

The Accenture logo, featuring a stylized chevron symbol above the word "accenture" in a lowercase, sans-serif font. The background of the entire page is a high-angle photograph of an offshore wind turbine. A large white blade extends from the foreground towards the right, and another blade is visible on the left. In the distance, another wind turbine stands in the blue ocean under a clear sky. The lighting is bright, suggesting a sunny day.

accenture

The power of offshore wind

Optimizing offshore wind
across the value chain

Offshore wind: The mega-plant of the 21st century

A promising industry emerges, but there are challenges

Offshore wind is set to be a game changer in the future energy mix. With site-consented capacities now increasingly counted in multiple gigawatts, offshore wind farms represent the mega-plants of the 21st century. **The offshore wind market is projected to triple in capacity between 2020 and 2025, and this is just the beginning.¹**

Despite being a relatively new technology—the first commercial-scale deployment took place in 1991—offshore wind farms are now being developed without subsidies and with increased capabilities that can help to address grid balancing challenges. It is now more realistic to envision a future in which offshore wind supplies more than a quarter of global power needs. The maturity of the industry differs greatly by market, with countries like the United Kingdom, Germany, China and Denmark leading the way in current capacity. Stated policies will drive significant buildouts in other European countries, the United States and several Southeast Asian countries. With suitable, accessible seabed space relatively abundant compared to onshore sites for competing technologies, there is significant room for decades of continued growth.

The growing offshore wind market



30 GW new annual installations expected globally by 2030²



205 GW of new offshore wind capacity expected by 2030³



US\$68 billion of anticipated spend by 2030 in the United States⁴



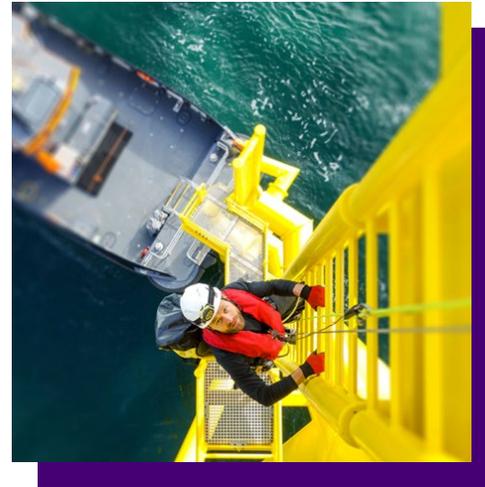
US\$1 trillion of cumulative investment expected in offshore wind business globally by 2040⁵



Facing the challenge head-on

Significant offshore wind will require new approaches for profitable development, execution and operation

A distributed power plant with more than 100 ocean-based turbines makes offshore wind an extremely complex and potentially risky renewable generation technology. However, a new offshore wind site can also represent billions of dollars in lifetime value. Success depends on securing optimal sites at a feasible price, seamless delivery and managing operational complexity.



Three keys to success

01

Securing optimal sites: From the onset, developers face greater competition for sites with the ideal characteristics particularly in relation to wind, shore proximity, soil composition, seabed dynamics, water depth, environmental concerns and local governing regulation. To acquire development rights, strong case planning and modeling needs to be applied in an environment where empirical data on everything from asset lifetime, cost base, availability performance and asset integrity remains sparse. As a result, whether they know it or not—many developers are currently taking on more risk on their binding investment decisions.

02

Delivering seamlessly: Around 40% of the lifetime costs of an offshore wind farm are invested during the execution stage. Developers face considerable pressure to deliver these large infrastructure projects on time and within budget while also adhering to strict scope, environmental and quality requirements. Enhancing and managing every step of development is critical to get the most out of full project economics and confirm on-time efficient installation.

03

Managing operational complexity: Many offshore wind farms struggle to consistently operate profitably and within defined operating budgets. They are hindered by issues with production underperformance, operational cost overruns and unforeseen serial defects on turbines and balance of plant. With the increase of non-subsidized assets in operation, merchant risk is likely to join the list of key operator concerns. As turbines, wind farms and portfolios continue to grow, so will operators' focus on verifying high revenue-based availability addressing key total cost contributors and intelligently managing more complex generation portfolios.

Significant advances into siting, developing and running offshore wind farms continue to help drive down costs and improve profitability. At the same time, accelerating investment and growing scale are increasing the value at risk for operators. With this backdrop, we believe it is the ideal time to bring new data-driven approaches to manage the full lifecycle of offshore wind farms.



Revealing value in offshore wind

Reduce risk and improve profitability with leading practice frameworks and technology

Offshore wind projects are unique in their scale, complexity and lifecycle. Based on experience supporting market development, construction and operations, we see significant opportunities to reduce risk, optimize operations and, ultimately, improve profitability. Accenture has more than a decade of experience working with providers throughout the lifecycle to identify key business imperatives and provide precise appropriate solutioning. An end-to-end suite of assets and accelerators, deep industry knowledge, global delivery capabilities and close partnerships with key players allow us to quickly target opportunities and help create lasting value for offshore wind programs.



Capabilities to support the entire project lifecycle



Ownership

Ownership models and capabilities (operator and non-operator):

Review and benchmarking of applied ownership models and capabilities for safeguarding company interests and making optimal value-optimizing decisions in an increasingly competitive world of joint-venture partnerships.

