



Ultra-high-resolution 3D for site characterization

Seismic clarity in offshore site assessment

Gunhild Myhr, Vice President of Business Development & Sales at TGS, shares insights on the groundbreaking capabilities of the Ramform Vanguard and the role of ultra-high resolution 3D seismic in offshore wind development. She discusses how TGS is helping developers minimize risks, reduce costs and speed up timelines in an increasingly competitive and complex market.

PES: Gunhild it's a pleasure to speak with you. Perhaps we could start with a focus on ultra-high resolution 3D (UHR3D), as it's very topical currently. It represents a noteworthy shift in site characterization. How are your clients benefiting in terms of clearer data, risk mitigation and enhanced design assurance?

Gunhild Myhr: Offshore wind projects are time sensitive and with many on tight timelines to meet climate goals and energy security needs, the Vanguard's ability to acquire vast amounts of data quickly, safely and accurately is a competitive edge.

Offshore wind farms are growing in size and complexity and developers, now need multi-layered subsurface insight, provided by such vessels, not just the basic seabed maps.

The Vanguard delivers ultra-high resolution seismic data that helps pinpoint shallow geohazards e.g. gas pockets and buried boulders; sediment layers for foundation design; and ideal routes for subsea cabling.

By combining broad bandwidth with massive streamer spreads, it can map large areas quickly with high vertical resolution, which means less downtime and fewer surprises during construction.

PES: TGS has been making waves with its deployment of the Ramform Vanguard in the North Sea this season. Can you tell us a bit about the vessel, its capabilities and why this moment is such a strategic one for offshore wind site characterization?

GM: The Ramform Vanguard is one of the leading vessels in the renowned Ramform Class, specifically designed for seismic operations. As a state-of-the-art seismic vessel, it is operated by TGS and has recently been deployed in the North Sea to support offshore wind site characterization efforts.

What sets the Ramform Vanguard apart is its innovative design, which ensures exceptional stability during ultra-high resolution 3D (UHR3D) data acquisition. This stability is critical for achieving the high-quality data needed for accurate seabed and subsurface mapping.

By minimizing vessel movement, the Ramform Vanguard not only enhances the precision of the data collected but also increases safety during operations in challenging offshore environments. This combination of cutting-edge technology and robust design makes it an ideal tool for advancing offshore wind development in the region.

PES: Foundation design, cable routing and trenching all depend on the quality of subsurface insight. Where does UHR3D provide the biggest leap in risk reduction or cost certainty?

GM: UHR3D seismic data is becoming the new standard for certain areas as offshore wind site characterization because it directly targets the most risk sensitive parts of project development: foundation design, cable routing, and trenching.

Foundation accounts for a significant share of CAPEX and construction risk. UHR3D can provide high resolution data for shallow geology and clear imaging of sediment layering, buried channels and boulders. Detection of shallow gas pockets can compromise piling or suction caissons.

With UHR3D data engineers can tailor foundation types to more actual soil conditions and reduce risk of overengineering with potentially fewer change orders and design revisions during construction and fabrication. Subsea cables are both critical and vulnerable. UHR3D supports route planning by identifying buried obstacles such as boulders, wrecks, and UXO; mapping seafloor variability and sediment transitions; and detecting small-scale faulting or channel systems that could increase burial risk.

PES: The Ramform Vanguard is widely regarded as one of the most advanced seismic vessels in the world. What makes its current role in the North Sea such a compelling opportunity for offshore wind developers?

GM: The European market is mature when it comes to offshore wind, and the North Sea is one of the most active regions globally for offshore wind development, especially as countries like the UK, Norway, Germany, Belgium and the Netherlands ramp up renewable energy commitments.

There is a need for precision and offshore wind farms require detailed seabed and subsurface mapping to ensure optimal turbine placement, foundation design and cable routing. The Ramform Vanguard is a top-tier seismic vessel; it represents a key moment of convergence between cutting-edge geophysical technology and the growing urgency of the offshore wind transition.

PES: Timing is everything in offshore wind planning. With the vessel already mobilized in the region, how can operators benefit from acting quickly during this peak season window?

