Enabling the power of wind

Competence and expertise for wind power customers

This is ABB

Rising demand for energy and its impact on the environment are the defining challenges of this century.

ABB is tackling these issues by providing solutions for the secure and energy-efficient transmission and distribution of electricity, and for increasing productivity in industrial, commercial and utility operations.

That's why ABB stands for "Power and productivity for a better world."

ABB – the biggest supplier of electrical components, systems and services to the wind power industry

Experience plays an important role when customers choose ABB for their products, systems and services. Over 100 years of experience and collaboration with power utilities, the process and automation industry and OEMs enables ABB to convert know-how and application understanding into products and solutions to benefit the wind power industry. Sustainable solutions, reliability and knowledge of industry-specifics, such as grid codes, have made ABB the leading partner for wind power.

ABB – present where you are

ABB is close to its customers everywhere in the world. Our global presence offers customers easy access to leading electrical engineering products, systems and services everywhere in the world. Innovation and quality, the key characteristics of our offering, are reinforced by our knowledge and understanding of local requirements and needs, and of local manufacturing, service and logistics. ABB companies operate in around 100 countries and employ about 108.000 people.

Grid code compliance guaranteed




Grid code knowledge for power quality, grid stability and improved control

Grid codes have existed for decades, mainly as national regulations for connecting all types of large power generators to AC grids. The grid manages the reactive power supply to keep the grid voltage within operational limits and recover voltage immediately after a fault.

Wind power generation, from large wind farms as well as a number of small turbine groups, now supply hundreds of megawatts to several regional AC power grids. The international harmonization of national grid codes to accommodate the growing contribution of renewable energy generated from wind is ongoing.

ABB supplies its customers with a variety of solutions and also participates in many international groups addressing grid code issues.

Reactive Power Compensation

With advanced power electronics, ABB offers STATCOM system knowledge. With its selection of compensator products such as PCS6000, SVC Light® and SVC, ABB also offers expertise for implementing the functions for connecting wind farms to the grid. FACTS is an acronym for flexible AC transmission systems.

ABB's systems based on power electronics offer dynamic reactive power compensation based on voltage source converter technology. The solutions offer farm operators fast control, continuous compensation, low harmonics and low costs with increased efficiency.

Grid code compliant converters

Converters, both low and medium voltage, are based on premium frequency converter technology and are grid code compliant. They can be single turbine installations with virtual direct-torque-control towards the grid. Our converters ensure continuous operation even during times of grid fault. The converter control principle enables fast control, robustness, increased availability and a high quality of generated power.

For wind farms and their reactive power compensation, we offer two STATCOM solutions, depending on the ratings. PCS6000 and SVC Light® are products based on, and equipped with, pulse-width-modulated control. They are particularly well adapted to enhance grid code compliance of wind power applications on a large scale. Power stations are now built and operated by a growing number of wind farm developers, increasing the supply of wind-derived electricity.

Grid connections in remote areas

ABB's HVDC Light® underground transmission system offers reliable grid connection and can be connected to any type of wind power concept.

Sustainability, reliability and lifecycle management

Minimizing the environmental impact of our technologies and products, while increasing reliability for the customer

Sustainability is integral to all aspects of ABB's business. We strive to balance economic, environmental and social objectives and integrate them into our daily business decisions to create value for all our stakeholders.

ABB's products, systems, solutions and services are designed to improve our customers' businesses. These are based on improving grid reliability and increasing industrial productivity, while lowering environmental impact.

We seek to minimize the environmental impact of our technologies and products, passing on this expertise to customers and suppliers, at the same time as trying to ensure that our business is environmentally friendly and energy-efficient.

Modern power systems rely on sophisticated power equipment, where control and monitoring systems all work in harmony. ABB products, systems and services ensure reliable, high-quality power for our wind power customers, from turbine manufacturers to grid owners.

Lifecycle management

ABB's global presence through its worldwide organization and network of selected partners provides systematic lifecycle management with services that maximize the production, availability, reliability and performance of the wind power industry.

Training is an an integral element of our service offering. Our certificated, local service centres provide local support. Service and maintenance contracts are customized to meet customer needs.

