deep insights pertaining to requirements at Indian ports necessary for developing an offshore wind farm and their respective O&M

- Additionally, the study analyzes the existing port readiness of critical ports in these states for offshore uptake, further verified through site visits by European experts

- Furthermore, a second report -**'Supply Chain Study for Offshore Wind in India[2]'** (EU-India Policy Dialogue Project) also provided key recommendations on the port infrastructure for offshore wind uptake

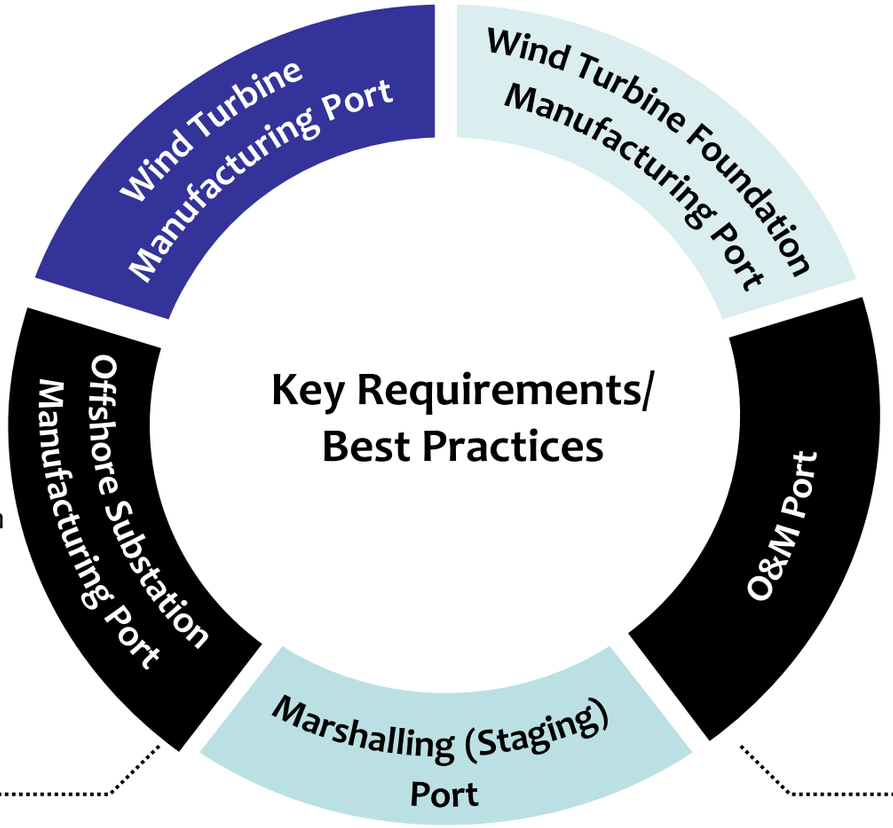
https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

https://www.gwec.net/wp-content/uploads/vip/Fowind-study-report_29-06-2016_pages_JWG-update_v2.pdf

Key Infrastructure Requirements for Offshore Ports

Ports need to be strategically evaluated on a case-by-case basis for most feasible operation/s –Manufacturing, O&M and Marshalling as different operations and components have different handling and storage requirements

- Workshops- – large inside facilities for blade, tower, and nacelle fabrication/assembly
- Storage areas- with sufficient bearing capacities and area to meet supply chain
- Quayside – with suitable access and depth for vessels
- Cranage – For fabrication and load-out of components



- Fabrication shops – very large internal workshops for fabricating, including controlled environments for cutting, rolling and welding
- Coating shops – large internal environments for blasting and painting offshore structures
- Storage areas – with sufficient bearing capacities Quayside – with suitable bearing capacities, access and depth for vessels
- Cranage – sufficient for fabrication and load-out
- Suitable supply chain for high grade offshore steels

- In terms of facility requirements-very similar to foundation manufacturing ports, but with larger bearing capacity and load-out requirements given the significant mass of these structures

- 100% accessibility is necessary for an O&M port
- Based on European experience, a building at the port of at least 300 m^2 is needed for storage of spare parts and a small workshop
- Port facilities used for major intervention must be able to accommodate the jack-up barges used in the industry (130 m LOA, 12 m draft).

- Intermediary port- uses a combination of cargo vessels to optimize windfarm transport and logistics
- CBA is needed to analyze, whether marshalling port makes more economic sense or opting for direct case, by examining cost of fuel, cargo vessels, and port handling.

