DISTRIBUTED GENERATION SOLUTIONS

New Age Automation for Renewable Plants.

Grid code compliant solutions for renewable plants.

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Harnessing renewables to supplement the grid.

Transmission and distribution of electricity in a power grid that integrates a high share of renewable energy at all voltage levels can be very challenging.

Grid operators ensure that the power flow does not overload cables thermally and that power quality stays stable.

In order to keep power quality stable, generation and consumption of electricity must be balanced at all times. Power plants using traditional fuels are usually well-planned and predictable for the grid operator. Traditional power plants can be controlled in a way that they follow consumption. Renewable energy plants in contrast generate power according to available solar or wind resource. In addition, they are very often unmanned at remote locations. Because the number and power of renewable energy plants are increasing, grid operators request them to take more and more responsibility for a stable power quality. They are requested to automatically contribute to active and reactive power control.

Today's requirement is a holistic solution that will effortlessly control renewable power plant operations and comply with grid code requirements of the respective grid operator. A solution that provides supervisory control and data acquisition products (SCADA), intelligent electronic devices (IEDs) and plant safety systems that are essential to match grid requirements for renewable power plants, optimize plant performance and maximize return on investment.

ABB automation for renewable power plants.

Renewable plant automation solutions from ABB help in simplifying plant operations, improving productivity and maximizing return on investments.

The pioneering automation technology provides monitoring and control for individual plants, generating energy from a mix of renewable sources, through to the remote management of a fleet of plants. A wide range of services are also offered to back up the hardware and software installations.

Plant monitoring and control systems.

ABB’s plant SCADA system acts as a single point of production monitoring and control to ensure grid code compliance for the entire plant. Plant data is gathered and stored in the SCADA system, according to a consistent data model, to provide real-time status and support the analysis of all the connected generation units.

Depending on the customer’s needs, the SCADA can act as a gateway, allowing data exchange with the remote control center. Alternatively, via a few simple configuration settings, it can work as a local monitoring or control system. Additionally, should network failures occur such that the remote control center cannot interface with it, ABB’s plant SCADA system can act as a backup unit for the overall plant management system.
Wind power plants.

For wind power plants, the SCADA integrates the generation and electrical equipment data into a single system by using HMI (human-machine interface). It provides a single point of control for the entire plant and one point of connection with the upper level systems – both plant and grid operators.

The SCADA coordinates the control of active and reactive power at plant level, integrating reactive power compensation devices and (or) energy storage into the control logics of the plant. It also dispatches the individual wind turbines in case the wind power plant controller is missing, or not desired.

To perform these functionalities, the system is equipped with a wide range of embedded communication protocols such as IEC 60870 5 101/104, DNP3, OPC and Modbus. In addition, to simplify the plant layout, the SCADA system has a wide choice of software connectors that allow it to connect to different devices at the plant, such as STATCOM, capacitor banks and IEDs.

Solar power plants.

To automate PV solar plants, ABB offers a versatile and scalable automation solution, spanning from plant automation – including solar panel position control, plant diagnostics and power management – up to enterprise SCADA which enables remote operations and management of solar plants.

The SCADA system can monitor all key plant components, from PV panels (with and without tracking systems) to the inverters, strings, transformers, switchgear, grid connection and meteorological stations. It supports many communication protocols like Modbus TCP, OPC, IEC 6087-5-104, enabling it to connect and exchange data with all plant components.

With a real-time database and a historian, relevant plant data can be acquired and either stored on-site, or forwarded to a remote management center.

A key differentiator of the SCADA is its capability to monitor and control plant and substation equipment using the IEC 61850 protocol. This enables ABB’s solution to integrate generation and electrical components into a single information and control system. With the built-in interlocking schemes, secure and easy operation of the protection equipment in the plant, or at the grid connection, is achieved, from the site or remotely. Also its ergonomic HMI, featuring real-time updates, makes it easy to see field problems and facilitates fast responses.

Wind Automation System

Real-time monitoring and control.

PV Automation System

End-to-end monitoring and control.
Advanced solutions for renewable power production maximization.

ABB offers advanced renewable focused software packages that help customers maximize power production. The following easy-to-deploy, custom designed software solutions are made available to customers at the plant level or at remote control center.

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**Plant diagnostics.**

The plant diagnostics software module does not require any additional sensors. It helps in end-to-end remote equipment surveillance by working across different types of technologies in the renewable domain. The software is designed to work with either ABB’s SCADA system or with a third-party system. The software helps customers perform online condition monitoring using data mining algorithms as well as detect and diagnose critical component failures quickly.

