



ABB Digital Solutions for Energy Industries

Putting data into the correct context
- for better data-driven decisions.



ABB's Digital Solutions for Energy Industries combines and contextualizes "Big Data" coming from your plant, then applies artificial intelligence and machine learning to deliver productivity and sustainability benefits.

Energy providers today face increasing pressure to raise output, while controlling costs and reducing their environmental footprint.

New technology can help achieve this through better use of contextualized data from multiple sources, which increases efficiency and supports the energy transition.

ABB's Digital Solutions for Energy Industries provide proven ways for operators to make better data-driven decisions that optimize efficiency, reduce emissions, improve safety and increase profit potential.



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Digital Solutions for Energy Industries

Smart ways to improve plant efficiency and sustainability

Plant performance improvement in terms of both capital and operational expenditures is the focus of ABB Digital Solutions for Energy Industries. These solutions help plant managers, process operators, maintenance personnel and data security specialists to safely produce the most high-quality product at the lowest possible cost. Results include increased productivity, lower emissions, better cyber security and higher profit potential.

ABB's Digital Solutions for Energy Industries combines and contextualizes "Big Data" from various sources – such as operational and condition monitoring systems – and applies artificial intelligence and machine learning to unlock opportunities for major gains.

ABB's Digital Solutions for Energy Industries benefit you by combining:

- Data coming from different sources (control systems, field instruments, financial systems, and other IT),
- Our own deep operational technology and engineering experience in energy,
- Enterprise, edge and cloud computing tools.

ABB's Digital Solutions for Energy Industries:

- Are vendor-neutral, meaning they use data from any source and not just from ABB,
- Provide reliable and safe operations, 24/7/365,
- Don't interfere with daily operations,
- Are cyber security tested and compliant.

ABB's Digital Portfolio for Energy Industries support customers by providing:

- Contextualized data visibility and analysis at various levels, including personnel, plant areas and across enterprises,
- Insight that is easy to act upon, to increase plant yields, operate safely, reduce risk and predict failures,
- Instruments and tools to improve operational efficiency, while reducing waste and emissions.

These solutions can be applied to all segments of energy industries, from power generation, to oil and gas, to chemicals and refining, to hydrogen and renewables.



ABB Digital Solutions for Energy Industries include:



Sustainability and Asset Performance Management: To monitor harmful emissions, support customers with plant operations, reduce maintenance costs and extend equipment life,



Operational Excellence: To improve operating conditions and performance,



Energy Management: To optimize energy efficiency and grid stability,



Cyber Security: To protect customers' assets from malicious cyber intrusions.

These solutions are detailed on the following pages.

Sustainability and Asset Performance Management Solutions



Sustainability and performance go hand in hand. Our solutions are designed to provide flexibility, from field equipment to the plant to the enterprise. Benefits include:

- Lower operating costs
- Reduced emissions
- Fewer equipment failures
- Less inventory costs
- Longer equipment life

Solutions include:



Asset Performance Management: a suite of solutions to optimize performance and manage condition monitoring and diagnostics of plant assets. These solutions can be installed on premise, on edge or in the cloud.



AssetInsight™ Condition Monitoring for Rotating Equipment: software that uses smart sensors to acquire at fixed intervals data such as temperature and vibration from rotating equipment. Machine learning and artificial intelligence applied to this data establish a standard operating baseline, then recommend actions to avoid unplanned failures should operating conditions fall outside the baseline.



AssetInsight™ Condition Monitoring for Electrical Systems: Uses smart sensors to collect data at fixed intervals on temperature, surface discharge and mechanical issues. Machine learning and artificial

intelligence applied to this data establish a standard operating baseline, then recommend specific actions to avoid unplanned failures should operating conditions fall outside the baseline operating range.



Try-and-Buy Kit: testing supplied free of charge for two to three months to help users evaluate potential benefits of **ABB's AssetInsight Condition Monitoring of Rotating Equipment**. The kit includes two smart sensors, a gateway to collect data, and a microprocessor pre-loaded with AssetInsight software. With support from ABB's Collaborative Operations Centers, users can learn to operate the system, understand the reports and detect imminent issues that may cause problems, with the aim to reduce maintenance costs. After testing AssetInsight, users can then decide to purchase it.



Continuous Condition Monitoring: helps avoid production outages by monitoring critical equipment using ABB's MCM800 condition monitoring module for collecting data on rotating equipment, and then analyzing and diagnosing it with ABB Analyst Software.