GM: Timing is a strategic lever in offshore wind, and with the Ramform Vanguard already mobilized in the North Sea, this current window represents a prime opportunity for operators. Operators can piggyback on existing campaigns or request add-on surveys, minimizing time and mobilization costs.

Early data acquisition can give wind developers an important advantage in competitive lease rounds, while also improving their readiness for upcoming feasibility studies and final investment decisions (FID).

PES: You're offering full acquisition, imaging and interpretation as part of the package. What difference does this end-to-end approach make for developers looking to streamline timelines and decision making?



Gunhild Myhr

GM: TGS offers acquisition, imaging and interpretation as a fully integrated package, it does more than just simplify logistics: it transforms how developers plan, decide and execute. Reduced lead time and cost, optimal data quality and a competitive advantage in project delivery and bidding. Stronger bids can be submitted, a head start in engineering and permitting and they can be in a better position for securing financing with de-risked site profiles.

PES: It's not just about speed; TGS is also known for its attention to HSEQ and delivery standards. What does that commitment to quality look like in practice for offshore wind clients?

GM: While speed and scale are certainly important in the fast-paced offshore wind industry, TGS's true differentiator lies in our unwavering commitment to HSEQ (health, safety, environment and quality). In a sector where safety and operational integrity are paramount, we pride ourselves on adhering to industry-leading safety protocols at every stage of a project. This commitment starts with our certified HSEQ management systems, which ensure that all processes, from planning to execution, meet the highest standards of safety and environmental responsibility.

We also place a strong emphasis on proactive risk assessment and mitigation, carefully identifying potential hazards before they become issues. Our teams are trained to manage complex offshore operations with the utmost caution, maintaining the safety of personnel, the environment and equipment.

By embedding these principles into our day-to-day operations, we not only protect our teams and the surrounding environment but also ensure that the projects we support meet the rigorous standards expected by our offshore wind clients. Ultimately, this commitment to HSEQ helps us deliver projects with confidence, ensuring quality, reliability and long-term success.



PES: You've spoken before about reducing time onsite characterization by up to 50%. Could you tell us more about how UHR3D is changing the pace and expectations around early-stage wind development?

GM: UHR3D provides complete, high-resolution coverage of entire lease areas within a single survey. To maximize project value, TGS also offers simultaneous acquisition of bathymetry, Side Scan Sonar, Sub-Bottom Profiler, and Magnetometer data. This rich dataset is processed and imaged immediately by our in-house team, enabling rapid interpretation.

Due to the exceptional density, detail, and accuracy, developers often eliminate the need for additional survey rounds. The results can be seamlessly integrated with CPTs, environmental baseline studies, and geotechnical cores, allowing future geotechnical campaigns to be more focused, targeted and cost-efficient.

PES: Whether it's fixed-bottom or floating wind, the need for precision is only going up. How do you see this influencing the evolution of geophysical techniques like UHR3D over the next few years?

GM: As offshore wind advances, driven by floating technologies and expansion into deeper, more challenging environments, the demand for precise subsurface data continues to grow. To meet these evolving needs, UHR3D is advancing to deliver finer resolution, broader bandwidth, and improved signal-to-noise performance at ultra-shallow depths.

Beyond floating wind, both fixed and floating developments increasingly require accurate mapping of tectonic structures, a deeper understanding of sediment behavior, and precise identification of anchorage zones. By integrating UHR3D with MBES, SSS, SBP, and Magnetometer data through AI-driven interpretation and predictive modeling,

engineers and geoscientists can focus on confident, data-driven decision making.

Across the industry, the future demands more data, better models, faster decisions, all with a lower tolerance for uncertainty. UHR3D is becoming more dynamic, more integrated, and more indispensable. Survey providers are shifting from data suppliers to strategic intelligence partners, while developers expect geophysical techniques to deliver project-critical value, not just regulatory compliance.

As offshore wind accelerates and projects grow in complexity, precision subsurface insight is no longer optional; it's foundational. With ultra-high-resolution 3D seismic and a fully integrated approach, TGS isn't just supporting the energy transition. It's defining its pace, certainty and success.

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