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LiDAR First

– Making premium wind measurements timelier and more affordable

Early during project development, the uncertainty of the metocean and wind resource conditions is elevated, often due to a lack of high-quality measurements

While having measurements earlier in the development process is preferred, for example, in advance of a wind energy lease auction, the costs to deploy offshore measurements are prohibitive and often don't make sense from a risk-reward perspective.

This is especially true in markets with competitive auctions, such as the United States. The lack of metocean and wind resource measurements leads to elevated uncertainty when estimating the wind energy potential of a project, and this uncertainty will affect developers' bidding strategies.

Solution

To alleviate this issue, TGS is introducing a multi-client business model to the industry for offshore measurement campaigns, specifically for deploying floating LiDAR buoys. The multi-client model provides two very attractive features. First, the cost of acquiring measurements is greatly reduced as costs for an individual buoy are shared across multiple stakeholders. And second, the floating LiDAR and metocean measurements are available much earlier in the development process, often well in advance of lease round auctions.

Stage 3 Floating LiDAR Buoys

The company is deploying Stage 3 certified floating LiDAR buoys to ensure the highest quality wind resource data. Stage 3 accreditation is the highest commercial maturity rating. This designation means the LiDAR buoy platform has successfully met or exceeded key performance indicators across multiple validation campaigns demonstrating the accuracy, reliability, and thus the low

uncertainty of the collected wind resource data. Collecting high-quality metocean data are also critically important.

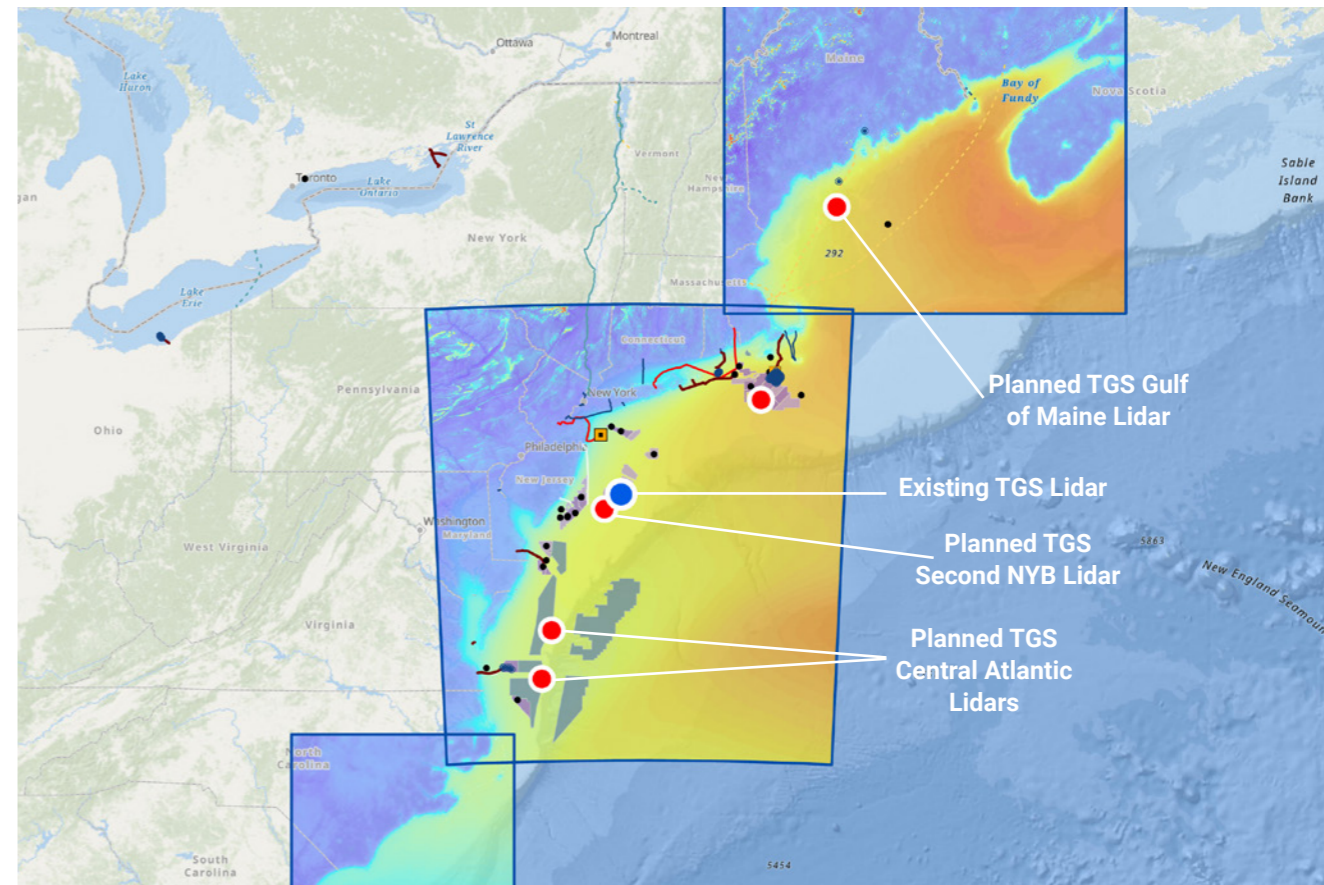
In addition to the standard metocean instrumentation on the buoy, TGS is deploying a seabed-mounted equipment frame that contains additional metocean sensors, including an upward-looking ADCP (Acoustic Doppler Current Profiler), a water level recorder, and a CTD (conductivity, temperature, and depth).