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

Examination of Port Readiness for Different Ports

A total of 8 ports have been identified as the most lucrative for uptake of different operational activities for offshore wind in Gujarat and Tamil Nadu

Port Name	Distance to Zones	Possible Offshore Port Type Recommendation
Gujarat		
Adani Container Port (Hazira)	Zone D & F - 13 km	• O&M (zones D & F) • Marshalling (WTGs and WTG foundations)
L&T Port (Hazira)	Zone D & F - 20 km	• WTG foundation manufacturing and Offshore substation manufacturing
Bhavnagar	Zone F - 35 km	• Scour protection marshalling during the construction and O&M phases
Pipavav	Zone A, B & C - 23 km, 27 km & 13 km	• O&M (zones A, B & C) , Marshalling (WTGs and WTG foundations) and Offshore substation manufacturing
Port Okha	Zone G - 40 km	• Limited - unless floating marshalling (zones G & H)
Tamil Nadu		
Kattupali	Zone H - 310 km	• WTG foundation manufacturing • Offshore substation manufacturing • Limited further application - vast distance to zones
Chennai	Zone H - 290 km	• Limited application - vast distance to zones
Tuticorin	Zones A, B, C & D - 10 km, 63 km, 25 km & 51 km	• O&M • Marshalling (WTGs and WTG foundations)

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

Key Recommendations for Indian Ports

1. **No single port fully viable:** No single port in Gujarat and Tamil Nadu is currently suitable to facilitate all offshore wind construction activities without some **level of adaptation, restructuring of space or relocation of existing port and birth activity**

2. **Soil strength improvements needed**: Some of the selected ports in Gujarat and Tamil Nadu will require soil strength improvements before they can fully **support offshore wind project construction**

3. **Port Compliance Needed:** International port compliance covering **ISPS[1] compliance** that ensures cargos can be transported internationally and **CSI compliance[2]** for O&M ports that ensures delivery of spares from the WTG manufacturer directly to the O&M facility port would be essential requirement for Indian port

4. **Conversion to O&M Ports not a challenge**: As the load bearing capacity and storage requirements for O&M ports are not that stringent and considerably smaller than those for installation ports, **Indian ports are expected to quickly adapt** to the requirements at an early stage of the Indian offshore wind industry development

5. **Future pipeline consideration to be factored in during development**: To avoid making serial upgrades and improvements to harbor facilities and to optimize work-flow and construction activity in a cost-effective manner**, future demands and OWF development pipelines** should also be taken into consideration when determining port requirements.

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf
ISPS: IMO International Ship and Port Facility Security Code
CSI: Container Security Initiative

Gap Assessment of Training and Skill Building in Offshore Wind Energy Sector in India

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

Background and Objectives of the report

Background -

- The Ministry of New & Renewable Energy notified the National Offshore Wind Policy in October 2015, to realize the Offshore wind power potential in the country.
- To instil confidence in the wind industry, the government also declared a long-term target of 30 GW offshore wind power capacity addition by 2030.
- Development of an offshore wind sector in India will require local training and skill development programs. It is thus relevant to take stock of the current situation with respect to active institutions, available training, key gaps, training requirements in the sector.

Objectives of the report -

- Assessment of the Key institutes active in Wind energy/ Offshore training programs in India
- Identification of the gaps and needed skills in the offshore wind sector value chain i.e., the development phase, construction phase and operation phase
- Mapping of EU's technical expertise in training and capacity building
- Key recommendations to improve the offshore wind sector skill base in India

