# Going for gold in offshore wind: preparing for success

In these challenging times, access to detailed data, insight and tools within the wind energy sector can make the difference between success and failure. As the profile of offshore wind continues to grow, companies with significant experience and resources gained from other industries can make substantial contributions toward enhanced efficiencies across the offshore wind development lifecycle.

As the industry matures, increased amounts of data are being made available to developers, fuelling the decisions that lead to success, even before any financial commitments are made. This data ranges from market intelligence to wind and metocean measurement, intelligent wind resource analytics, subsurface imaging, and data management considerations. Crucially, as the volume and diversity of raw data volumes increase, more resources are required by developers to make full use of this enhanced knowledge.

One particular data provider has risen to this challenge. Rather than merely setting themselves the goal of supplying the best raw data to the offshore wind industry, TGS aims to build partnerships with wind energy professionals and developers throughout all the stages of wind farm development, using their vast datasets, compute resources, and subsurface expertise to provide actionable insights all the way 'from feasibility to farm.

### Empowering intelligence

One of the first moves into the wind industry by TGS was the acquisition of market intelligence experts 4C Offshore in May 2021. Supported by the resources of its new parent company, TGS | 4C Offshore continues to expand and enhance its exclusive subscription service accessible through its ForeSEE dashboard, now the industry standard in global offshore wind research and analysis, backed by a team of specialists and experts.

The Premium GOLD tier of TGS | 4C Offshore's market intelligence service, provides seamless navigation through online and offline tools with access to in-depth data points, and relevant analysis on the offshore wind sector. Coverage includes projects ranging from potential development zones right the way through to the planning and installation phases, in addition to those under operation or decommissioning. Subscribers are kept up to date on the latest developments and trends in this ever-changing global industry.

An intelligent dashboard and highly detailed interactive maps, graphs, and charts help developers visualize the vast amount of data available. These range from market shares, vessel contract timelines, component trends, and even CAPEX analysis. The details can be filtered and refined before being exported and shared.

In addition to delivering hour-by-hour updates, regular market reports complement the dashboard to provide a holistic view of the market for those who need a more readily digestible information stream. Each report is designed to keep users informed of emerging demand for offshore wind across 30 unique country markets, identifying new and upcoming policy shifts and auction activities across Europe, the Americas, and Asia-Pacific.

### GIS datasets and online map services

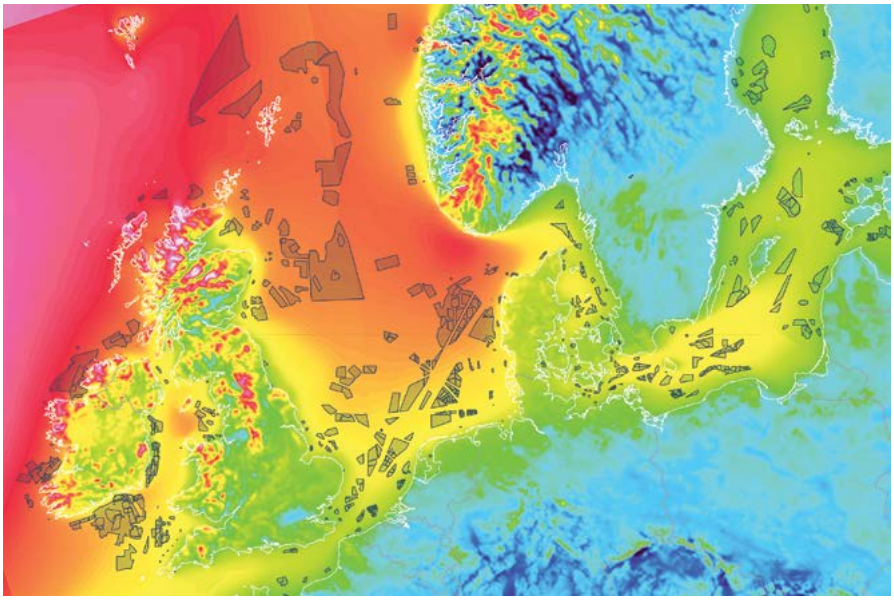
The written word can only convey so much for those at the sharp end of development. GIS datasets and online map services bring offshore wind data to life with a complete set of spatial layers that capture the location of every offshore wind asset anywhere in the world. TGS | 4C Offshore data includes every wind farm boundary, turbine location, cable route, substation, and more, with GIS specialists capturing every change as it is announced using official sources, so no more wasted time checking local data sources or georeferencing press releases.

With collaboration a key aspect of those working in market intelligence, data formats allow users to directly connect to the cloud layers for hourly updates of changes as they are made. Offline data files can be archived in their environment, where they can connect these resources to a preferred desktop or web application including ESRI ArcGIS Pro/ ArcGIS Online.

### The science behind offshore wind project screening

In addition to gaining the best understanding of their marketplace, offshore wind developers must also become experts in their resource: wind. But again, raw numbers and figures alone do not empower development.

With a history of innovation, TGS was keen to bring a fresh perspective to wind data. The Wind AXIOM package was a natural inception, created to leverage TGS' core experience in collecting and processing vast quantities of data into actionable insights. AXIOM acts as a powerful screening resource to allow the assessment of early-stage offshore wind projects. It is specifically designed to allow users to explore an offshore wind site's physical and environmental characteristics.



