For safe and efficient operations, it is important that all the disparate project stakeholders have the same situational awareness to make the right decisions at any time

Wave measurements to reduce risk, costs and emissions

Providing live sea state insights allows offshore wind operators not only to be better informed about weather-sensitive operations, but also access to sea conditions in real-time is also crucial for improving safety, cost saving and the environment. The wind industry moves further out and pushes its boundaries of operation toward deeper waters and harsher environments, which demands an increased focus and commitment to enhance the safety of the people who operate and maintain these assets.

Reliable and accurate wave and weather data is essential for ensuring the safety of staff, as well as the integrity of assets and we must work on minimising risk for the people who operate in one of the most hazardous work environments.

We interviewed Gunnar Prytz, Miros' Chief Technology Officer, to discuss how and why monitoring waves and sea level conditions in real-time are vital to enable better decisions for operations offshore.

PES: Welcome to PES Gunnar. It's great to have you with us. For readers who may be unfamiliar with your company, can you give a brief introduction to Miros and your fit within the wind energy industry?

Gunnar Prytz: Miros is a technology company specialising in measuring the ocean surface, providing sensors and systems for environmental monitoring to the global offshore and maritime industry. We provide accurate, real-time data for weather-sensitive operations offshore, as well as valuable input to asset integrity systems and coastal monitoring through our portfolio of sensors. The primary applications include wave and current monitoring and oil spill detection systems.

Miros' journey started nearly 40 years ago, as an offshore research project utilising microwave radars with the company that is now Equinor. Since then, we have been working with some of the largest companies in the offshore and maritime industry. That is how we gained our vast experience and this high-demanding industry's trust. Hence, we do not compromise when serving extremely high requirements on quality, performance, accuracy, reliability and security.

We have grown alongside our clients on their energy transition journey and have been providing wave monitoring solutions to the offshore wind market since 2014. Our deep knowledge of working in various offshore markets and their challenging environments, nurtured our technology development as we continuously learned what high-performance sensors and data services are needed to succeed in an offshore milieu. Thus, the transition to supporting offshore wind operators came naturally.

We have been working with a range of clients on both fixed and floating projects, including the world's first floating wind farm. We value our legacy as we have been working with the energy industry from the start and we have the track record to prove it. We are proud of being a trusted partner to our clients and it is this trust and continued collaborative working that has ensured our success as the energy industry has transformed over the past four decades.

PES: What does Miros bring to the offshore wind industry?

GP: Measuring local environmental conditions is critical for the planning and execution of offshore operations.

Traditionally, on offshore wind farms data are siloed into the Construction, Operations, SCADA, IT, Metocean, and Asset Integrity teams. This means that, once the project is operational, it becomes rather cumbersome for data to be shared across both internal teams and external stakeholders like vessel operators and various consultancy companies.

One of our strengths as a supplier and a project partner is that we can connect all the disparate stakeholders through our data platform, Miros Cloud. This is a service offering which is available alongside all our core IoT wave and weather sensors as a subscription, allowing for easy and secure access to real-time sea state data. It is important for everyone to have the same situational awareness to support internal teams' decision-making as well as the planning of future life extensions or bidding for new leasing rounds for example.

While we cannot underestimate the intrinsic value of data, the added value for our clients comes from this holistic image we can offer

to all the involved parties. To help our clients better understand the wave conditions across a site Miros has also developed a brand-new tool called Sensor Placement Optimisation Tool (SPOT).

The methodology embedded ensures that we can advise best installation points for instrumentation in an intelligent way across an offshore wind farm to maximise the value of the solution. Our advanced cloud platform then enables us to easily make data available to all stakeholders, anywhere on any device, in real-time. More importantly, for our customers it comes down to using data to solve real problems. That is why we are focusing on adding applications on top of our data to enable our customers to improve their decision-making.

In addition, we are also working with other service suppliers for these projects and are integrating data both to and from their platforms i.e., marine coordination, weather forecast and even vessel management systems. This all contributes towards enhancing and connecting the digital ecosystem on an offshore wind farm.

There is value in the data we provide, but there is even more value in connecting all the project stakeholders and enabling them to commonly make faster and better-informed decisions about their operations and assets. To boost this dynamic work environment, we will be introducing a new IoT multi-parameter wave sensor to the Offshore Wind Market in 2023.

PES: Do you have any recent case studies you could share with us, as an example of your products in action?

