'It is critical to undertake INFRASTRUCTURE ASSESSMENT STUDIES related to Supply Chain, Grid Infrastructure & Logistics'

Under the Indo European Co-operation on Renewable Energy Programme, the European Union has funded a consortium for implementing the Facilitating Offshore Wind in India (FOWIND) project. This consortium is led by the Global Wind Energy Council (GWEC). Other consortium partners include the Center for Study of Science, Technology and Policy (CSTEP), DNV GL, Gujarat Power Corporation Limited (GPCL) and World Institute of Sustainable Energy (WISE).

Suhas Tendulkar

Mr. Suhas Tendulkar, head, Center for Wind Power, World Institute of Sustainable Energy (WISE) at Pune and Ms. Sandhya Sundararagavan, research scientist, Center for Study of Science, Technology and Policy (CSTEP) at Bengaluru have jointly provided answers to some key questions on offshore wind energy technology, policy and potential based on the analysis conducted under the FOWIND project.

Sandhya Sundararagavan

IWC: What are your views on the recent Offshore Wind Energy Policy announced by the Union government? Do you think India's time has come to take up offshore wind energy?

Ms. Sundararagavan and Mr. Tendulkar: The recent Offshore Wind Energy Policy is a welcome step for the renewable energy sector. India is the fourth-largest in the global onshore wind industry, contributing to 65 per cent of the country's total renewable energy capacity. India has a long coastline and important load centers near the coast, which provide a great opportunity to harness energy from the seas. Offshore wind farms operate at a plant load factor (PLF) of around 30-40 per cent as compared to the onshore wind power plants with 20-25 per cent PLF. With the country facing peak power deficit situations, offshore wind could serve as a potential resource in meeting the energy shortfall. The National Offshore Wind Energy Policy is, therefore, a very good step to promote offshore wind power.

IWC: With offshore wind power costing much more than onshore wind, how prepared do you think is the industry? Can you name the companies that have shown keenness to participate?

Ms. Sundararagavan and Mr. Tendulkar: Costs are a major challenge to the deployment of offshore wind. Based on preliminary calculation, offshore wind-based power costs 3-4 times more than onshore wind-based power. To begin with, it is critical to undertake infrastructure assessment studies covering aspects related to the supply chain, grid infrastructure, and logistics (ports and vessels). Additionally, socio-environmental investigations along with onsite wind measurements should also be undertaken. Supply chain constraints for offshore wind power are different from those in the established onshore wind industry. The development of supply chain capacities, including development of ports and specialised vessels may take time to develop. Therefore, it is necessary to initiate collaboration with experienced international companies to learn from their other offshore wind operations.

In the coming years, cost competitiveness with other resources can also be achieved as has happened in the case of solar. It is a good opportunity for the wind power industry in India to rise to the challenge for manufacturing offshore wind turbines and components. As part of the policy, the government could provide attractive incentives in a phased manner to motivate investors and developers. As the industry matures, hopefully, costs will see a downward trend, as has been observed with other renewable technologies.

Many institutions and consortia are eyeing offshore wind power and have already envisaged plans to develop

offshore wind capacity. A consortium of PSUs could help kick-start project development in this area. Companies such as National Thermal Power Corporation (NTPC), Power Grid Corporation of India Ltd. (PGCIL), Indian Renewable Energy Development Agency (IREDA), Power Finance Corporation (PFC), Power Trading Corporation (PTC) and Gujarat Power Corporation Ltd. (GPCL) have an active role to play.

IWC: In terms of electricity uptake from offshore wind farms, the grid in India is not fully equipped. What constraints do you see there and how can these be ironed out? Please throw light on infrastructure upgrade needed to carry out electricity transmission.

Ms. Sundararagavan and Mr. Tendulkar: Robust and flexible grid is a necessary requirement for most of the renewable energy projects. Integrating large-scale variable wind power with the grid is a challenging task, as it involves grid augmentation as well as modernisation, which would involve high capital expenditure by the Union and State governments. As stated in the National Offshore Wind Policy, adding large capacities of offshore wind generation to the power system would also require reliable integration to the national grid. Feasibility studies need to be conducted for analysing the existing and required evacuation arrangement at the coastal zones with high offshore wind potential. It is necessary to develop suitable evacuation and transmission infrastructure in a timely fashion. Timely implementation of the Green Energy Corridor project could be helpful. Further, availability of different financing options should be ensured by the government to create robust infrastructure for evacuation purposes.

IWC: In terms of regulations and tariff policy, what sort of support do you expect from the government? Should the regulations be in the domain of the CERC or should be left to the State(s) where the landfall is?

Ms. Sundararagavan and Mr. Tendulkar: In the FOWIND study, Gujarat and Tamil Nadu have been recognised as offshore wind-rich potential States. Central and State regulatory bodies, energy departments and nodal agencies could play a significant role in drafting State-specific policies, mechanisms and incentive schemes, which would motivate various stakeholders in the offshore industry. Drafting of regulations and tariff policies could be initiated by the Central Electricity Regulatory Commission (CERC) in the initial stage. The State regulatory authorities and State nodal agencies should actively participate in the process, when multiple States are benefiting from offshore wind farms.

