Introducing ABB in Power Generation
Overview
Global Power Generation
Market outlook to 2025 / Challenges in front of us

- Utilities with mixed portfolio of conventional and renewable generation
- Conventional power plants with changed operational profile and life time policy
- Growing demand of power and water in emerging markets
- Distributed generation
- Regional diversity of investments in power & water with majority of investment in gas generation and renewables
- Global EPCs with strong push into new markets
- Footprint in emerging markets
- After sales service driven by life-time extension and energy efficiency
Global Power Generation
Business positioning

- ABB’s Power Generation is a leading provider of integrated power and automation solutions for conventional and renewable power plants, and water applications
- Our comprehensive portfolio includes turnkey electrical and automation systems, including instrumentation, all supported by a service offering to optimize performance, reliability, and efficiency, while minimizing environmental impact
Global Power Generation
Our portfolio

Power and Water Automation
Instrumentation and control systems and products for all power and water applications

Plant Electrification
Turnkey projects for integrated electrical balance of plant for thermal and water, PV, hydro and pump storage plants

Service and Energy Efficiency
All service activities performed on ABB and non-ABB products / systems, and customer processes

Power and water utilities, municipalities and EPCs specialized in power plants and IPPs for industrial conglomerates
Global Power Generation
Competitive advantages

- Cutting edge technology with a track record of innovation
- Product portfolio covering the entire plant
- Strong local presence supporting customer focus
- Global manufacturing and engineering footprint
- Globally installed base and proven track record
- Significant service presence to support installed base
- Skilled, experienced workforce
Global Power Generation
Facts about ABB in power generation and water

- Global leader in power generation and water industries
- Reliable supplier in all power generation and water applications
- Turnkey capabilities supported by
  - First class product selection
  - Broad process and system know-how
  - One of the largest installed bases in the world
# Global Power Generation Core management team

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Department</th>
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<tbody>
<tr>
<td>Managing Director</td>
<td>Massimo Danieli</td>
<td>Global Power Generation</td>
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<tr>
<td>Controlling</td>
<td>Ferdinand Schulz</td>
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<tr>
<td>Global Sales and Marketing</td>
<td>Markus Bruegmann</td>
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<tr>
<td>Technology</td>
<td>Marco Sanguineti</td>
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<tr>
<td>Communications</td>
<td>Stefania Mascheroni</td>
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<tr>
<td>Product Management</td>
<td>Marina Bill</td>
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<td>Human Resources</td>
<td>Federica Momoli</td>
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<td>Quality, OpEx &amp; HSE</td>
<td>Tatiana Oswald</td>
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<td>Supply Chain Management</td>
<td>Thomas Frizlen</td>
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<td>Power and Water Automation</td>
<td>Ingo J. Wagner</td>
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<tr>
<td>Automation Products</td>
<td>Marina Bill</td>
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<tr>
<td>Plant Electrification</td>
<td>Frederic Trefois</td>
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<tr>
<td>Service</td>
<td>Stefan Hatt</td>
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Global Power Generation
Footprint - equipment and value-added services

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<td>• Supply chain</td>
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<td>• DCS hardware and software</td>
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<td>• HV and MV equipment</td>
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<td>• MV and LV drives</td>
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<th>Low-cost manufacturing for main in-plant equipment</th>
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<td>• DC and UPS system</td>
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Global Power Generation
Symphony Plus automation: defining great performance

Supports power and water industry's diverse portfolio with a simple and flexible system architecture

Drives effective operations with complete plant information

Ensure plant integrity and confidentiality with inherent system security

Ensure plant integrity and confidentiality with inherent system security

Achieve total plant automation with a single control and I/O platform

Simplify design and maintenance with a unified engineering workbench

Improve plant visibility through comprehensive electrical and device integration

Sustain profitable growth by transforming data into actionable business decisions

Optimize system design with embedded intellectual know-how

Protect capital and intellectual investments through seamless lifecycle management

Sustain profitable growth by transforming data into actionable business decisions
Global Power Generation
Symphony Plus for power generation and water sectors

- Specifically designed control for power generation and water plants
- Evolution of Symphony control systems
  - Backward compatibility with previous systems
    - From Network90, Infi90, to Harmony
    - From Contronic to Melody
  - Continues ABB tradition of “evolution without obsolescence”
- Key characteristics include:
  - Simple system architecture and scalable control platform
  - Seamless integration for a secure and reliable control environment
- Key focus areas are:
  - Improving plant productivity and energy efficiency
  - Ensuring operational security and plant safety with cyber security
  - Lowering cost of ownership
Symphony Plus distributed control system
ABB’s control systems expertise at your service

more than 30 years of continuous system enhancement and support ‘Evolution without obsolescence’

6,500+ Symphony Plus DCS running worldwide

400+ Water, waste-water and desalination installations worldwide

Symphony Plus

3,000+ Turbine control systems in operation

40+ GW of additional capacity controlled since 2011
Symphony Plus distributed control system
ABB's control systems expertise at your service

