UK Science & Innovation Network

Proceedings of the

UK-India workshops on offshore wind energy

Organised by:

UK Science & Innovation Network, India
[Vijay Iyer]

in partnership with:

Knowledge Economy
[Vimal Subramanian, Vishakha Chandhere]

Energy Climate & Growth Unit
[Naman Gupta, Vidya Soundarajan]

UK Trade & Investment
[Milind Godbole, Ashwin Ravindran]

at:

Ahmedabad [February 3, 2014] & **Chennai** [February 6, 2014]
India

TALKS

UK delegates

Mimicking Conventional Generation by Wind Farm Control - Is It Possible?
Prof. Bill Leithead, University of Strathclyde

Asset Management Aspects of Turbine Systems Technology
Dr. Simon Hogg, Durham University

Offshore Floating Wind Turbine Foundations: Overview and Design Methodologies
Dr. Maurizio Collu, Cranfield University

Offshore Wind Resource
Prof. Simon Watson, Loughborough University

An Introduction to the Offshore Renewable Energy Catapult
Dr. Paul Ellsmore, Offshore Renewable Energy (ORE) Catapult centre

The UK's Offshore Wind Industry
Dr. Mark Leybourne, IT Power

Offshore Wind Resource Assessment: Methods and Issues
Andy Oldroyd, Oldbaum Services

10 years, 10 lessons – 10 minutes
Dr. Jack Giles, DNV-GL

India delegates

Offshore Wind Energy Development in India
Shobhit Srivastava, Ministry of New and Renewable Energy (MNRE)

Offshore Wind Energy Potential of Gujarat
Rajendra Mistry, Gujarat Power Corporation Limited (GPCL)

Suzlon Group
Bimlesh Shah, Suzlon Energy Limited

Offshore Wind – An Underwater Perspective
Saurabh Antani, HR Wallingford

Wind Energy
Dr. Ketan Shukla (IFS), Mahatma Gandhi Labour Institute

Preliminary Assessment of Offshore Wind Power Resource in Coastal Areas of Gujarat
Prof. Surendra S. Kachhwaha, Pandit Deendayal Petroleum University

CDM & REC funds – How to secure?
Manish Dabkara, EKI Energy Services Limited

Analysis and Design of Offshore Structures
Dr. S. Nallayarasu, Indian Institute of Technology (IIT) Madras

Centre for Wind Energy Technology
Dr. S. Gomathinayagam, Centre for Wind Energy Technology (C-WET)

Wind Resources Assessment in India
K. Boopathi, Centre for Wind Energy Technology (C-WET)

Feasibility Studies on Offshore Wind Development in India
Dr. M. V. Ramana Murthy, National Institute of Ocean Technology (NIOT)

UK	INDIA
Strengths • First mover advantage • More than a decade of experience • Existing research networks, national facilities, and technology readiness • Advanced manufacturing skills • Well-developed policy, active government support, clear consenting process • Existence of mature onshore and offshore industries • Expertise in oil & gas resourcing • Investment-friendly nation • Meteorological skills • Integration of different aspects of offshore wind energy • Close collaboration within the academic research community through SUPERGEN Wind	**Strengths** • Expertise in oil & gas resourcing • National momentum for adopting renewable energy • A potent combination of mature onshore industry and expertise in offshore oil & gas • Presence of a strong, cost-effective, manufacturing base • Impending national policy on offshore wind energy • Academic (IIT) and research institutes (C-WET, NIOT) • Accelerated development of cost-effective technologies • Availability of diverse climatic conditions for validation of models
Needs • Reduction of costs in operation and maintenance (O&M) • Funding for test facilities, which would be easily accessible to universities • Accessibility to demonstration facilities and ensuing data • Use of high voltage direct current (HVDC) to transfer power from an offshore wind farm to the electrical network on land • Asset management • Understanding resource availability • Floating wind turbines • Designing turbines and foundations	**Needs** • Resource assessment • Data acquisition • Marine spatial planning • Forecasting and surveying • Environmental impact assessment (EIA) studies • Study of subsea soil and undersea marine life • Development of wind turbine technologies suitable for Indian conditions • Collaboration for implementing a pilot project • Condition monitoring • Government incentives for offshore private sector • Grid integration • Macro level resource evaluation

	• Government funded doctoral training programs • Creation of a singular node for data collection from institutions such as Indian National Centre for Ocean Information Services (INCOIS), NIOT, C-WET, Navy • Condition health monitoring of offshore structures in water

UK-INDIA COMMON RESEARCH NEED

- Joint database to record the following items:
- failure rates and down-times
- cost effectiveness
- trouble shooting
- scheduling
- grid integration