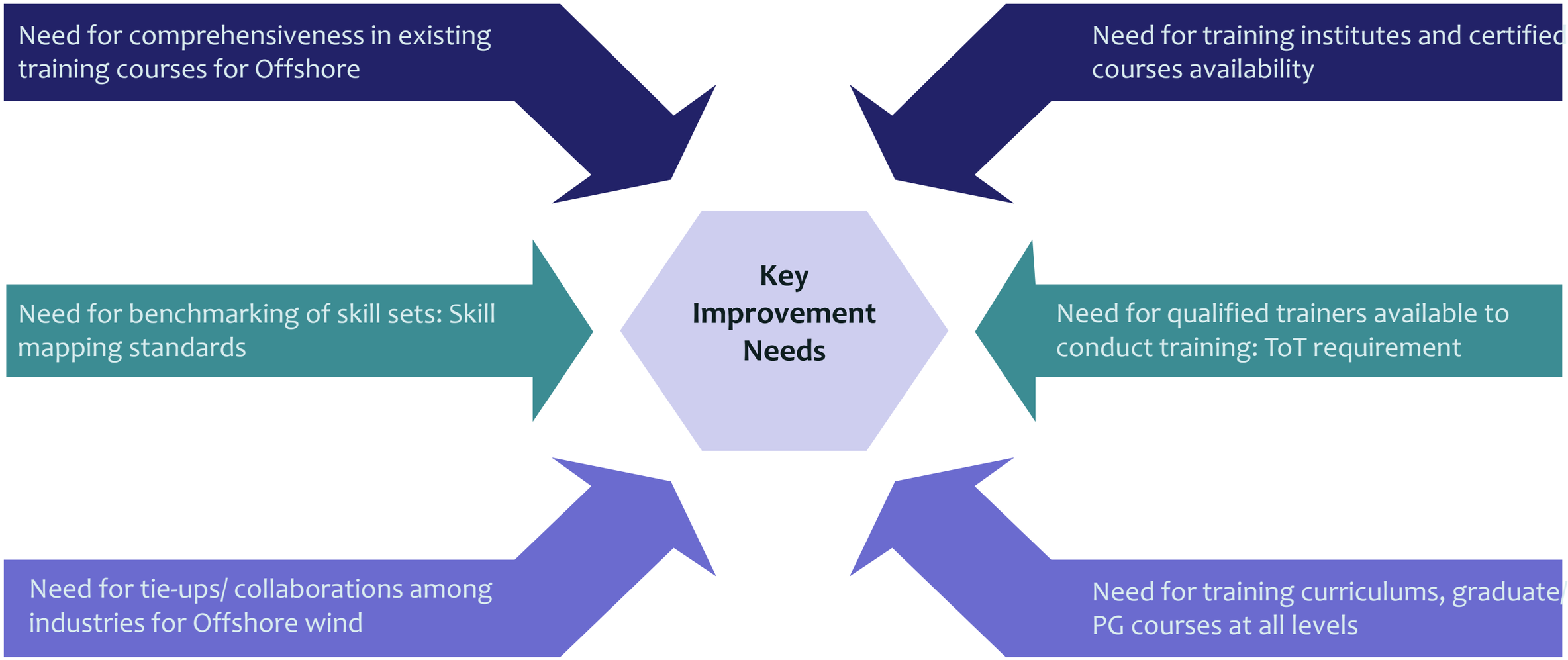
Employment and Skill Mapping Across Offshore Supply Chain

India currently lacks major skills in the construction and operations phase of offshore wind project development

	Key Skills Required	Skill Availability in India	Additional skill/certification requirement	EU based institutions providing training
Development Phase	• Site selection and project development • EIA and Wildlife Survey • Technical and financial feasibility • Wind farm layout and port studies • Geotechnical & geophysical survey • Engineering R&D and design • Tender support	• Skills related to wind and oceanic measurement, geophysical and geotechnical services, bathymetry, seabed engineering, EIA inspection, numerical modelling of offshore structures • Key Institutes: NIWE, INCOIS NIO, IIT Chennai	• Health and Safety "HSE" practices through inclusion of HSE manager with NEBOSH[1] Diploma • Specific Marine and Logistics Certifications[2] for Vessel Master, Vessel Mate and Deckhand and UXO Diver	▪ Focus on Training ▪ Astutis ▪ British Safety Council ▪ Lloyd's Register ▪ The Knowledge Academy
Construction Phase	• Specific skills in core areas of: ➢ Tower manufacturing and supply ➢ Foundation manufacturing and supply ➢ Foundation Installation ➢ Turbine Installation ➢ Array Cable Installation ➢ Installation Support and Logic	• **Most of the skills are absent** • IIT Chennai offers specific skills relating to Installation and design of offshore structures, and subsea engineering	▪ Health and Safety "HSE" practices through inclusion of HSE manager with NEBOSH[1] Diploma ▪ GWO[3] certification for personnel working at sea and height	▪ RelyOn Nutec ▪ Global Wind Academy ▪ Deutsche WindGuard Offshore ▪ Deutsche Windtechnik ▪ FMTC Safety ▪ STC KNRM
Operation Phase	• Specific skills in core areas of: ➢ Wind farm operations ➢ Turbine Maintenance ➢ Structural inspection and maintenance ➢ Maintenance and logistics service	• **Most of the skills are absent**	▪ IRATA certification level (1-3) for personnel working at height ▪ Health and Safety "HSE" practices through inclusion of HSE manager with NEBOSH[1] Diploma ▪ GWO[3] certification for personnel working at sea and height	▪ Altitude Above All Training ▪ RT9 ▪ Skylotec ▪ Vertex Training Solutions ▪ Ascent Safety ▪ Health Safety Expert