Performance Management and Diagnostic solutions: collect data from assets and then validate, contextualize and compare them with optimal data derived from historical baselines, operating conditions, and equipment age. Allows customer to improve plant performance and extend asset life.



Genix APM: an enterprise-grade software suite offering a complete, modular AI-driven asset performance management solution. Genix applies predictive and prescriptive analytics on assets and process areas, from plant to enterprise, with the purpose of generating actionable insights to achieve maximum uptime, safety, and performance.



Advanced Monitoring System (AMS): Used in Italy, but configurable for other countries, AMS monitors pollutants and reports their values to local authorities, in compliance with DDS 4343 and UNI17255 regulations. The AMS solution includes measurements, analytics, continuous monitoring and OWASP-compliant cyber security.



Operational Excellence Solutions



Designed to improve efficiency in operating conditions and performance, these solutions help users to:

- Monitor, analyze and improve plant performance,
- Reduce energy consumption and emissions,
- Reduce operating costs,
- Optimize production.

Operational Excellence solutions include:



Manufacturing Operations Management: a suite of applications supporting visibility, insight, understanding and control throughout plant operations. It ensures efficient operational execution through dedicated modules for quality management, document management, materials management and performance management.



Visual Remote Support: guides on-site operators with experts connected remotely from ABB Collaborative Operations Centers and/or from user control rooms. The solution is installed on a mobile device (smartphone, tablet, smart glasses etc.) from which users remotely engage with ABB experts and share data, documents, images and video clips.

The solution facilitates problem resolution with the help of experts, but without the cost in time and money that travel involves. It can also be used for onsite training for new employees, and to reduce human errors caused by inexperience.





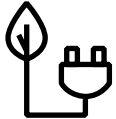
Advanced Process Control (APC): a suite of solutions that control and optimize plant performance. APC includes:

- Predict & Control: multivariable model predictive control,
- Inferential Modeling Platform: combining neural networks and statistical regressions,
- APC Performance Manager: allowing continuous optimization by tracking APC performance and suggesting ideas for improvement.

OPC-compliant connectivity enables each product to operate and communicate with any ABB or third-party control system.

APC solutions are supported by our engineers who provide services such as feasibility studies, to operation and maintenance of the solutions.

Energy Management Solutions



ABB's Energy Management and Energy Profile Coordination Solutions help to:

- Reduce energy costs and emissions,
- Monitor, control and predict energy production and usage,
- Report energy consumption or reduction data to authorities,
- Manage bi-directional energy flows by controlling the loads and shaving peaks in power grids.

Solutions include:



OPTIMAX® for Industrials and Commercials: enables industrial, commercial, island and other microgrids to cut energy costs by 5-10% without impacting operations. It provides day-ahead optimizations based on weather and load forecasts, and then coordinates the customer's energy resources - in real time - to balance supply and demand using dynamic load shedding. With optimized supply and demand, industrial sites and microgrids can readily add low-cost but intermittent renewables, without risking grid reliability or stability. And when favorable pricing or production conditions exist, the sites and microgrids can even sell surplus energy production and capacity.



OPTIMAX® for Virtual Power Plants: aggregates and optimizes decentralized energy resources into a virtual power plant. Users can buy or sell on wholesale energy markets or provide energy as a subscription service.

Suppliers, brokers and aggregators can optimize production and also respond quickly and flexibly to changing power markets by operating internally as a virtual power plant.

Vertically integrated municipal utilities and smart cities can balance energy production with consumption across all of their services (water, district heating, combined heat & power) using powerful day-ahead and intra-day planning based on weather and load forecasts.



OPTIMAX® for Green Hydrogen: supports ABB's automation and electrification solutions so that energy producers and industrial plants can coordinate assets, generation and production to optimize the total value of energy. This helps:

- Optimize total asset performance,
- Simulate and virtualize the most productive energy flows,
- Achieve the energy flows through adaptive control,
- Forecast energy demand and supply, including renewable energy.



OPTIMAX® for Renewables integrated with Condition Monitoring and Predictive Diagnostics: supports the development of renewable energy models through operation excellence, and also enables energy efficiency and reliable operations through maintenance excellence. This solution:

- Predicts the output of a wind or a solar PV farm,
- Coordinates power production with the atmospheric conditions and relevant forecasts,
- Evaluates renewable farm performance and availability,
- Analyzes equipment health (e.g., wind turbines) and performance loss,
- Optimizes production.