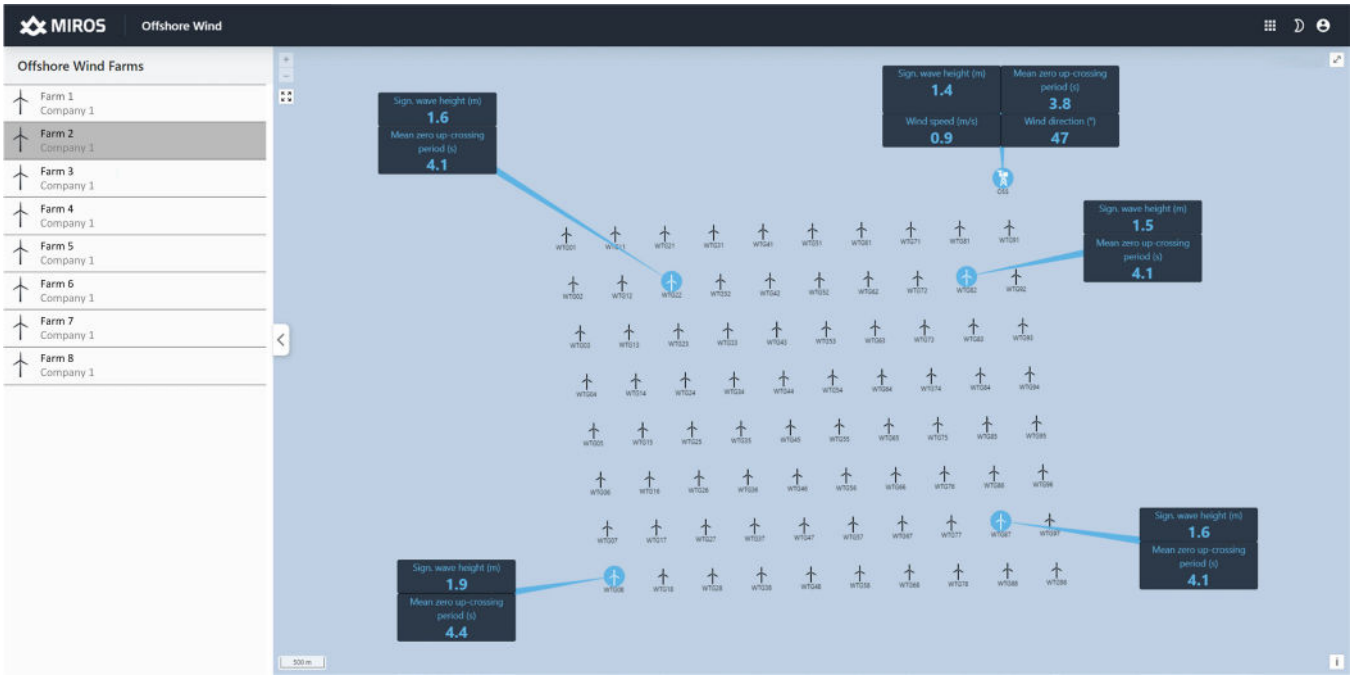
Successfully operating Miros sensors and Cloud solution on several wind farms, the company has now transferred the gathered experiences into the development of a new multi-parameter wave sensor, which will be launched in 2023. Expect streamlined sensor design, smarter functionality as well as tailored cloud dashboards for easy access to the crucial sea state data you need

GP: In the wider offshore community, there is a marked lack of awareness of the economic value of wave measurements, particularly when it comes to having spatially distributed ocean measurement technology installed.

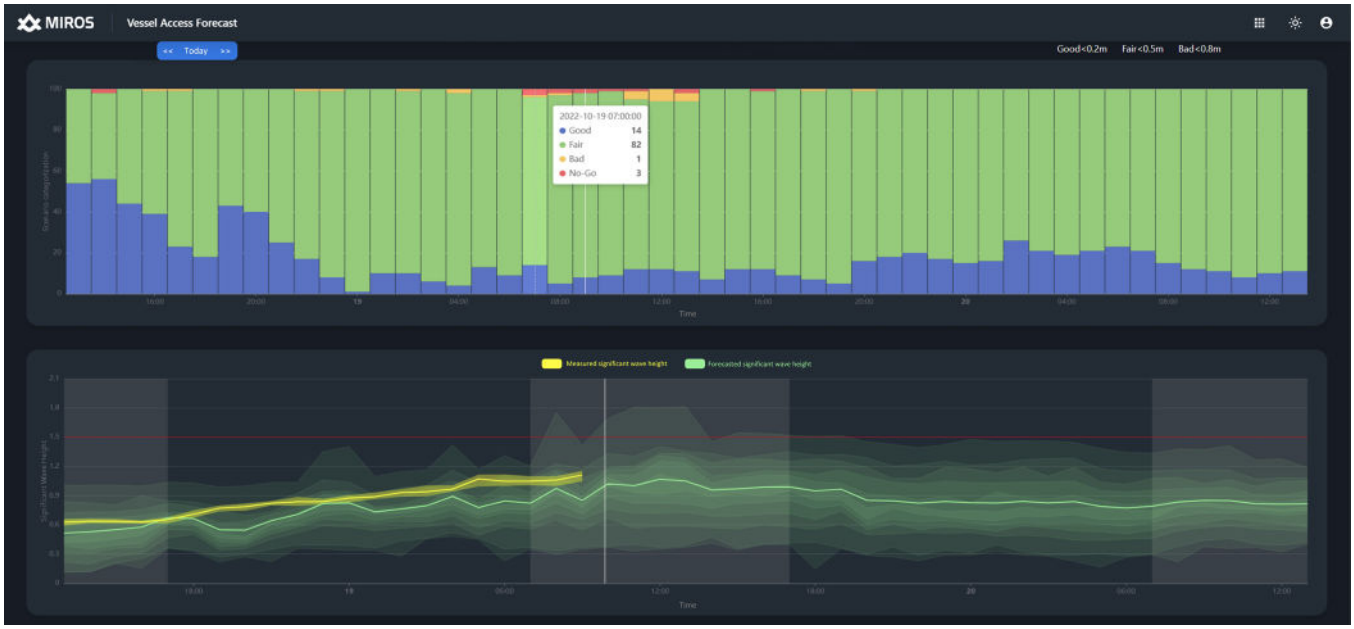
We recently ran a study with Trios Renewables which has provided evidence of the potential benefits of direct wave measurements for offshore wind farms. The model used two case studies, an existing offshore site, a modern Scottish site with seven megawatt turbines, and a ScotWind site expected to be operational by 2030, as a benchmark for the effectiveness of different approaches to measurement.

