

Data tracking



Wind AXIOM allows users in the US east coast to scrutinize the newly defined leases in the central Atlantic by evaluating water depth, environmental risks, conflicts with other marine users and seafloor characteristics. Users can get an idea of the amount of energy and, therefore revenue these leases may generate annually using an easy to use scenario builder from TGS

With its multi-client approach, TGS provides quality data early and at a low cost, reducing uncertainties and enhancing project development decisions. Matthew Cramer, the company's Offshore Wind Commercial Lead, New Energy Solutions, explains how it is shifting the mindset of the industry and creating significant efficiencies in the way measurements are performed.

PES: It's great to speak with you and I'm looking forward to learning about offshore wind measurements and the technical capabilities of TGS. For background, your company centers around data and intelligence, correct?

Matthew Cramer: That's correct. For over 40 years, TGS has provided energy data and intelligence to companies and investors across energy markets. In addition to data acquisition, analytics platforms and market intelligence, we hold the world's largest global library of subsurface data, such as seismic and well data.

Two years ago, we launched a new business unit, New Energy Solutions, with the specific objective of offering data and software solutions for renewable energy and Carbon Capture and Storage (CCS). Since then, our offshore wind offerings have expanded rapidly through organic initiatives, acquisitions, and partnerships. We've introduced a range of novel data-driven solutions to the industry and our offshore wind customers now number over 500 globally.

PES: You recently announced the start of the world's first multi-client offshore wind measurement campaign. Can you give me some more information about that?

MC: One of the main challenges for offshore wind is to reduce the cost and time it takes to develop projects. To address this, we've taken the multi-client model from oil and

gas, where multiple customers can subscribe to the same subsurface data, and adapted it to offshore wind. We started conducting wind, metocean and environmental data campaigns with floating LiDAR buoys last year and now have six such campaigns ongoing, with more to come.

Our deployments use one of the world's most advanced Stage 3 floating LiDAR systems ensuring the highest level of accuracy. Data is continuously acquired and quality-controlled and customers have daily access to it through the Wind AXIOM platform, TGS' unique site evaluation and wind data analytics tool. Along with wind speed measurements, the data package includes important metocean and environmental data such as significant wave heights, ocean current profiles, water salinity and temperature, and acoustic monitoring of whales, dolphins, birds and bats.

PES: You mention six floating LiDAR deployments. What areas are you concentrating on?

MC: Our aim is to provide wind and metocean data at a point in the project development cycle when it can have the biggest impact. The answer to this is as early as possible, so we are identifying those regions where offshore wind development could benefit most. These tend to be places where bidding for offshore wind leases is imminent, or where crucial decisions are being made ahead of investment.



Matthew Cramer

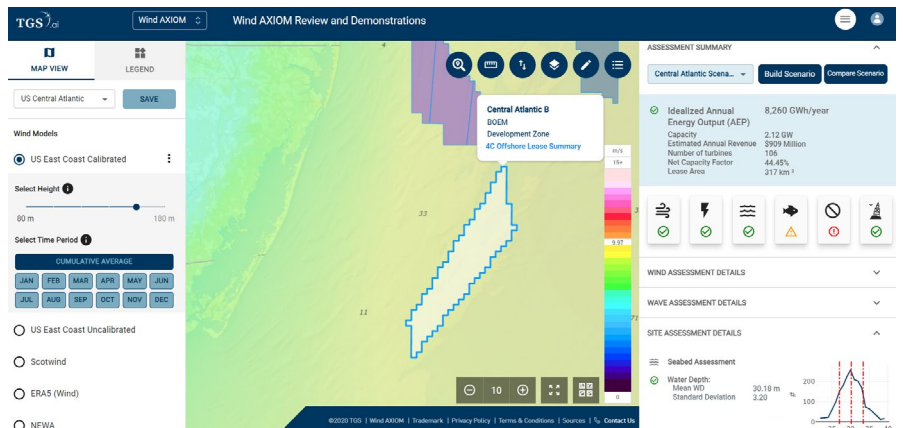
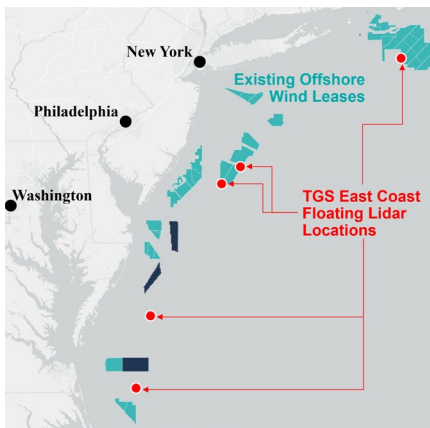
In the central Atlantic, the two TGS buoy deployments will supply valuable wind, metocean, and environmental insight to those pursuing wind development opportunities allowing the de-risking of prospects well before the lease bidding process. These data campaigns will provide the only modern and complete dataset covering the central Atlantic lease areas, due to open for bidding in early 2024. This is the same for our deployment at Utsira Nord in Norway, where three areas have recently been nominated for wind development.