Water Management System (WMS):

- Connects different types of information coming from various systems or plants,
- Harmonizes, aggregates and contextualizes data to feed specific cognitive modules,
- Enhances situational awareness,
- Supports customers in taking the best decisions for improving operational efficiency.

WMS collects data from different sources, and then contextualizes it to present on a web-based dashboard. Using a digital twin, WMS allows leakage detection, localization and water quality monitoring at different levels, from the highest (the complete network) down to specific districts in the network.



Energy Profile Coordinators (SAPP, SART and UVRx):

Used specifically in Italy, but configurable for other countries if needed:

- **SAPP** is a solution for automatic reception of Energy Production Plans, allowing automatic modification of the plans according to power authority balance orders,
- **SART** and **UVRx** support customers to manage voltage variations in all the nodes of the National Power Grid.

These solutions benefit customers who participate in the energy market.



Cyber Security Solutions



Cyber security is critical to ensure reliability of plant systems. ABB Ability™ Cyber Security Services mitigate and manage cyber risks by identifying potential threats, automating compliance efforts, and defending against cyber-attacks.

Cyber threats today are unfortunately very real, and all industries face increased risk of cyber-attacks. Automation systems are an especially

attractive target, due to the damage that can be caused.

Malicious attacks in the process industries have already caused hundreds of millions of dollars of losses globally, and dangerous threat actors continue to find new ways to exploit and attack data vulnerabilities.



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01 Operating system patches and antivirus signatures are validated by our R&D department before being distributed to the DCS system at the customer site.

ABB Cyber Security solutions minimize cyber risks and provide high-level protection for automation assets:



Cyber Assessments: Gain an understanding of the cyber security posture of your systems,



Cyber Security Controls: Defend against threats by implementing cyber security controls through:

- Cyber Security Protect Base: includes a firewall to segregate ABB control networks from other industrial systems in a plant and from non-operational technology related networks. It includes cyber security centralized management software integrated with antivirus and with Microsoft WSUS for operating system patching.⁰¹ Provides backup and recovery software to centrally manage the backup and restore functionality of all system nodes. Two independent network attached storages (NAS) are supplied in order to store all backup images,
- Cyber Security Protect Automatic: extends Cyber Security Protect Base functions, and includes automatic download from ABB repository of antivirus signatures and operating system patches. Downloads operating system patches and antivirus signatures via the ABB Remote Access Platform to create an encrypted and secured communication channel between an ABB datacenter and a dedicated DMZ network connected to an ABB onsite control system,

- Several complementary packages are available in addition to the packages above, including:
 - Whitelisting,
 - System Hardening,
 - Device Control,
 - Centralized User Access Management,
 - Restore Test,
 - Firewall segregation of third-party systems,
 - Event Monitoring,
 - Network Intrusion Detection,
 - Asset Inventory.



Training on Cyber Solutions: Reduce incidents by equipping your team with cyber security insight,



Maintenance: Ensure continuous protection of your operational technology systems with the help of our skilled industrial cyber security engineers,



Consulting: Implement your cyber security projects with the help of our global network of industrial cyber security experts,



Security Operations: Leverage our global network of experts through ABB Collaborative Operations Centers for 24/7 continuous monitoring and support.

ABB Ability Collaborative Operations Center

ABB's integrated digital offering covers all industries and extends from individual components to the cloud, with solutions and services that harness the full potential of the industrial Internet of things, transforming data into actions that create value for energy industries.

The value offered by the ABB Ability™ Collaborative Operations Center comes from combining digital applications with expertise. ABB deploys experts in automation technologies and software in our Collaborative Operations Centers. Services are delivered and supported 24/7 through telephone and computer links, and through a team of experts under a service agreement, supported by software that manages and monitors customer requests.

The customer request system used is integrated with Salesforce and allows detailed tracking of all calls or emails received by the Center per the service agreement, and provides customers with a report on services provided and actions taken.

ABB supports our digital solutions via Collaborate Operations Centers. Each customer is identified by a code which confirms service agreement details and services to be provided.

ABB pays particular attention to IT security. All data is managed in compliance with the highest level of IT security, both for on-site installations and connections to the Collaborate Operations Center in Genoa. Services include:

- Preventive and predictive monitoring services,
- Cyber security services,
- Installation, configuration, maintenance and supervision of monitoring systems,
- Back-office services.

All services are provided by phone or through ABB's Visual Remote Insight application.





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