Call pack 2.1 - Weather forecasting

As part of the Offshore Wind Research and Innovation Programme, EMEC and platinum sponsor West of Orkney Windfarm are looking to fund several innovation projects. Projects in the second innovation call, launched February 2025, must fall under at least one of the two identified themes: **weather forecasting** (call pack 2.1) or **SOV design for turbine access** (call pack 2.2). Applications from consortiums are welcome.

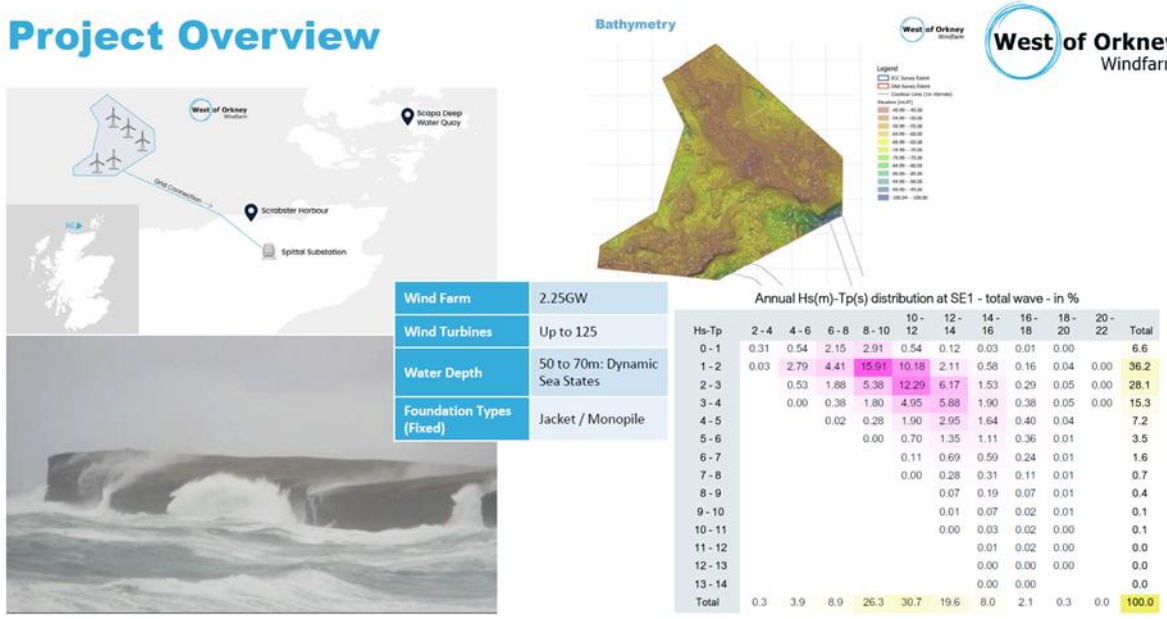
Weather forecasting

Background:

The West of Orkney Windfarm is a fixed bottom offshore wind farm off the North Coast of Scotland; it is exposed to waves from the Atlantic Ocean and is characterised by persistent periods of high wind speeds and sea states (see overview figure below). This is significant for the construction and operational phases because some offshore activities can only be done in the gaps (weather windows) between times of strong wind and/or high waves. There are safety, practical and economic upsides associated with being able to reliably forecast weather windows at short (minutes to hours) to long (weeks, months and seasons) ranges.

The West of Orkney Windfarm therefore wishes to explore techniques to improve the monitoring and forecasting of weather windows at the project site, its cable route, ports and transit routes. This will allow better weather-sensitive operational decisions to be made during surveys, construction, and operations and maintenance (O&M).

The Offshore Wind Research and Innovation Programme has already contracted several projects (see call 1 winners press release). Applications to this call should be cognisant of these current projects and ensure that the new work proposed is substantially different from the current projects (however, new applications may build on, link with, or utilise the expected results of the current projects).



Hs-Tp	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14	14 - 16	16 - 18	18 - 20	20 - 22	Total
0 - 1	0.31	0.54	2.15	2.91	0.54	0.12	0.03	0.01	0.00		6.6
1 - 2	0.03	2.79	4.41	15.91	10.18	2.11	0.58	0.16	0.04	0.00	36.2
2 - 3		0.53	1.88	5.38	12.29	6.17	1.53	0.29	0.05	0.00	28.1
3 - 4		0.00	0.38	1.80	4.95	5.88	1.90	0.38	0.05	0.00	15.3
4 - 5			0.02	0.28	1.90	2.95	1.64	0.40	0.04		7.2
5 - 6				0.00	0.70	1.35	1.11	0.36	0.01		3.5
6 - 7					0.11	0.69	0.59	0.24	0.01		1.6
7 - 8					0.00	0.28	0.31	0.11	0.01		0.7
8 - 9						0.07	0.19	0.07	0.01		0.4
9 - 10						0.01	0.07	0.02	0.01		0.1
10 - 11						0.00	0.03	0.02	0.00		0.1
11 - 12							0.01	0.02	0.00		0.0
12 - 13							0.00	0.00	0.00		0.0
13 - 14							0.00	0.00			0.0
Total	0.3	3.9	8.9	26.3	30.7	19.6	8.0	2.1	0.3	0.0	100.0

Call aims:

To improve the quality of weather forecasts (and specifically weather windows) from advances in live weather forecasting, machine learning, and artificial intelligence. This means predicting the weather conditions and weather windows on site and en route more reliably and/or further in advance, so that the actual weather windows can be better utilised, and the opportunities and risks associated with marginal and/or short weather windows better managed. This may require the integration of live metocean measurements.

Priorities: Your application must include/deliver:

- A comprehensive description of your innovation, the stage of the innovation (concept (TRL1-3), basic validation (TRL4-5), prototype demonstration (TRL6-7)), how it compares to current practice*, and how it addresses this specific innovation call.**
- A description of how your innovation would be implemented in a wind farm project such as the West of Orkney Windfarm, and how it would reduce the time, cost, and/or risk of delivering the project, and/or increase generation revenue.
- A description of Scottish and UK benefit, including impact on supply chain capacity.
- Tailored solutions specific to the West of Orkney Windfarm (applicability to other projects is welcome).
- A description how your organisation will deliver your project, including risks, mitigations, and any key dependencies.
- A statement explaining why grant funding is required for your innovation, and of any match-funding, in-kind, or other contribution that you are willing to contribute, as set out in the Scope and Guidance document.

* Applicants should demonstrate knowledge of the current and emerging techniques used for weather forecasting, as applied in the offshore wind sector and more widely.

** This call is targeting innovations at the more advanced TRL and applications focussed on later stage TRL innovations which can deliver significant benefits in one year will be favoured.

Examples:

- Demonstration of improved weather forecasts by using AI / machine learning.
- Innovative techniques to improve the successful prediction of weather windows at short, medium, or long timescales.
- Integration of forecasted wave spectra to go/no-go forecast.
- Techniques for making better use of forecast uncertainty.
- Improvements to forecasts by using far field wind and wave measurements.
- Use of satellite products to visualise or improve weather forecasting and interpretation.
- Downscaling and coupling of ensemble forecasts.
- Other advanced modelling and prediction techniques; predictions vs actual analysis.

Additional information: Further publicly available information, including on the wind, wave and current conditions at the West of Orkney Windfarm, can be found at https://www.westoforkney.com/document-library. If there is more information that would be beneficial to inform your innovation that the West of Orkney Windfarm might already hold, please provide a detailed description to emec@offshoreinnovation.scot. If such information is not already held but is essential for developing your innovation, please include within your application where such information might be obtained and at what cost.