



# ABB Power Grids Service

## Your strategic partner for a changing world

# Changing power landscape

## A successful power future integrates the old with the new

Advancements in power technologies and evolving power needs are rapidly changing the power landscape. From challenges like aging infrastructure and a rapidly retiring workforce, to mandates for clean energy and an increasingly regulated environment, to new opportunities created by technology advancements in distributed energy and energy storage, industry and business leaders must stay agile and adapt quickly.

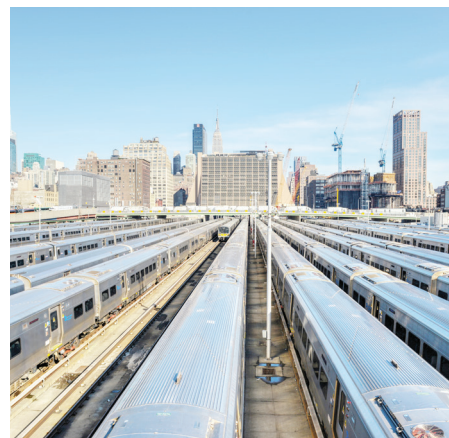
However, some things haven't changed. The world still needs safe, reliable power to meet its often-growing, ever-changing needs. Current assets, some decades old, will have to be integrated with newer intelligent devices. Budgets will have to be carefully managed to ensure the right investments are made and objectives met.





# Strategic thinking required on key issues

Resiliency. Efficiency. Safety. Security. Sustainability. Businesses and grid operators have many of the same power goals. To reach these goals, there will need to be strong collaboration between those who generate, transmit, and distribute electricity and those who develop the technologies required to overcome the challenges of the modern grid. As the grid evolves and new technologies allow consumers to produce electricity as well, even closer collaboration will be needed.



Despite all of the uncertainty and the many challenges, certain issues rise to the top of the list, year after year. For many, however, the situation is becoming critical. To create a stable future, current challenges must be addressed so that a solid foundation is laid—one that prepares your organization to tackle whatever the future holds.

## Ensure power availability

Today, an estimated 1.3 billion people worldwide lack access to electricity, and daily outages are a fact of life in many major cities. Even in more developed areas, brownouts and blackouts are increasing as the nature of loads becomes more challenging and puts greater stress on aging infrastructure.

## Reduce maintenance spend

The average power plant is over 30 years old. The average power transformer is even older. Many of the technologies that comprise the power grid were installed in the last century and based on designs Thomas Edison would recognize. Modernizing the grid is going to take considerable CapEx resources and will not be accomplished overnight. Grid operators and business leaders need to find ways to manage operational expenses, including maintenance, and extend the life of their assets.

## Protect assets and people

Safety is a key concern for the entire power industry, and these concerns are growing as infrastructure gets older and the current shortage of experienced workers becomes even more severe. Assets are also under threat from a wide range of physical and cyber security attacks that not only threaten the health of these assets, but power reliability as well.

## Fit for future

Modernizing the grid is going to take a significant amount of investment in new technologies as well as the upgrading of existing technologies with intelligent sensors, monitoring solutions, and predictive analytics to take full advantage of the emerging IIoTSP. At the same time, grid operators and industry need to optimize operational and capital budgets. These competing requirements put a real strain on the organization, and leaders need to know that the investments they make today will continue to serve them well into the future.

# Transformational change for asset intensive industries

ABB combines industry knowledge with a broad portfolio of IT/OT software and power and automation products and services to help drive transformational change in asset intensive industries.

In an increasingly digital world, grid operators and business leaders can start to tackle their toughest challenges in ways that weren't available to them just 20 years ago. Millions of intelligent devices on the grid collect data on power usage and efficiency. Asset management allows grid operators and operations managers to monitor the health of their assets, facilitating approaches, such as condition-based maintenance, that help meet uptime objectives, drive down capital and operational expenses, and improve safety.

Power Grids Service can help you to optimize your asset performance. Leveraging 125 years of technology leadership, domain expertise, and the largest installed base in the industry,

we deliver value through consulting, service, and software solutions that cover wide range of electrical asset systems including:

- Substations
- High-, medium- and low-voltage switchgear
- Transformers
- Substation automation
- Network control
- HVDC interconnections
- Flexible AC Transmission Systems (FACTS)
- Power cables
- Offshore Wind Connections (OWC)



“The Industrial Internet of Things, Services and People (IIoTSP) is fueling a fourth industrial revolution that promises to profoundly transform the way we approach power generation, transmission, distribution, and consumption.”