ABB provides support for its products and systems throughout their lifetime. Support includes everything, starting from installation and commissioning services to preventive maintenance programs, as well as upgrades and replacement of products. Spare part kits, repair and field services ensure that the equipment operates smoothly.

Competence and expertise for wind power customers



Wind power converters for all main generator concepts

Low voltage converters for all main solutions

ABB uses premium DTC technology, which provides reliable control for different types of wind power concepts. The doubly fed concept is currently the mainstream solution. It allows a compact converter size and a modular, expandable system from 800 kW to multi-megawatts.

ABB also offers speed-controlled systems with permanent magnet generators. ABB can offer an optimized solution package for different types of wind turbine solutions, in the power range from 300 kW to multi-megawatts.

Medium voltage power converters to meet the demand for increased power ratings

With the growing demand for wind power, the rating of wind turbines is increasing. To cover this request ABB has developed MV converters for large, multi-megawatt turbines. ABB medium voltage power frequency converters transfer the power supplied from a wind turbine direct drive permanent magnet generator into a power converter transformer connected to the utility network. The IGCTs (Integrated Gate Commutated Thyristor) are state-of-the-art semiconductors, with an excellent reliability record. ABB's advanced design philosophy minimizes losses and does not rely on fuses, leading to reliable and highly efficient converters with low maintenance needs.

The wind power converters use the same proven power technology as MV Drives for other industries. The standardization of these power electronic modules delivers substantial advantages in terms of cost and quality.

Generators for all main turbine concepts

ABB supplies generators for both stall and pitch regulated wind turbines with outputs ranging up to 5 MW and higher. We offer all main concepts, from fixed speed and doubly fed to permanent magnet generators.

Our traditional stall concept is the fixed speed generator, with the generator directly coupled to the grid.

The doubly fed, semi-variable speed generator is a mainstream pitch concept where the rotor winding is also connected to the grid using a small converter to utilize wind gusts.

ABB offers three different permanent magnet generator concepts, all fully controllable in different grid conditions: low speed, medium speed and high speed.

Since the 1980's, ABB has delivered more than 15,000 wind turbine generators.

Competence and expertise for wind

Transformers

ABB offers the most complete range of transformers and associated products and services for wind power. Power transformers for substations have primary voltages up to 800 kV, liquid filled distribution transformers up to 72.5 kV, and dry transformers up to 52 kV. We have more than 6,000 transformer units operating reliably and efficiently in the wind power industry around the world.

Low and medium voltage products

Low voltage products

ABB offers a modern and comprehensive range of low voltage products, including circuit breakers, control products, connection devices, enclosures and cable systems, switches and fusegear. Working in close co-operation with the wind power industry, we have developed large contactors in accordance with special requirements for different generator types and control configurations.

The air circuit-breakers and the moulded-case circuit-breakers are used for protecting the main power circuits in order to guarantee extremely rapid isolation of the fault and – in case of problems over the network – fast disconnection of the generator. They ensure high reliability as well as high performance in small dimensions.

Medium voltage products

ABB meets customer needs for reliable medium voltage products that include switchgear, apparatus, modular systems and distribution automation. The ABB product offering includes breakers and contactors, fuses and cutouts, reclosers, surge arresters and voltage indicators. Ranges of switches and disconnectors, instrument transformers and sensors are also available.

Low voltage motors

Low voltage motors are used in various applications in wind power, for example in fan and pump applications, and in yaw systems.

power customers



Switchgear

ABB develops, produces and delivers a full range of medium voltage solutions for wind power applications: switchgear for main substation - grid connection; switchgear with integrated switching and protection of the wind farm network, either located inside the tower and as a complete solution, or in a compact substation close to the tower; and other switchgear developed and adapted according to customer requirements. ABB's portfolio also includes gas insulated and air insulated solutions with a choice of gas or vacuum circuit breakers. The voltage is 1 - 40.5 kV and current ratings cover all possible technical combinations meeting IEC and ANSI requirements.

ABB air and gas insulated switchgear with control, monitoring, protection and operation are designed to operate in harsh environments. The dimensions are reduced and plug & bolt technology is used for all medium voltage connections.