80,000+
Operator consoles running worldwide

Symphony Plus

250,000+
Symphony controllers installed worldwide

1.5+ Million
I/O points being controlled
ABB provides well proven I&C, electrical and hydraulic solutions for all makes and types of steam, gas and hydro turbines for new and retrofit business.
Global Power Generation
Turbine control solutions

- Control solutions for all turbine types (steam, gas, hydro, etc.) sizes and manufacturers
- Flexible, scalable and open system architectures
- Technologically advanced, cost efficient solutions for both retrofit and greenfield applications
- Single-vendor solution for all turbine functions
- Governor, excitation, protection, condition monitoring, auxiliary systems, etc.
- Integrated DCS, turbine control, condition monitoring, synchronization, excitation, static frequency converters and protection systems
- Partnerships with major turbine OEMs around the world providing proven and standard solutions
- Mechanical and hydraulic upgrade options designed to improve availability and performance of aging mechanical systems
- Field service expertise including turnkey installation
- Turbine specific research and development
- Life cycle policy of “evolution without obsolescence”
Global Power Generation
Total plant electrification: defining value-added integration

Plant common facilities
- Plant lighting
- Communication and CCTV
- Cabling system
- Earthing and lightning protection system

Power evacuation and grid connectivity
- HV substation equipment
- Tele-protection system
- Control and protection
- Substation automation system
- Metering
- Station transformer

Generated power evacuation
- Unit auxiliary transformer
- Generator circuit breaker
- IPB
- Generator step-up transformer
- Transformer monitoring
- Protection equipment

Field instrumentation
Primary
- Pressure, temperature, flow and level transmitter
- Positioner and position transmitter
- Combustion instrument
Analyzer
- Flue gas
- Continuous emission monitoring system (CEMS)
- Steam and water analysis (SWAS)

Total plant automation
- Boiler control
- Boiler protection / burner management
- Turbine control
- Condition / vibration monitoring
- Plant auxiliaries control
- Operator workplace
- Engineering
- Alarm management
- Electrical and device integration
- Information management
- Performance monitoring
- Plant optimization
- Asset management
- Enterprise management
- Cyber security

Electrical switch room
- MV / LV switchgear
- Motor control center / distribution protection
- Non-segregated phase bus-duct
- Distribution transformer
- Diesel gen-set and UPS
- Variable frequency drive and soft starter
- Control and safety systems cabinets
- Emergency diesel generator
Global Power Generation
Integrated electrical, control and instrumentation systems

Integration of electrical, control and instrumentation systems

Consulting enterprise & technology leadership
Risk management
Improved plant Performance & Efficiency
Integrated competitive Solutions
Fast-track E-Houses

Electrical System know-how
Health & Safety
Turnkey Capability
Life cycle Support & Services
Global Presence & References

De-risk is a huge part of “value” offered in integrated electrical, control and instrumentation systems solution

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Global Power Generation
Integrated electrical, control and instrumentation solutions for fossil-fired power plants

- Partnership and collaboration from all stages of project
- Risk mitigation
- Simplified plant control
- Coordinated multi-disciplined design
- Sustainability
- Involvement from conceptual design to grid connectivity
- Minimizing commercial and technical risk
- Seamless integration of automation and electrical interfaces on a unified platform
- Optimization through plant design, engineering, automation and site management
- Reduce environmental impact

ABB deliverable
Reliability
Availability
Redundancy
Performance
Energy efficiency

Fossil-fired power plants
Global Power Generation
Integrated electrical, control and instrumentation solutions for open, close cycle power plant

- Competitive solutions and optimized conceptual design
- Global footprint
- Quality & time effectiveness
- Cost effectiveness
- Total plant solution
- Integrated solution for grid connectivity in plant automation interface for efficient and reliable power generation
- Factory-tested, pre-assembled modular solutions for fast track projects
- Strategic global sourcing and global operation centers
Global Power Generation
Integrated electrical, control and instrumentation solutions in figures

- More than 10 years of EBoP experience
- 55 + GW plant delivered with EBoP solutions
- 250 + EBoP projects delivered since 2011
- More than 150 companies in 50 countries benefitted from ABB’s EBoP solutions
Global Power Generation

Modular containerized solution

- Delivered more than 500 factory tested modules to enable speedy project completion and commissioning for fast track projects.
- Pre-assembling and pre-testing in the factory produces high quality and standardized modular deliverables.
- Customers appreciate short erection and commissioning schedule which leads to lesser site activities and efforts thus reduces customers’ risks.
- Appropriate for installations with restrictions due to security and time constraints.

