

Offshore wind and the energy transition

Chaired by: Damon Sunderland, Arup

Tim Sawyer, Director and Vice President - Asia, Flotation Energy

Offshore wind is a mature industry that has seen rapid technological development and cost reductions, leading to some 18GW of installed capacity in 17 countries. This rapid growth has been driven by a transition away from traditional thermal electricity generation, the need for energy security and increasing energy demand. This presentation will provide a developer's perspective on the global offshore wind industry, including Australia as an emerging market, with examples from both fixed and floating offshore wind. This presentation will draw upon the experience of Flotation Energy, a UK based developer of offshore wind projects, in consenting and constructing major fixed and floating offshore wind projects. More recently, Flotation Energy developed what will be the world's largest floating windfarm - the Kincardine Offshore Windfarm, near Aberdeen, Scotland.

Offshore geotechnics for renewable energy developments - overview of UWA research activities

Britta Bienen, Associate Professor, UWA

The shift to energy generation from renewable sources is underway globally. Geotechnical engineering for offshore renewable energy installations poses many interesting new challenges. While lessons from the offshore oil and gas industry have been useful for the emerging offshore renewable energy industry, there is a limitation to transferability due to the differences in challenges. This includes the environment (water depth, seabed conditions), loading regimes (large number of cyclic loads in combination with low self-weight, multi-directional cyclic loading), design considerations (performance under fatigue and serviceability criteria, extreme loading) and foundation optimization over large numbers of renewable energy devices. This presentation will provide an overview of UWA research activities focusing on offshore geotechnics for renewable energy developments, touching on examples from a range of ongoing research projects related to offshore wind & wave energy generation.

Renewables in the Asia Pacific – a new frontier

Chris Meecham, Principal Geoscientist, Fugro

Offshore renewables have contributed to the global energy budget for three decades but are relatively novel in the Asia Pacific region (APAC). This new frontier is providing fresh challenges in terms of foundation solutions; challenges that stem from ground conditions, geohazards and metocean conditions that are local to the region. Despite the challenges, proven foundation concepts are being rolled out across APAC. Successful implementation of these concepts in APAC is dependent on geoscientists, geotechnical and design engineers working together to improve data collection, site characterisation, and design and installation assessments. In this manner, project risk can be best understood and mitigated through adequate data acquisition, diagnostic site evaluation, appropriate engineering and fit-for-purpose asset management. We present this multi-disciplinary approach.

Applications of machine learning for efficiencies in offshore wind foundation design

Laith Tapper, Senior Engineer, NGI

Offshore wind farms often require ground characterisation over extensive site areas and can consist of wind turbines numbering in the hundreds. Accordingly, particular emphasis is being placed on exploring efficiencies to reduce site characterisation, foundation and installation costs for offshore wind farms. The use of data science techniques and machine learning models is attracting increasing focus in the geo-sciences. This presentation will highlight how such techniques, through examples of application to the prediction of geotechnical properties from seismic data and in foundation installation prediction, can be used to achieve efficiencies in offshore wind foundation design.

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