Compact Secondary Substations (CSS)

ABB supplies type-tested prefabricated Compact Secondary Substations (CSS) for wind power applications up to 36 kV, complete with type-tested equipment. CSS contains distribution transformer, LV switchboard, MV switchgear, connections and associated equipment.

Competence and expertise for wind

Reactive power issues in substations

ABB's optimized substation solutions cope with grid code requirements anywhere in the world. We offer a variety of environmentally friendly substation designs, specifically adapted to wind park requirements, based on GIS, PASS or AIS technologies up to 800 kV. ABB provides reactive power compensation equipment, which naturally belongs in substations receiving a farm's wind power, and integrating the power to AC power grids. Our solutions fit into substations flexibly, and save space. The grid code compliance of wind farm in-feeds is safeguarded by reactive power compensation solutions such as STATCOM, FACTS, and SVC.

Network management

Network Manager SCADA (Supervisory Control and Data Acquisition) is a solution for the supervisory control of the entire power system. Network Manager offers a full range of solutions that enhances the efficiency and reliability of the power system in both deregulated and traditional electricity markets. The solution has a load forecast system for wind, providing load forecasts with a time horizon of several days in advance as input for several planning tools.

FACTS (Flexible AC Transmission Systems)

FACTS solutions, receiving and integrating wind power in grids, is a natural element of substations. They fit into the substation in a flexible and space-saving way.

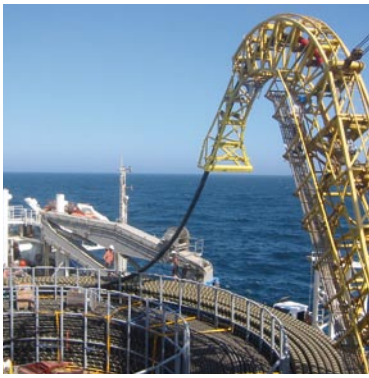
ABB's cable offering

ABB is one of the world's largest submarine cable manufacturers with experience ranging from complicated submarine interconnection projects between countries to near-shore feeder projects with relatively small cables. The knowledge acquired from submarine cable installations over the years is beneficial for offshore wind farm installations.

ABB can offer a complete range of services from design to commissioning, including complete project management; AC cables between the windmills, AC or DC cables from the wind farm to the shore station, cable accessories including installation, system site test, and cable laying, burial and protection.

power customers



System knowledge with AC

ABB offers system knowledge, responsibility, and a range of products for implementing the functions for connecting wind farms to the grid. National grid codes put the focus on connection issues, requiring know-how regarding system studies, modeling, and FACTS installations – all available from ABB. STATCOM, SVC Light® and SVC are all members of the Flexible AC Transmission Systems family.

An SVC is based on Thyristor Controlled Reactors (TCR), Thyristor Switched Capacitors (TSC), and/or Harmonic Filters. STATCOM such as SVC Light® and PCS6000 are based upon voltage source converter (VSC) technology.

HVDC Light® cable and converter system, up to 1,100 MW per system

ABB's HVDC Light® is a successful and sustainable way to design the ideal power transmission system for submarine cables, underground cables and network interconnection for offshore wind farms. The polymeric insulated HVDC Light cables are strong, flexible and robust.

The HVDC Light system and its cables have proved to be a very successful concept. The low losses together with the possibility to connect asynchronous networks make it ideal for connections between mainland and offshore wind farms or oil platforms.

Today, for example, submarine HVDC Light cables are installed between the mainland of Norway and the Troll A gas platform in the North Sea, and across the Long Island Sound in the U.S. The world's longest underground cable is also an HVDC Light cable from ABB. It is the 2 x 180 km long HVDC Light cable connection between the Australian states of Victoria and South Australia.

Studies and planning

ABB is experienced in conducting initial feasibility studies, interconnection requirement studies, and power collection design studies for its customers.