1. National Examination Board in Occupational Safety (NEBOSH)
2. Vessel Master: Certification for Seafarers; Vessel Mate and deckhand: Basic Seafarer Training; UXO (unexploded ordnance) Diver: Explosive Ordnance Disposal Qualification, Diver certificate
3. Global Wind Organization

Key Improvement Needs in Offshore Wind Sector Skills in India



Action areas for enhancing offshore skill development framework

- Development of Qualification Packs (QPs) for Offshore Wind
- Institutional level capacity building of certain institutes
- Leverage skills from Offshore Oil and Gas
- Creation of offshore knowledge portal
- Utilization of collaboration opportunities for certification
- Creation of conducive policy environment
- Developing concrete education and training courses at university level
- Utilization of collaboration opportunities for R&D institutional development
- Creation of tools/frameworks for financial institutions
- Share experiences gained with work and peer training

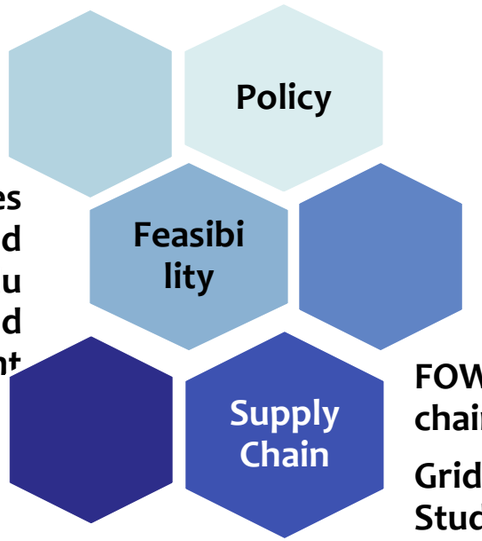
Thank you

Annexures

https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

FOWIND laid the groundwork for offshore wind power development

- ***FOWIND released various reports to help investors to evaluate business opportunity in offshore wind in India***



FOWIND Policy Outlook

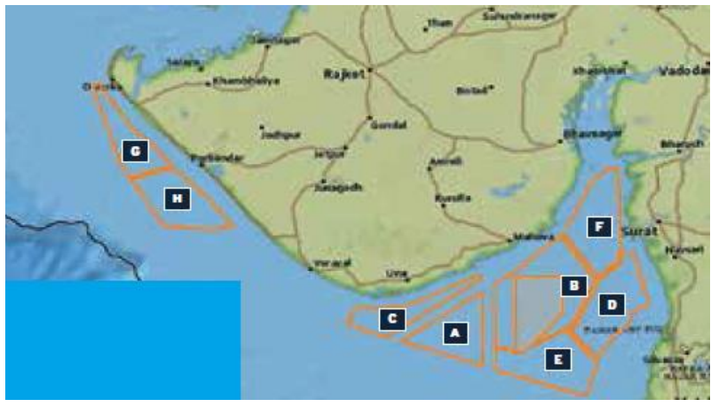
From Zero to 5 GW Outlook of 2032

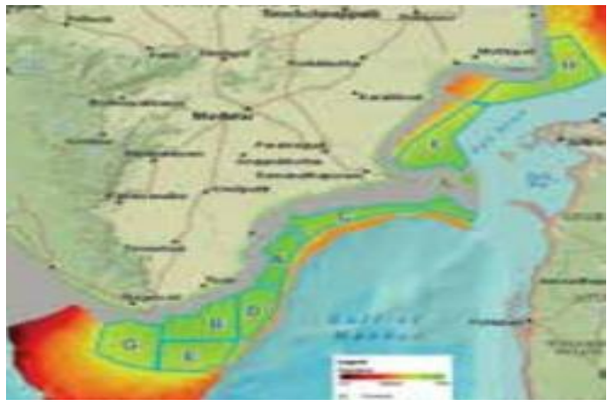
Feasibility studies for Gujarat and Tamil Nadu offshore wind development

