IGI GEOSCIENCE FACT SHEET

ROLE OF GEOSCIENTISTS IN IRELAND FOR OFFSHORE RENEWABLE ENERGY

Figure 1: Wind farm in the Irish Sea. Source: Alpha Marine

Ireland's Commitment to Climate Action

In alignment with the 2021 Climate Action and Low Carbon Development (amendment) Act, Ireland is committed to reducing greenhouse gas emissions by 51% by 2030 and achieving carbon neutrality by 2050. The electricity sector will facilitate much of the decarbonisation requirement through increased electrification from renewable sources, with renewable energy targets of 80% by 2030. The 2023 National Climate Action Plan outlined a range of actions to achieve this, including at least 5 gigawatts (GW) of offshore wind capacity by 2030, with a further goal of 37 GW by 2050. Assisting this development, the Government launched the National Marine Planning Framework, Ireland's first comprehensive marine spatial planning framework. These offshore projects have the potential to add at least €38 billion to the Irish economy[1].

Geoscientists play a significant role in the development, implementation, and management of offshore renewable energy projects in several ways, including:

Site Selection and Characterisation

The analysis of geological, geophysical, and oceanographic data is conducted to identify suitable locations for offshore wind farms with stable seabed conditions, favourable water depths, minimal geological hazards, and low environmental risks. This includes use of national seabed data (such as INFOMAR) with supplementary site-specific survey data. This process helps de-risk the project and increase suitability and lifespan of the installations. Geological data is also used to determine the most suitable routes for subsea cables that connect offshore installations to onshore infrastructure.

[1] https://windenergyireland.com/images/files/web-bvg-report-jan-2024.pdf

Figure 3: Offshore wind foundation types with fixed bottom in shallower water and floating in deeper water. Illustration by Joshua Bauer, NREL 49055

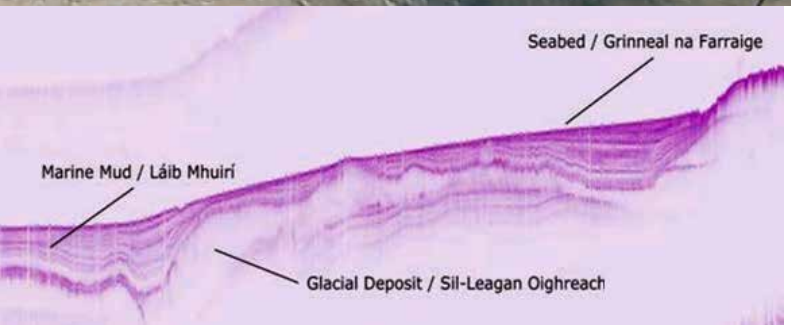

Figure 2: Sub bottom profile of sediment layers beneath the seabed off Donegal. Seismic profiles like this can be used to position turbines in suitable substrate. Source: Rodinia Consulting / INFOMAR

Geotechnical Studies

Geotechnical investigations are conducted to understand the composition, strength, and stability of seabed sediments at selected sites. This information is crucial for designing appropriate foundation systems that can support offshore wind turbines or other associated infrastructure. Technical analysis is provided to engineers to design foundations to ensure installed infrastructure can withstand the challenging marine environment.

Geohazard Assessment and Risk Management

Geological hazards, such as shallow gas, submarine landslides or fault lines, pose risks to offshore renewable energy projects. The identification and assessment of these hazards is critical to project success. Existing industry survey data and INFOMAR geophysical data provide an extensive baseline dataset to assist with the targeting of additional, site-specific data. Geological data must be analysed to contribute to risk assessment and management strategies that enhance the safety and resilience of installations.

Regulatory Compliance, Monitoring and Maintenance

Offshore renewable energy projects must meet geological and environmental standards at planning, construction, operational and decommissioning stages. Geoscientists provide technical expertise and data to support the various regulatory consenting processes, including planning. After project installation, geoscientists monitor ongoing geological conditions and potential changes in the seabed. This information is critical for ongoing maintenance and extending the equipment's longevity.

Research and innovation

With offshore renewable energy in Ireland still in the development stage, geoscience research is fundamental to understand the unique geological and oceanographic conditions specific to the Irish offshore environment and ensure the offshore wind industry is to expand as required by our climate targets.

Geoscientists from industry and academia must collaborate with engineers, environmental scientists, government officials, and other stakeholders to ensure a holistic approach to offshore renewable energy projects that considers technical, environmental, and economic factors. Their contributions will be critical for the successful, sustainable, and environmentally responsible development of offshore wind farms and other renewable energy initiatives.