POTENTIAL AREAS FOR COLLABORATION

- Wind resource assessment
- Resource mapping (wind, geotechnical)
- Manufacturing of wind turbine components
- Designing offshore turbines
- Floating wind turbines
- Marine spatial planning
- Technologies for wind measurement
- Development of vertical axis wind turbines
- Virtual designing of offshore wind farms
- Array layouts for turbines and measurement of expected wake losses
- Buoy-mounted LiDARs for cost-effective measurement
- Energy modeling
- Asset Management
- Mapping of the entire value chain
- Policy development (*ongoing*)
- Implementation of a pilot project
- Water acoustics
- Impact of offshore wind farms on the marine ecosystem
- Modeling the impact of wind turbines on radars and mitigation thereof
- Offshore networks and grid integration

POTENTIAL ISSUES IN COLLABORATION
• Gaps in policies • Intellectual property • Cost differential • Time differential • Climatic conditions • Funding mechanisms • Establishment of credentials • Identification of common goals • Differences in skill sets • Funding appetites of industry and government
GENERAL COMMENTS
• Pilots in India need to take a long term perspective into account • SUPERGEN Wind consortium could help India with its immediate needs – resource assessment, policy, condition monitoring, and asset management • ORE Catapult centre might consider supporting the implementation of a pilot in India for the joint generation of data • Marine industry needs to be inducted into the realm of offshore wind energy • Cost of energy needs to be minimised to instill confidence in Indian stakeholders

ACTION ITEMS

Immediate

- **Reciprocal visit**
  A 2-3 member Indian delegation could visit the UK for 3-4 days in March 2014 during which, the delegation would attend the General Assembly meeting of SUPERGEN Wind on March 20, 2014 (venue – tbd) and tour the relevant facilities at the University of Strathclyde and National Renewable Energy Centre (NAREC) in Northumberland.

Near Term

- **'Associate Partner' status**
  The academic partners of the SUPERGEN Wind consortium will determine if C-WET could be accorded an 'associate partner' status with the evolution of the consortium as a hub starting April 2014. The EPSRC will need to approve the grant of such status. Also, CWET would

need to procure clearance from the MNRE prior to being associated with SUPERGEN.

- SUPERGEN Wind consortium could enter into a Memorandum of Understanding (MoU) with C-WET and NIOT to facilitate the exchange of expertise and personnel.
- SUPERGEN Wind consortium could hold outreach, education, networking, and training events in India.
- Relevant Indian stakeholders could be invited to the 6-monthly General Assembly meetings of the SUPERGEN Wind consortium.
- Exchange of academic visitors between the two countries could be facilitated through the SUPERGEN, **contingent** upon the availability of relevant funding sources in each country.
- The UK could assist India in developing **pilot** offshore wind projects with the aim of jointly generating data for understanding and strengthening the offshore wind energy sector in India. However, it was acknowledged that the offshore activity in India lay in its exclusive economic zone (EEZ); also, the coastal waters along the peninsula are sensitive from the viewpoint of the Department of Defence. Consequently, accessibility might be a challenge, which could be addressed through bilateral dialogues at the ministerial level.
- Exchange of students and visiting researchers between Indian institutions and academic partners in the SUPERGEN could be explored.
- UK-India research collaborations could be invoked through the Grand Challenges competition organised by the EPSRC.
- Short placements or recruitment of students from India into the Doctoral Training Centre in Wind Energy Systems programme
- UK based organisations could collaborate with the fund recipients (2013) of the Indo European Cooperation on Renewable Energy programme - Global Wind Energy Council (GWEC), Center for Study of Science, Technology and Policy (C-STEP), DNV-GL, Gujarat Power Corporation Limited (GPCL), and World Institute of Sustainable Energy (WISE).

- Gujarat Energy Research & Management Institute (GERMI), India expressed interest in setting up a centre of excellence for offshore wind energy research in Gujarat.

TESTIMONIALS OF UK DELEGATES
"There seems to be a strong will in India to move wind power offshore but the next steps are uncertain. After visiting a number of institutes and talking to researchers, there is clearly relevant expertise and knowledge in the country. The UK has a good lead in offshore wind power development and has learnt a lot from the early offshore wind farms. I am confident that we have much to offer both from the academic side through centres such as the Supergen Wind consortium and from drawing on UK industrial expertise. It should be stressed that the UK also has something to learn from future cooperation with India and has the opportunity to develop more innovative and cost-effective solutions for offshore wind energy." **Prof. Simon Watson, Loughborough University** *"My first ever visit to India was a great experience, both personally and professionally. The workshops and visits to facilities were an excellent way for me to understand the offshore renewables expertise, capabilities and potential in India. I have made contacts that I am sure I will maintain and develop."* **Dr. Paul Ellsmore, Offshore Renewable Energy (ORE) Catapult centre, Glasgow** *"It was most stimulating to hear first-hand about India's ambitions in Wind Energy. The enthusiasm of everybody we met was very evident. I came away from the discussions convinced that future collaboration in Wind Energy research between the UK and India would be very useful and that both parties could gain much."* **Prof. William Leithead, University of Strathclyde**