FOWIND Supply chain report

Grid Integration Study

- ***The feasibility study for Gujarat and Tamil Nadu cover the following aspects:***
  - Wind resource assessment
  - Wave and current study
  - Geotechnical conditions
  - Selection of potential wind sites
  - Turbine selection
  - Windfarm layout
  - Energy yield estimation
  - Electrical concept
  - Foundation concept
  - Installation and logistics
  - Risks





Wind zones in Gujarat and Tamilnadu

These reports provide a good starting points for private players to further analyse the investment opportunities in Gujarat and Tamil Nadu offshore wind development.

https://www.cecp-eu.in/resource-center/post/fowind-website/home

First Offshore Wind Project of India (FOWPI)

- **FOWPI played an instrumental role in strengthening country's offshore wind sector by providing TA in implementation of 200 MW project near Gulf of Khambhat, Gujarat**
- **FOWPI was led by COWI A/S Denmark with local key-support provided by WinDForce Management Services Ltd and COWI India Ltd involved in the project implementation. The program was well supported by EU, MNRE and NIWE.**
- **The project was successfully completed in 42 months: Jan 2016-June 2019**

Key Focus Areas Covered Under FOWPI
Building of Knowledge Banking & Capacity building
Preliminary drawing of Farm Layout and Energy Yield Estimates
Environmental Impact Assessment- Scoping
Carrying out Geophysical studies
Preliminary foundation design, including appurtenances
Preliminary Electrical Services
Coastal and Onshore identification
Financial Modelling
Permits and Procedures

Key Reports Developed under FOWPI

- Metocean Study Report
- Electrical Design Report
- Wind turbine layout and AEP report
- Environment scoping report
- Coastal and port aspects
- Procedures for offshore
- Weather windows for installations
- Recommendations on EIA framework

https://www.cecp-eu.in/resource-center/post/fowpi-website/home

Offshore wind study tour to the Netherlands and Denmark

- Study tour was organised in Nov 2019 for Indian delegation to Netherlands & Denmark
  - Maasvlakte and Eemshaven port in the Netherlands,
  - Esbjerg port in Denmark.

- Study tour builds upon two key projects in India - FOWIND and FOWPI.

- Study tour focused upon -
  - Firsthand experience from existing installations in Europe,
  - best practices for planning & implementing offshore wind projects,
  - Need for pre-feasibility study of existing port infrastructure & subsequent requirement,
  - Gap analysis covering required skills and identification of possible training supplementing existing training institutes,
  - Mapping of the supply chain in India and identification of gaps / possible synergy with European companies,
  - Support required from policy makers to boost the sector.

- Meetings with European companies to understand their expertise & possible role in Indian context.

- Also participated in the WindEurope Offshore 2019 conference held in Copenhagen.

https://www.cecp-eu.in/resource-center/post/fowpi-website/home

Key Institutes in India and EU

Indian institutes

- NIWE (National Institute of Wind Energy)
- SCGJ (Skill Council for Green Jobs)
- INCOIS (Indian National Centre for Ocean Information Services)
- NIO (National Institute of Oceanography)
- IIT Chennai (Madras)

EU Institutes

Universities and institutes (examples)

- Ghent University
- Vrije Universteit Brussel
- Technical University Denmark
- Aalborg University
- Technical University of Munich
- Carl von Ossietzky University of Oldenburg
- Left University of Technology, Netherlands
- Universiteit Twente
- Frauenhofer IWES Germany
- TNO Netherlands
- DHI Denmark
- MaREI Ireland
- Chalmers University of Technology Sweden

Key Institutes in India and EU

Indian Training Providers

Private training providers

- Elite
- Mærsk
- Sagar

- Synergies with oil & gas sector

EU Training Providers

Private training providers

- Mærsk: Global company within wind
- BFW: Offers vocational education
- Global Wind Academy: GWO certified safety and technical courses
- Danish Wind Power Academy: Courses included optimization of components
- Lucas-Nülle: Training systems facilitating hands-on learning
- Monsson, Renewable Energy School of Skills: GWO and BZEE certified wind energy training programs
- Vulcan Training and Consultancy: Offers GWO certified safety training programs