The Wind AXIOM platform from TGS helps wind developers explore high-value areas, prepare bids and develop leases

Utilizing advanced wind model analytics, the platform automatically calculates the annual energy production (AEP) of a wind farm design, considering particular specifications and location. This sophisticated method instills confidence in its results, which are presented via user-friendly tools that reduce complexity for improved understanding.

A single click of an offshore wind area presents an AEP estimate based on a large library of power curves multiplied by the wind frequency distribution for the site selected, based on long-term windspeed models and factored against relevant losses.

Users can simulate high/low case scenarios for specific areas or compare portfolios of wind farm proposals against each other to examine which can generate the most energy from a given number of turbines.
A winning combination.

By focusing on AEP, Wind AXIOM allows the estimation of project revenues early in the design stage, enabling feasibility assessments of different portfolio options or build-out scenarios and creating a better understanding of the size and delivery of neighboring yet-to-be-built windfarms.

Wind AXIOM combines wind resource analysis with large volumes of environmental and marine spatial plan restrictions, seabed characterization and onshore transmission layers. Also made available via the same GIS cloud connections or offline downloads.

These resources present a complete picture of an offshore wind site at a cost substantially lower than alternative options.

### High-quality wind and metocean data when you really need it

Timely access to data plays a key role across the entire wind development lifecycle, but what do you do when that data is not available? Proprietary wind and metocean data acquisition can be a costly exercise. However, the TGS business model, known as 'multi-client' in other industries, uses the pretext many different parties will have an interest in the same or similar data. Instead of each party taking on the cost and operational risks themselves, one company commissions the acquisition of this data and licenses it to multiple clients.

TGS has been doing this for over 40 years with subsurface data, where it has become the norm in many parts of the world. So much so that TGS now holds the world's most extensive library of modern subsurface data. By bringing the multi-client model to offshore wind using floating LiDAR buoys and a range of other sensors that measure

wind, metocean, and environmental data, TGS can leverage decades of experience in acquiring precision measurements on a huge scale, generating an unrivalled knowledge of storing, processing and delivering vast amounts of data.

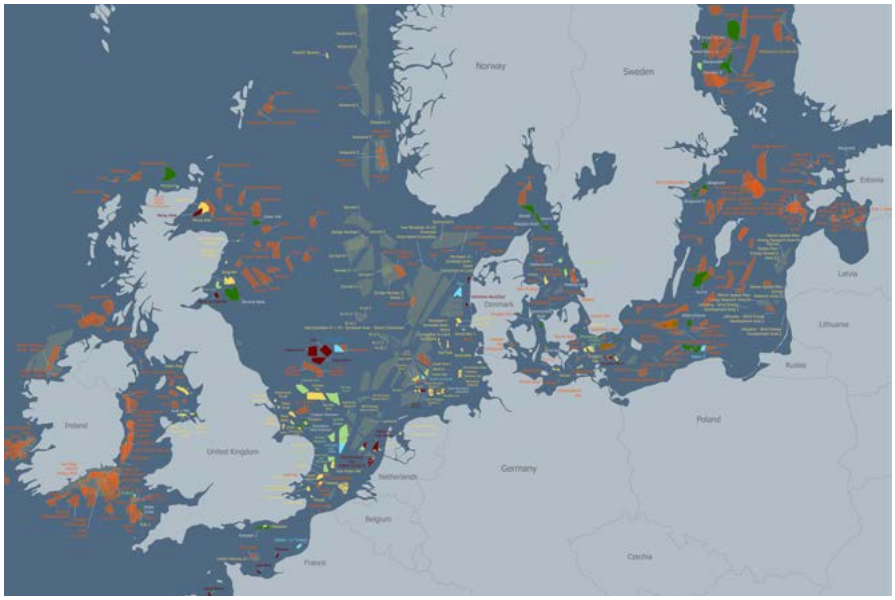
Many customers can now subscribe to the same floating lidar data with these multi-client buoys, offering offshore wind stakeholders the added benefits of reduced development costs, timelines, and a smaller environmental footprint.

Most importantly, this approach allows developers to significantly reduce energy uncertainty as early as possible – often before lease rounds.

Throughout 2023, TGS has significantly expanded its groundbreaking offshore wind measurement campaigns, following the multi-client model, to five locations off the US East Coast and within the Utsira Nord floating offshore wind lease area in Norway.

This Norwegian campaign includes over 25 different companies, from traditional offshore wind developers to local power companies, all with access to wind and metocean data pre-award.

2024 will represent further growth in this sector, supporting multiple offshore wind lease auctions across Europe.




ForeSEE, the offshore wind market intelligence app from TGS | 4C Offshore, delivers insight through data streams, reports and an interactive map

### Innovation built on a solid foundation

By leveraging existing strengths and a history of innovation, TGS has, in a very short space of time, been able to make notable contributions to the offshore wind industry. However, not all of its products have been borne out of originality. A core expertise in geology and subsurface imaging across the globe, coupled with a vast library of seismic data, can also be applied when considering the siting of wind turbines.

Equally, the large volumes of data produced by monitoring turbine efficiencies and associated infrastructure also fall within the scope of traditional TGS knowledge, where data management and asset management experience can continue to enhance wind farms far beyond the development stage.

Many companies like TGS are now focusing on ways to leverage vast experience in other industries to enhance offshore wind development. As others see the opportunities that renewables provide, they, too, could fuel the next generation of innovation and efficiency within the wind industry.

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