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**Performance analysis.**

Based on IEC guidelines, 61724 for photovoltaics (PV) and 61400-12 for wind, the performance analysis software module assesses overall system performance of renewable fleets.

For PV, the software calculates inverter availability, energy production and performance ratios. In addition, it facilitates the comparison of system performance across different PV plants, such as those spread across multiple regions.

The system calculates energy production or production loss of wind turbines, as well as availability indexes split per component inside turbines, collector grid, the quality of the grid connection and the impact of weather conditions.

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**Wind power optimization system.**

Wind farms have many turbines each of which can create a “wake effect” on other turbines in close proximity. ABB collects data from the field itself and from weather forecasts. Depending on the relative position of the turbines, the system can suggest how each individual turbine should change its configuration to increase its power. For example, the system could recommend a position change of five degrees or a different pitch of the blade. The solution thus analyzes what is happening in field and, depending on wind conditions, suggests how the wind turbine should adapt their position to generate more power under the existing conditions reducing as much as possible mechanical stress.

Remote management solutions.

For customers who integrate renewable assets into their enterprise infrastructure, ABB provides enterprise SCADA solutions that enable remote management of the plants. The solution integrates, monitors and manages all generation assets into a single system, independent of the plant technology or provider. Being able to manage a fleet of renewable plants from one centralized location optimizes production while reducing costs.

Built on a hierarchical architecture, the SCADA allows for effective management of a few or hundreds of plants – whether they are solar, wind, geothermal or hydroelectric. The remote management system for each is based on common technology; therefore, the HMI, the power management software module and the forecasting application can easily be deployed at enterprise level across a wide range of renewable sources.

Remote management solutions are offered to customers in two different business models, Remote Control Center and Remote Monitoring Services.

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**Remote control center.**

For large-scale customers who want to monitor, as well as control renewable assets that spread across multiple geographies, Remote control center solution is offered. With this offering, customers not only gain access to monitor or control renewable plants but they can also perform plant diagnosis and conduct performance analysis as per IEC guidelines.

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Remote monitoring services.

For businesses that want to monitor renewable plants with minimal investments, ABB offers remote monitoring service as a SaaS (System as a service) offering. This affordable alternative allows instant monitoring with easy-to-install software packages. Customers have access to an intuitive web portal, through which they can access a wide array of services: performance ratio calculations, power forecasting, shading estimations, alarm handling and more. The service offering also comes with a pre-configured dashboard displaying critical health parameters of renewable plants.

Cyber Security

It is increasingly becoming essential to have measures ready to prevent cyber security breaches. We help our customers protect their renewable assets by complying with local and international cyber security standards including NERC-CIP regulations.

Our standard cyber security features include:
- Authentication and authorization (Role based access control)
- Auditability and logging
- Product and system hardening - robustness
- Virus protection
- Backup and recovery
- Security patch verification
- Secure communication

Global sales support services.

Backed by 125 years of technological leadership, domain expertise and the industry’s largest installed base, ABB helps customers optimize asset performance. Our after-sales support package empowers companies to take full advantage of global services team and reduce maintenance spend while better protecting assets and employees. Life cycle management and training can also be provided.

Predictive, preventive and corrective maintenance support services are offered via phone or remote monitoring and on site intervention on the installed systems. Customers have the option to opt for either round-the-clock (24x7) support or work-hour only support.

If customers opt to have ABB monitor their renewable power plants remotely while retaining, of course, web access to the plant data, customers can avoid making upfront hardware and software infrastructure investments in monitoring technology. This helps customers cut-down regular maintenance costs significantly.

Cyber security assessments and services as well as security patch and anti-virus upgrades are offered to customers for plant asset protection.
Customer benefits.

ABB’s scalable and highly flexible automation solutions provide renewable power plant operators and investors an affordable way to maximize their return on investment—however big or small the fleet—for minimal effort.

With a single automation and management system to oversee all plant assets, customers can reduce the time, effort, and cost they expend on overseeing and optimizing their renewable investments. 

Consultancy support throughout the project life-cycle from feasibility study to after-sales service.

Comprehensive plant monitoring, diagnostics, and control.

Integration of all plant assets into a single management system.

Optimized operations & maintenance of entire power plants.

Improved asset performance and increased power production.

Grid integration and grid code compliance.

After-sales support services across all global locations.

New age automation solution for renewable plants.