



Offshore wind

Enabling safe, reliable, smart and profitable operations for a sustainable energy future

— ABB is committed to fulfilling the high

growth potential of offshore wind as part of the renewable energy mix that will sustain future generations. As an established leading supplier to the wind industry coupled with our long track record in the offshore space, we can help producers optimize the performance of offshore wind assets to generate and transmit clean power efficiently and sustainably.

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Offshore wind

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Wind for sustainability

Together with land-based wind farms, offshore wind is now the fastest-growing renewable power segment and extremely important in supporting the green transition. The International Energy Agency (IEA) estimates that offshore wind capacity may increase 15-fold and attract around \$1 trillion of cumulative investment by 2040. EU is targeting 60 GW of installed capacity by 2030. The development is being driven by increased cost competitiveness, supportive governmental policies and rapid technological progress.

Our credentials

ABB is a global leader in the wind industry, with over 40 years of experience and more than 100 years' participation in power generation, management and control. We are one of only a handful of technology supplier that have been involved in the commercialization of large-scale wind energy since 1980s.

Today we are the largest supplier of electrical components to the wind industry with an installed base in many countries.



Why ABB

With a holistic approach across the entire wind industry value chain, our focus is helping utilities and power producers build resilience and adaptability, enabling transmission of power to land without distance limitations or constraints on the grid. We support the entire asset lifecycle with programs, tools and global service capability that will ensure your infrastructure and operations are always safe, secure, reliable and serving your business needs optimally.

ABB offers the complete package of wind power solutions including integration of electrical, automation and telecoms solutions – all of which can be managed remotely for increased productivity. We can help you gain visibility and control of your entire electrical ecosystem while optimizing operations through digitalization and data-driven decision-making.

Key offerings:



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- Complete industrial control systems including SCADA/DCS, low voltage distribution and UPS, telecom systems connecting turbines, offshore converter platforms, hub platforms and onshore sites
- Electrical system design and equipment integration for HVAC Substations and grid connection, including all necessary early-phase feasibility studies, technical consulting and analysis
- Digital and operational services in areas such as installation and commissioning support, asset management and condition-based maintenance, cyber security and electrical power simulation



'Lean' offshore wind



As new energy business models emerge and the offshore wind sector continues to evolve, navigating the ever-changing societal, environmental and governance landscape can be complex. We need to ensure that assets run at optimum capacity and power is produced as efficiently and sustainably as possible. Our integrated portfolio of electrical, automation and telecoms solutions help minimize risk while optimizing the levelized cost of energy (LCOE). Our core value propositions are:

Ensure safe, smart and efficient operations

With our long experience in asset performance management we can help you increase your competitiveness and improve your return on investment with smart operations. We can help build a reliability culture, eliminate expensive turnarounds and drive cost reduction through operational improvements that bring together people, process and technology. Our remote operations (data support and analytics) and robotic technologies can dramatically reduce offshore manning levels thus increasing safety. Digitalizing operations and maintenance (O&M) ensure system availability by predicting potential failures.

Optimize electrical systems to drive down transmission costs

We can help customers deliver electricity to the market cost efficiently with high uptime, minimal downtime and low losses. We have decades of experience in doing so in a broad range of energy segments, including offshore oil and gas.

Decarbonization of existing offshore assets

Supplying emission-free wind energy to existing offshore platforms will reduce CO₂ footprint per unit of oil and gas produced. However, customers need to understand and handle this change in the best way to secure power quality and reduce risk. ABB can help by analyzing and optimizing power system design and implementing effective control so as not to compromise platform operations.

Visibility from blade to cloud

Monitoring single pieces of equipment (Single Asset Monitoring) does not address total systemlevel performance. Through ownership of system Architectural Control Points (ACPs) and orchestrating all assets with AI, ABB can help customers unlock their full digital potential to achieve total performance in operations management, including energy storage, smart breakers, and distributed control.