ABB – the leading supplier for wind

ABB components for wind turbines:

- Generators
- Converters
- Transformers
- Switchgear
- Low voltage products
- Low voltage motors
- Cables

power industry

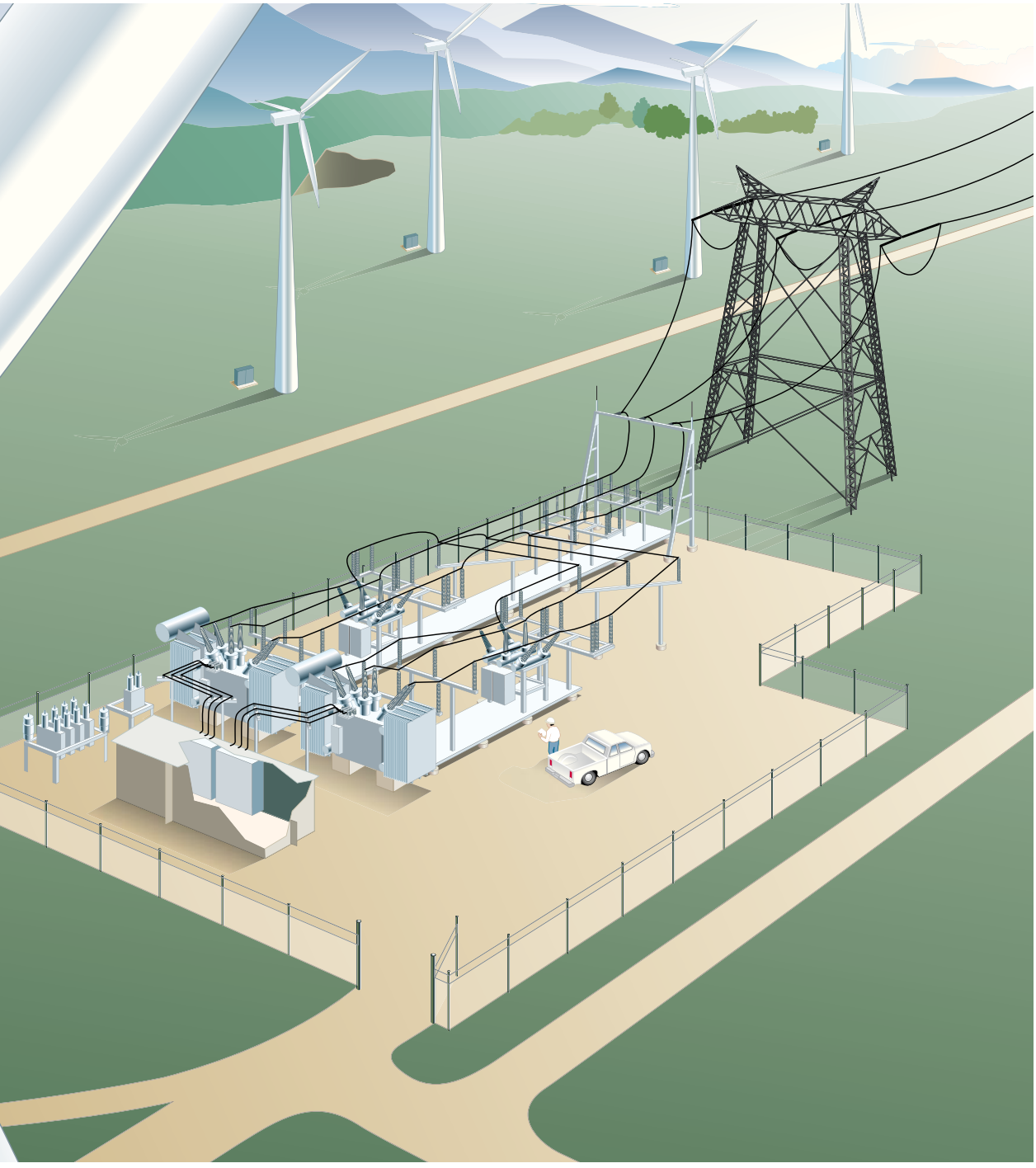


ABB wind power plant solutions:	System studies	MicroSCADA
	Substations	Compact Secondary Substations
	Grid connections	HVDC Light® for offshore wind farms
	Static VAr compensation systems	Service and maintenance

ABB (www.abb.com) is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 108,000 people.

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