1. Generation
2. Transmission
3. Distribution
4. Industry
5. Microgrids
6. Infrastructure



# Service and support to meet your objectives

We may not make the world go round, but ABB's Global Customer Care team does its part to keep it running. Through our four key pillars of focus, we provide ongoing technical and functional support to help you meet your objectives.

## Rapid response

When something goes wrong, you need it fixed fast! Whether it's spare parts, replacement equipment, or repairs, our Care agreements are tailored to your needs. Our remote services and 24/7 call center also provides quick troubleshooting and root-cause analysis services so you can identify the most effective course of action and address problems before they grow.

## Operational efficiency

Need to modernize or address a sticky issue? Our consultants can help you assess the challenge and design cost-effective, fit-for-future solutions. In addition, we offer a wide range of commercial and proprietary enterprise-level applications to help you improve operational efficiency.

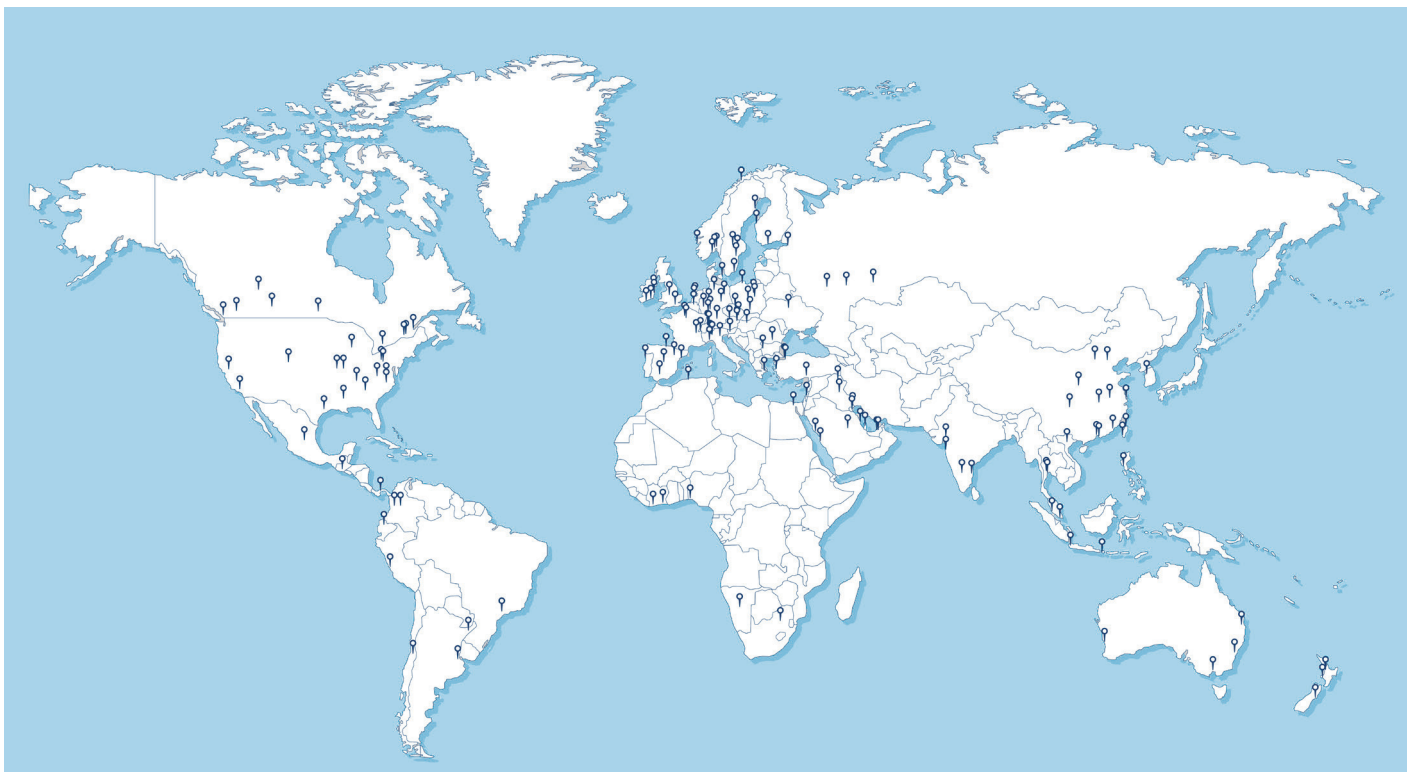
## Performance improvement

Hitting key performance targets can be tough to do when you're trying to keep costs under control. Our team can devise solutions that help you hit your targets as well as provide software applications that deliver actionable insights for future performance improvements.