Central SCADA to enhance control, operations and diagnostics

For automation control and protection, including cyber security, our Supervisory Control and Data Acquisition (SCADA) platform gathers, processes, analyzes and displays real-time data for reliability condition monitoring of entire substations. Effective energy management is critical to minimize the risks associated with power disruptions. SCADA benefits include:



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Unified integration of all global wind assets providing unparalleled visibility



Unlock information from disparate systems providing new insights into operational parameters



Real-time operational performance management



Empower and enhance strategic decision making and crossfunctional collaboration



Maximize asset availability and performance



Reduce risk by monitoring critical HSE parameters



Maximize net profit by reducing CAPEX and OPEX

ABB Adaptive Execution™

The offshore wind market has to grow in a sustainable fashion, with no compromise to safety. Projects must be developed cost efficiently, with digital tools ensuring the smoothest possible energy transformation. Leveraging our Adaptive Execution[™] framework for managing and executing large capital projects, we help customers assess and address challenges by identifying the best tools and capabilities needed.

Our intelligent project delivery experience puts ABB in a unique position to assure the integrity of renewable assets worldwide. We are also aware of requirements to optimize local content and local value creation in power generation projects and can optimize local input due to our worldwide presence.

How do we enable this change?



Service – ABB Care program

Offshore wind farms are typically unmanned, with continuous high performance and availability requirements. To accommodate these parameters, we structure our service program around four pillars:



Our comprehensive Care program accommodates the different levels of support required, from technical support, spare parts and grid code compliance to ABB Ability™ OPTI-MAX (for virtual plants, demand forecasting and energy trading), ABB Collaborative Operation Center and customized training programs.

The potential for subsea operations

Most offshore wind turbines and transmission platforms are today bottom fixed in shallow water. Floating wind farms in deeper water further from shore are becoming more relevant but present some challenges. Building substations on the seabed will offer several advantages, both technically and economically. It eliminates the need to build huge transformer stations on foundations. Studies have shown that collecting wind power to feed maintenance-free subsea substations could reduce costs by 30-40 percent compared to a floating station on water depths deeper than 60-70 meters. The cost saving could be even higher in water depths beyond 100 meters. Operators would reduce

- Costly dynamic export cable requirements
- Maintenance needs and environment footprint
- Human exposure to risk

In addition, subsea substations require less steel, with subsea cooling provided for free by the surrounding seawater.

In the case of electrifying existing offshore assets, such as oil & gas platforms, power from floating offshore wind turbines could be an attractive alternative to power from shore. Locating the substation on the seabed in such case would diminish the modifications you need to make to a platform or floater with limited space, consequently offering a major cost benefit.



A leaner, smarter and more sustainable subsea future



What's new and even more exciting for the future of subsea technologies are rising opportunities for 'sector coupling' between classic oil-and-gas applications and new energy solutions such as carbon storage; offshore wind – particularly floating wind; offshore floating solar; offshore hydrogen production with subsea storage; Subsea vehicle charging stations; and Subsea mining.

In short, what we're seeing in outline is a leaner, smarter and more sustainable Subsea future.

Systems will emerge that are increasingly autonomous while at the same time ensuring safe, secure and climatefriendly operations. At ABB we wholeheartedly believe in the fantastic opportunities that subsea electrification heralds for the offshore industry.

We also believe its potential stretches far beyond oil and gas. Sector coupling is developing in the same way on-shore, and subsea electrification technologies will serve to couple both on-shore and offshore energy much more directly than in the past.

At ABB it's our job to listen, learn and adapt as we continue to push the technology boundaries.

Building the energy system of tomorrow takes vision, but it also requires collaboration. So let's embrace, connect, and deliver for a sustainable energy future, together.

Partnerships to accelerate the energy transition



Whatever your needs, ABB can help design and operate future-proof facilities utilizing our best products, evolved methods and integrated approach to energy efficiency and decarbonization. Together we can achieve the step change in integrated lean infrastructure that society needs to thrive while conserving the environment. Our unrivalled expertise makes us an excellent partner in managing complex projects and driving sustainable growth.