IWC: Considering the vulnerability of offshore wind areas to natural calamities, the suitability of material and technology for power equipment needs to be studied. What has been the assessment so far? Have any estimates been made of the insurance cost of such offshore wind farms?

Ms. Sundararagavan and Mr. Tendulkar: Institutes such as the National Institute of Ocean Technology (NIOT) and IIT Madras have carried out studies on wind-wave loading on substructures and pile-soil interaction in Indian waters. There is considerable experience in this regard with offshore petroleum industry.

Vulnerability to natural hazards cannot be avoided completely. To deal with this, the best practice is to mitigate their effects by better engineering designs that can sustain seismic, wave and wind forces. Wind turbines are more resilient to natural calamities such as earthquakes than nuclear and other conventional power plants. During the Fukushima disaster in Japan, it was the wind farms (onshore and offshore) which incurred much less damage and supplied electricity in the times of crisis. Risks could be mitigated by strengthening turbine designs and grid infrastructure. Comprehensive studies need to be conducted to assess the risk, vulnerability conditions and related insurance costs.

IWC: Different agencies have presented varying estimates of offshore wind power potential for India. Has the data been further validated? (NIWE has measured near-shore wind data at 54 locations along the coast.)

Ms. Sundararagavan and Mr. Tendulkar: As of now, there are no authentic data to validate the satellite-based offshore wind speed measurement stated in various reports. The near-shore wind data does not provide the perfect information about wind resource availability in the sea. In the FOWIND project, India's first offshore measurement campaign using LiDAR is going to be key initiative to gather offshore wind data. The data generated from this campaign will act as a guide for different stakeholders for planning offshore development activities at these sites.

IWC: Which areas have been identified by the government for offshore wind turbine installation from the baseline?

Ms. Sundararagavan and Mr. Tendulkar: The National Offshore Wind Energy Policy of 2015 has identified a wide Exclusive Economic Zone (EEZ) of about 200 nautical miles for exploring offshore wind resource potential. The

policy paves way for offshore wind energy development, including setting up of offshore wind power projects and research and development activities, in waters, in or adjacent to the country, up to the seaward distance of 200 nautical miles (EEZ of the country) from the base line. The depth of the sea bed beyond 12 nautical miles varies across the coastline. For example, the depth of the zones selected in the FOWIND pre-feasibility study varies between 15 meters and 53 meters.

IWC: The offshore wind segment will also require creation of support services infrastructure, specialised turbine installation vessels, skilled manpower to undertake O&M etc. in addition to a strong manufacturing base in India. What are your views on these issues?

Ms. Sundararagavan and Mr. Tendulkar: India is a manufacturing hub for onshore wind turbine components; however, the offshore wind energy supply chain is much more complex. The infrastructure required for developing offshore wind farms is yet to be established. Transportation and installation of huge turbine parts and components will need large cranes, specialised vessels and bulk handling infrastructure at ports. Offshore substations for evacuation of power will also be required.

Indigenous development in foundations and substructures design and manufacturing will be cost effective. However, in the initial phase, existing oil and gas vessels may be used or modified to suit requirements for both construction and O&M phases of offshore wind projects. Specialised vessels for offshore wind project installation could be designed based on the scale of deployment in due course of time.

Further, offshore wind will require skilled professionals and technicians to undertake various activities. The FOWIND project envisages capacity building measures including study tours, research and development collaboration networks and stakeholder workshops for supporting government as well as researchers and private sector in understanding the technicalities of offshore wind power.

IWC: Has any study been conducted on the number of approvals/clearances that would be called for to set up an offshore wind project? Can there be a simplified mechanism to get such approvals?

Ms. Sundararagavan and Mr. Tendulkar: Several approvals from the Union government agencies as well as the respective State agencies will be required. The best way to shorten the approval process will be to identify

zones for offshore wind development early on. This would require collaboration of maritime sectors to develop a spatial maritime planning tool, as has been done in Europe under the SEANERGY 2020 project. Once zones are delineated and vetted by relevant central and State agencies, approval processes can be streamlined through a single window clearance mechanism to minimise the time necessary for approvals.

IWC: Have tariff issues been studied - likely tariff, feed-in tariff methodology, the system of allocation of offshore wind sites, parameters, if bidding or auction method is to be followed etc.?

Ms. Sundararagavan and Mr. Tendulkar: The regulators would have to develop a suitable tariff framework for developing offshore wind farms in India. As a part of FOWIND study, suitable policies, regulatory framework and market mechanisms will be explored. The objective of the FOWIND study is to establish a platform for structural collaboration and knowledge sharing between stakeholders from European Union and India, on offshore wind technology, policy, regulation, industry and human resource development. The project aims to develop an offshore wind outlook and development pathway for India up to 2032.

The World institute of Sustainable Energy (WISE) is a not-for-profit institute established in 2004 in Pune, India. It is committed to the cause of promoting sustainable energy and sustainable development, with specific emphasis on issues related to renewable energy, energy security, energy efficiency, and climate change.

The Center for Study of Science, Technology and Policy (CSTEP) is an Indian not-for-profit research organisation incorporated in 2005 u/s 25 of The Companies Act, 1956. Its vision is to enrich the nation with technology-enabled policy options for equitable growth. CSTEP works in the areas of energy, infrastructure, security studies, materials, climate studies and governance.