The first scenario, business-as-usual, assumed wave height (Hs) access conditions were the same at every location across the site while the second, with Miros sensors deployed, used simulated distributed real-time measurements at five sensor locations across the site.

We looked at suitable weather windows, missed opportunities, and successful trips, comparing the results between relying on forecasts and using our sensors for real-time measurements. The main aim was to see if we could reduce turbine downtime and operational costs.



Preview of the new Miros Offshore Wind portal to improve visibility of wave conditions throughout the farm, for improved operational planning and infield decision-making



Preview of a new vessel access forecasting tool using a fusion of environmental and operational data sets to provide the user with a streamlined dashboard that can identify weather windows for go/no go vessel dispatch decisions

The results clearly showed that deployment of sensors at various locations across a site would enable operators to better utilise their opportunities for site visits, leading to potential annual savings of more than £1m.

This benefit would be enhanced even more on a site with digital vessel dispatch planning, which is becoming more prevalent in offshore wind, as a key uncertainty in an optimised schedule is the Hs condition across the farm.

PES: How important is the ability to measure the ocean surface for those in the wind sector?

GP: Hugely important! Many of those directly involved in the operational side of offshore wind recognise the huge importance of site accessibility and the value wave measurement plays in achieving efficient access.

We need to remember that Hs is still the key parameter in terms of decision-making for vessel dispatch. So even if an operator does not use sensors for wave measurement, they will still look at the weather forecast, wind speed and direction when deciding whether to send personnel out on a crew transfer vessel for example.

Having accurate wave data is not only significant in terms of crew safety, but also for optimising efficiency for operations. This ensures that vessels are not sent out unnecessarily, which is obviously incurring costs from a manpower and fuel perspective, but it also increases CO_2 emissions at a time when companies are looking to reduce their carbon footprints.

PES: Where do you see the future of wave measurement for offshore wind?

GP: Throwing out some guiding keywords to characterise the future of wave measurement for this burgeoning industry I would highlight accuracy, transparency and flexibility at first. Very closely followed by scalability, adaptability as well as easy data integration and accessibility.

As projects are moving further from shore and the turbines are becoming larger and larger, the space between turbines also increases. This means that weather conditions can vary dramatically from one side of the wind farm to the other and that, from an operational perspective, planning access to these projects will become more of a challenge.

Also, as the turbine sizes increase, both from a megawatt perspective and from a physical size perspective, it becomes more important than ever to reduce downtime as not only will the commercial implications be massive if they are switched off unnecessarily, but the longer distances between turbines will increase risk in terms of getting there and back safely. It is about enhancing weather windows and driving operational safety in harsh offshore environments and because of that, accurate wave data plays a crucial role.

As the offshore wind industry is poised to experience exponential growth over the coming years, the need to send personnel offshore to conduct the operation and maintenance of those assets, many in more hazardous areas than previously experienced, will also rise. This is an urgent reminder that identifying ways to minimise the risks faced by the workforce must always be a priority.

Therefore, are we constantly investing heavily in research to find the best ways to improve our products to better support our clients and the wider offshore industry. Almost half our staff is involved in the development of our products in one way or another and we are excited to launch a new sensor and new advanced tools next year.

Getting the right data at the right time to inform operational decisions is critical in this picture and that is exactly our focus in Miros as a leading provider of ocean insights.

https://miros-group.com/markets/renewables/

Gunnar Prytz, Ph.D., CTO Miros

Miros' portfolio has undergone a dramatic transformation under Gunnar's keen eye, with IoT-enablement and cloud-integration paving the way for evermore exciting innovations in the field of real-time wave and environmental monitoring.