Reference case: ABB helps to increase offshore wind power reliability in Germany

In March 2020, ABB won an EUR 10.6m contract from the Aibel/Keppel FELS consortium ANS to supply ABB Ability[™] digital products and services for the DolWin5 (Epsilon) power converter and transmission platform in the North Sea. This will facilitate the reliable, safe and secure delivery of clean, efficient power to the national grid as Germany gradually transitions to a more diversified energy mix.

Germany plans to generate 65% of its electric power needs from renewable sources by 2030, including 20GW from offshore wind farms. The DolWin5 (Epsilon) platform will deliver 900 MW of zero-carbon electricity from a cluster of three connected wind farms in the North Sea, 100 kilometres off the German coast. The transmission system includes an onshore converter station located in Emden/Ost in Lower Saxony. DolWin5 (Epsilon) is due to go into operation in 2024.

ABB is leveraging its expertise in remote, unmanned operations and advanced digital services to supply a comprehensive package for DolWin5 (Epsilon) including IT infrastructure, Operational Technolgy (OT) security, plant-wide condition monitoring, SCADA control and remote access capabilities.

Aibel/Keppel consortium is designing and building the HVDC transmission system for European operator TenneT, which already supplies more than 20 million people in Germany and the Netherlands with electricity from offshore wind farms.

Offshore hydrogen production

The big challenge with a burgeoning number of wind farms is the sheer quantity of cables they would entail, in addition to limited space to build receiving substations in populated coastal areas. Energy will increasingly need to be moved to the market by means of molecules versus electrons. Producing hydrogen offshore using renewable wind energy could be a valuable solution. Societies and industries need to run around the clock and require an additional energy carrier that is easy to store versus relying wholly on wind energy which is by nature intermittent. ABB solutions can maximize the value of the hydrogen plant using standard components and building blocks.

Solutions maximizing the value of the hydrogen



ABB's broad portfolio encompasses the full hydrogen value chain from production, transportation, storage to consumption. We are working closely with partners and our customers to create the new hydrogen ecosystem.







Hydrogen production

- Grid and plant electrical and automation infrastructure
- Energy optimization models
- Asset management including condition monitoring and predictive maintenance
- Safety and security management
- Analyzers and instrumentation
- Service
- High performance, energy saving motors for hydrogen compressor

Transport and storage

- Containerized, modular electrical and automation infrastructure
- Tank farm automation and remote control/ optimization system
- Compressor and pumping stations
- Pipeline stations, automation, instrumentation, telecom, security and monitoring
- Leak detection

Consumption

- Process industries and power generations
- Modular, containerized electrification and automation infrastructure
- Full electrification, automation and optimization scope
- Mobility
 - Hydrogen-fueled mobility infrastructure
 - Condition monitoring and usage optimization across network
- Fuel cells
- Smart cities
 - Turbine automation
 - CHP (combined heat and power)

Lhyfe's first green hydrogen clean energy production project, France

Project information

Lhyfe, the French producer and supplier of green hydrogen, has chosen ABB, the world leader in control systems and advanced technologies, to implement an automation solution at its first green hydrogen production site.

Application

- Freelance DCS
- S500 and S500-XC IOs (~1000 HW IOs)
- ABB Ability™ MOM (Dashboard, Trends & Events, Excel analyze)
- Electrical cabinet through local System integrator (BOSSARD SA)

Outcome

Integrated automation with common and centralized database.

Benefits

- Improving industrial efficiency
- Productivity and quality
- Minimizing environmental impact

ABB solution

ABB supports a wide range of industries in their digital transformation and will supply the first Lhyfe production site with its Freelance distributed control system and ABB Ability[™] Manufacturing Operations Management (MOM) digital platform.

These solutions will control all the elements involved in the hydrogen production process at the Bouin site in the Vendée region, France and ABB's automation technology is being installed to deliver improved efficiency, safety and productivity across the operation.











ABB Energy Industries

https://new.abb.com/windpower