Further, the company also equips buoys with environmental sensors, which measure bird and bat activity above the buoy and whale and dolphin activity below. Environmental measurements are performed using acoustic monitors and tag detection.

Deployments

Initial deployments are focused on supporting wind energy development along the east coast of the United States. TGS's first buoy campaign commenced in June 2022 in the New York Bight. This buoy is located at the eastern border of the New York Bight wind leases. The location was chosen to provide new information about the east/west gradient of wind speeds across the region.

Subsequent deployments will significantly improve our understanding of the wind resource and metocean conditions across the eastern US seaboard. Two buoys are planned for the Central Atlantic call areas, one buoy in Massachusetts and a second buoy in the New York Bight. In addition, next year, TGS plan to deploy a buoy in the Gulf of Maine in advance of BOEM's auction there in 2024.



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significant additional value is acquired when integrating TGS's floating LiDAR buoy data with the NWP model data to validate the NWP model results and create bias-corrected NWP model outputs. The bias-corrected NWP model data have much lower uncertainty and increased skill, allowing stakeholders to make decisions confidently.

Given the geographic expanse of TGS's NWP model simulations and numerous floating LiDAR measurements, the company will be able to create the largest, highest-quality, and most validated wind resource data set. A truly foundational data set to drive offshore wind energy development along the US eastern seaboard.

What's Next?

The United States east coast is just the start. TGS will replicate the multi-client model for floating LiDAR buoy campaigns and develop bias-corrected NWP model results across many markets. Next will be the United States west coast, starting in Oregon. From 2023 onwards, international deployments across all markets will be the focus.

Integrating with NWP Model Data

All buoy data collected are delivered to clients through Wind AXIOM. This insights platform for offshore wind development allows clients to visualise and download all the wind resource, metocean, and environmental data from the floating LiDAR buoys.

Additionally, Wind AXIOM aggregates together a plethora of public and private data sources to help clients understand the feasibility, costs and risk of developing any offshore wind lease. One important proprietary data source included in Wind AXIOM are TGS's high-resolution Numerical Weather Prediction (NWP) model data sets.

NWP model

The NWP model results are presented across multiple hub heights, and long-term time series data may be visualised at any location, allowing clients to discover the wind resource characteristics across large regions of active wind development both in the United States and internationally. NWP model results in Wind AXIOM may be exported as maps, time series, or wind resource grid (WRG) files. While the raw NWP model results are quite useful,

TGS

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