Contract management: Intelligent tool for storing, accessing and sharing key documentation from as-built drawings to operations and maintenance (O&M) agreements to confirm compliance and efficient processes in a documentation-heavy industry. Upgrade to automatically remind users of the need for renewal and auto-mining for important high-value clauses.

← -5-10 year (approx.) ————— -3 ————— 0 ————— 25+ → Decommission



Market development

Investment strategy and capital allocation:

Strategic evaluation of possible markets, technologies and sites for optimal offshore wind investment based on the company's overall strategy, investment profile and capabilities.

Development portfolio process tool:

Establish ongoing learning feedback loops for improved bidding, supported by an integrated cross-portfolio project evaluation coordination interface.

Wind assessment model: Intelligent models for weather and production estimation and forecasting on wind farm assets.



Engineering Procurement Construction

Project process excellence: Review of processes for design, benchmarking and others.

Execution management tool: integration of leading central pipeline execution tools for in-time, on-budget project delivery.

Digital twin and layout optimization: Modeling of turbine and balance of plant components for better design, installation and O&M. Optimization algorithm for wind farm layout design.

Supply chain management: Integration of procurement processes to installation and O&M.

Offshore logistics: Integrated tools for managing offshore logistics including planning, vessel, and crew management, tracking and reporting.



Operations and maintenance

Control room centralization and optimization: Evaluation of existing control center setup and performance, and peer performance benchmarking. Assessment, selection and integration of core production improvement and cost-reduction capability levers.

OPEX and production review: Benchmarking of current production and OPEX levels as well as review of core processes and cost contributors.

Inspection drones and on-site technician digital toolbox: Assessment of potentials from introducing additional technical tools. Integration and customization of tools.



Commercial optimization

Big data analytics and governance: Optimize data models and processes to most effectively support commercial optimization activities.

Forecasting, simulation, and optimization models: Improve and automate forecasting for weather, production, market behavior etc., combined with powerful simulation engines to optimize planning and performance.

Risk management and hedging solutions: Analytical models to better understand and manage revenue volatility.

Automation for back-office and auto-trading execution: Processes and robots to improve efficiency and process insight.

Power purchase agreements (PPAs): Origination, negotiation and management of renewable PPAs.



Other cross-lifetime

Cyber security program: OT security program with development, governance and risk assessment.

Cyber security implementation: OT protection deployment with security controls design and implementation, anomaly detection, etc.

Cyber security update and support: OT security with managed security services, incident response and secure IoT cloud capabilities.

Health, safety and environment: Cross-market and site monitoring systems to maintain overview of own and contractor health, safety and environment (HSE) performance.

Full operating model and IT architecture landscape: Review and benchmarking of full unit operating model, core processes, KPIs, capability maturity and IT architecture. Gap identification and rectification. Cooperative tools, fueled by cross-unit analytics.



The synergy of technology and human ingenuity

Proven assets and accelerators to help reduce risks and drive operational innovation

Assets and accelerators

Wind Farm Operational and Performance Monitoring

Wind O&M control center setup supporting key activities including portfolio and site monitoring and troubleshooting, power curve performance and workforce management.

Offshore Power Curve and Time-to-Failure Analytics

Algorithms to determine wind farm production deviation sources pertaining to power curve displacement as well as time-to-failure model to predict future major component faults, timing and prevention.

Offshore Wind Development and EPC Optimization Tool

Integrated tool covering offshore wind market development, project development, design, procurement, installation and commission with tools for collaborative, and efficient delivery.

Offshore Logistics Integration, Planning and Management

Full solution covering optimized offshore logistics planning, vessel and helicopter management and offshore surveillance. Master data functionalities reports performance and supports decision-making at sites.

High-Performance Process Model and Capability Benchmarks

Reference model and accelerator for leading-practice operating models, processes, IT landscapes, capabilities and KPIs for offshore wind generation.

Research and thought leadership



Wind Industry Digital Landscape Review

A mapping of the use of digital levers for improving offshore wind O&M performance, the experienced value and challenges as well as recommendations for how to unlock asset value from digital.



Commercial Optimization for Renewables

An outline of the most important considerations and levers for today's renewable generators, in making the move from production optimization to maximizing revenue.



Offshore Wind Spare Part Management

Case study on cross-industry learnings for spare part management and ways the offshore wind industry can apply them to improve production and lower operational expenditure.



Bridging the Gap: The Growing Market for Renewable PPAs

Study on the developments within the market for renewables power purchase agreements, the inherent challenges in buyer-seller negotiations and ways these may be most effectively addressed.

We use our deep **expertise in renewables, broad market knowledge, hands-on understanding of the offshore wind industry** and **established assets** to identify trapped value and offer a range of solutions to help drive success across a project lifecycle.



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About Accenture

Accenture is a global professional services company with leading capabilities in digital, cloud and security. Combining unmatched experience and specialized skills across more than 40 industries, we offer Strategy and Consulting, Interactive, Technology and Operations services—all powered by the world’s largest network of Advanced Technology and Intelligent Operations centers. Our 537,000 people deliver on the promise of technology and human ingenuity every day, serving clients in more than 120 countries. We embrace the power of change to create value and shared success for our clients, people, shareholders, partners and communities. Visit us at www.accenture.com.

References

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