In New York Bight our two data campaigns are assisting those embarking on site assessment activities following the successful lease round there, and in Massachusetts developers can acquire additional data to de-risk Final Investment Decisions (FIDs) or enhance Construction and Operations Plans (COPs).

PES: What has the data availability been like during the campaign so far?

MC: Our first New York Bight data campaign was launched in June 2022 and has just passed a significant milestone for a full year of data collected. The campaign is entering the second year of data collection and has averaged 90% data availability for the full duration of the deployment. We expect data availability to meet or exceed this target for all other data campaigns. We are pleased to be receiving superior quality wind measurements at 300 m turbine hub heights which provides very insightful and unique





information to those who plan to bid, develop or finance wind energy leases.

PES: What are the benefits of this combination of trusted wind resource models and real measurements?

MC: Observational data in multiple locations in the same region, in this case the United States Atlantic coastal region and the North Sea, allows TGS to calibrate wind resource model data. Calibrated wind resource model data is adjusted to better reflect actual conditions and allows for lower uncertainty in wind energy production estimates across the entire region and therefore reduces risk to investors. Risk reduction translates into cost reduction for project finance.

Our initial analysis of collected wind resource data in the US reveals some deviations from current industry expectations which were largely based on theoretical models. It's critical to enhance the accuracy of wind information which leads to further precision of projects energy estimates.

PES: So, this is a multi-client approach?

MC: Yes, essentially, multiple customers can subscribe to the same floating LiDAR data. This allows offshore wind stakeholders to reduce the costs and timescales associated with bankable wind and metocean data and minimise energy uncertainty. Most importantly they can access critical information very early in the cycle, sometimes even ahead of the lease round. Our recent deployment in Central Atlantic WEAs is a good example of how we are improving the accuracy of energy assessments and helping potential bidders to make better decisions.

In addition to supplying this raw data, TGS will also use observational data to create the region's most comprehensive and validated Numerical Weather Prediction (NWP) model.

PES: Tell us more about the floating LiDAR systems being used.

MC: In all six deployments, TGS is using Stage 3 certified floating LiDAR systems, one of the world's most advanced systems with the highest level of validation and accuracy.

PES: What kind of data is being gathered and how will it be delivered?

MC: The data will be continuously acquired and quality-controlled, and customers will have daily access to it through the Wind AXIOM platform, TGS' unique site evaluation and wind data analytics tool. Along with wind speed measurements, the data package includes important metocean and environmental data such as significant wave heights, ocean current profiles, water salinity and temperature, and acoustic monitoring of whales, dolphins, birds and bats.

PES: What are the main advantages of the Wind AXIOM data analytics platform?

MC: Wind AXIOM is not only a gateway to access our floating LiDAR data, it is also a unique insight platform that helps wind developers explore high-value areas, prepare bids and develop leases. It provides developers easy access to vast amounts of data and advanced analytical tools, Wind AXIOM has taken the industry away from spreadsheets and disparate file formats and integrated all the information into an interactive data map.

Much of the data collected can be used to fulfill regulating agency requirements for information regarding site environmental and ocean conditions. All data collected meets high quality standards intended to address both the engineering solution and the basis of a projects' bank loan arrangements, hence the term 'bankable wind assessment', so the quality of the data derived from the measurement campaigns can have a critical impact on project finance, engineering, and schedule.

PES: How does this tool improve the quality and speed of decisions that need to be made in wind farm operation?

MC: Wind AXIOM aggregates data from multiple sources, refines it, makes it comparable, and adds high-quality insights. As a result, this web-based platform offers the industry's most complete data and insight platform for wind feasibility studies. It provides easy access to vast amounts of site-specific data in the cloud, cost-effective and secure. However, what really sets it apart is its ability to derive crucial insights into site development.

PES: Are the same LiDAR systems being used in each campaign?

MC: Although TGS is agnostic to the various available floating LiDAR technologies and is more concerned with high quality data collection regardless of the system, the current campaigns are all based around identical wind resource assessment buoys outfitted with stage 3 ZX LiDAR machines. They also are equipped with a very similar suite of metocean and environmental sensors typically including a TRBM seabed frame.

PES: Are there plans for further expansion of this initiative in high potential offshore wind regions in the United States and even beyond?

MC: The industry has responded very positively to our multi-client model and we see interest across the globe for additional deployments. In the US our near term plans include all emerging wind energy areas which are included on BOEM's roadmap, more immediately we plan deployments in California, the Gulf of Mexico and the Gulf of Maine. We are also focused on advancing this critical knowledge in other emerging regions such as Brazil, Canada, continental Europe, Asia.

Our experts are talking to governments and developers across the globe who have expressed an interest in expanding this model to enhance their own offshore wind ambitions.

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