Prefabrication and integrated tests

Simplified transportation

Ease of installation and commissioning

Schedule

Mobility

Standardization

Reduced risk

Seamless and integrated

Cost effectiveness
Global Power Generation
Integrated electrical, control and instrumentation for water plants

Extensive global experience
- 50 years experience in water industry
- Combining in-house technology with process and application know-how
- Notable global footprint from smallest to world’s largest

Seamless integration
- Symphony Plus automation platform enables seamless integration of field devices, process and PLC automations, electrical, SCADA, business and maintenance systems

Desalination plants

Pumping stations

Wastewater

Operational excellence
- Single vendor interface, ensuring continuity, efficient project execution and on-time delivery

Energy efficiency
- Efficient motors and drives - cuts pump energy consumption and reduce motor stress and wear & tear
- A suit of dedicated optimization tools

Instrumentation, control and electrical solutions for entire water plant, including substation
Global Power Generation
Integrated solutions for photovoltaic power plants

- String monitoring
- Output forecasting
- Reactive power support, frequency support
- Inverters and transformation centers
- Substations and protections
- Security access control
- Supervisory control
- Grid dispatching control
- Solar energy optimization
- Installation and commissioning
- O&M concepts
- Remote plant monitoring
- Maintenance on site
- More than 1,000 MW installed

- ABB electrical and automation solutions for photovoltaic plants maximize performance for rapid return on investment and long plant operating life
- Standard modular sub-systems are fully interoperable, enabling fast, efficient plant construction
- ABB project development services include design, selection of PV modules, trackers and mounting structures
Global Power Generation
Integrated electrical, control and instrumentation solutions for hydropower plants

In partnership and serving end-customers, EPCs and turbine / generator manufacturers

5 + MW onwards
- Run-of-river, reservoir, pump storage,
- Low- and high- head plants,
- Greenfield and rehabilitations

Full solutions
- Complete design, engineered solutions
- Substation, electrical packages and automation solutions
- Installation, commissioning and lifecycle commitment

Optimal integration
- Seamless integrated electrical and automation solutions based on Symphony Plus
- Protection and excitation system
Global Power Generation
Integrating renewables into microgrids

Micro-grids
For independent, reliable and affordable access to distributed power
Increased penetration of renewable resources lowering environmental impact
Combine grid stabilization – PowerStore™ – and automation – Microgrid Plus

Use our system integration capability – help integrate renewables
Global Power Generation
Microgrids in figures

80 + Projects worldwide

75 + MW total size of all microgrids controlled with Microgrid Plus system

25 + years of experience

Fossil fuel saved in
+10,000,000 liter/year

CO₂ emissions reduced
+30,000 tons/year
Global Power Generation
ABB covers the entire service value chain

Rapid Response
We guarantee fast and flexible service response to maximize equipment availability

Lifecycle Management
We provide powerful tools and a broad knowledge base to optimize and extend lifecycles of production equipment

Operational Efficiency
We optimize the usability and efficiency of equipment and systems to increase industrial productivity

Performance Improvement
We are a strategic partner for improving productivity, usability, reliability, safety, cost-efficiency, energy-efficiency and emissions control
Global Power Generation
ABB service solutions prevent system obsolescence

Advanced ABB service solutions provide continuous automation and control system upgrades that make the most of your investment, while reducing operation and maintenance costs.

Using past investments...

- ‘Evolution without obsolescence’ policy grants backward compatibility between ABB’s new offerings and heritage systems, and support across the investment life cycle
- All ABB legacy systems supported
- Seamless evolution to new Symphony Plus control technologies tailored to specific needs and budgets

… to solve future needs

- ServiceGrid solutions match operational and maintenance needs of a power generation facility; planned delivery transforms routine maintenance tasks and frees resources to proactively focus on power production
- Increase performance and efficiency, extend asset life, complement technical resources, protect financial and intellectual investment, maximize reliability
Global Power Generation
Main benefits of our service portfolio

- Protect investments with stepwise evolution and upgrades of ICE systems
- ‘Evolution without obsolescence’ ensures new generations of ABB plant automation enhance and are backwardly compatible with prior systems
- Upgrades provide increased plant safety, availability, reliability and profitability
- Options for an aging installed base include upgrades, evolution or replacement strategies
- Minimize energy consumption, cost of ownership, while prolonging asset operating life
- All-from-one ABB services cover ICE equipment, from generator terminals to grid connections
- Enhanced service contracts provide performance-related benefits protecting financial and intellectual investments
- Valuable support programs identify plant needs, diagnose inefficiencies, remedial measures and product evolution strategies that improve, maintain equipment performance
Global Power Generation
Service in figures

- We offer our service capabilities in 48 countries and 8 regional service centers
- All services out of one hand: ABB covers instrumentation, control and electrical equipment - from generator terminals to grid connection
- All plant types are being serviced: gas and CCPPs, steam included nuclear, diesel, hydro, wind, solar, WtE, biomass, water
- ABB energy efficiency solutions can improve power output to the grid by up to 10% without increasing fuel consumption
Global Power Generation

Summary

- One ABB approach brings global competence to local projects
  - With ABB project management experience
  - Optimized costs using global procurement
  - Reduced commercial risk with ABB guarantees

- Added value to client
  - Increased availability
  - Greater flexibility
  - Optimized operating costs
  - Support to finance projects

- Supports fast track projects
  - Shared responsibilities
  - Guaranteed delivery
  - Access to complete product range

For more information, visit our websites
new.abb.com/power-generation
new.abb.com/water
Power and productivity for a better world™