## Life cycle management

Cradle to grave, Power Grids Service is there to help you take care of your assets by providing installation and commissioning services, maintenance, replacements, spare parts and consumables, and training. We can also help you extend the life of your assets with extensions, upgrades, and retrofits. When it's time to retire an asset, we offer end-of-life services that help you do so cost-effectively and responsibly.

ABB Power Grids Service has more than 150 Customer Care centers strategically located around the globe. These one-stop-shops are staffed by 6,000 professionals with extensive industry and service experience on a wide array of power equipment and systems. Our team of power experts and analysts can help you address today's toughest power challenges and prepare you to meet the challenges of future.



# Extensive service portfolio



## Power consulting

- Grid power system studies
- Asset management
- Software (sales & management)
- Training
- Economic feasibility analysis
- System dynamics & control studies
- Reliability studies
- Diagnostics
- Design & engineering
- Renewables consulting
- Failure analysis
- Maintenance operations improvement
- Cyber security

<http://new.abb.com/power-consulting>



## Substations

- Brownfield projects
  - Substation retrofits and upgrades
  - Substation extension
- Service agreements
  - Substation inspections
  - Preventive maintenance
  - Predictive maintenance and diagnostics
- Corrective maintenance and repairs
- Spares and consumables
- Training
- Turnkey life extension and new substation solutions
- Reliability management services
  - Substation assessment
  - Substation care
  - Substation LifeStretch™
- Engineering and advanced services
- Installation & commissioning

<http://new.abb.com/substations/service>





# Single point of contact



## Grid automation

- Advanced services
- Engineering and consulting
- Extensions, upgrades and retrofit
- Installation & commissioning
- Maintenance
- Repairs
- Replacements
- Care agreements
- Spares and consumables
- Training
- Asset health center
- Enterprise software
- Network control
- Site audit
- Cyber security care



## HV switchgear

- Service agreements focused on life cycle management
- Installation & commissioning
- Training
- Spares and consumables
- Preventative maintenance, inspection and diagnostics
- Repairs
- Extension, upgrade, retrofit and replacements
- Advanced services:
  - Predictive maintenance
  - Radiography
  - Energy efficiency
  - Asset optimization
  - Condition monitoring
- End of life services
- Engineering, consulting and environmental services

<http://new.abb.com/network-management/service>



<http://new.abb.com/high-voltage/service>



# Seamless processes and relentless execution



## Transformers

- Transformer Intelligence™
  - Expert services
    - Oil & gas analysis
    - Advanced diagnostics
    - Fleet condition assessment (MTMP)
    - HV testing (TrafoSiteTesting™)
    - Training
- Asset management solutions
- Monitoring and diagnostics
- Sensor technologies
- Repair
  - Workshop repair
  - Onsite repair (TrafoSiteRepair™)
- Spares and consumables
- Site services
  - Installation and commissioning
  - Basic maintenance
  - Advanced maintenance
    - Bushing replacements
    - Cooling system overhaul
    - Oil regeneration
    - On-site LFH drying
    - Tap changer overhaul
    - Transformer rehabilitation (life extension)
- Service agreements

<http://new.abb.com/products/transformers/service>



## HVDC, OWC

- Turnkey installation & commissioning
- 24/7 phone support
- Rapid response
- Maintenance
- Spares and consumables
- Service agreements
- Repairs
- Extensions, upgrades and retrofits
- Training
- Asset management
- Remote access service
- Cyber security

<http://new.abb.com/systems/hvdc/hvdc-service>





# Committed to our customer's success



## FACTS

- Rapid response
  - 24/7 phone
  - Remote service
  - Corrective maintenance
- Scheduled maintenance
  - Onsite preventive maintenance
  - Remote preventive maintenance
- Evergreen
  - Spares and consumables
  - Updates
  - Upgrades
- Consulting
  - FACTS system assessment
  - Cyber security
- Training
  - Classical training
  - Remote instruction

<http://new.abb.com/facts/service>



## Power cables

- Service level agreements
- Repairs
- Spares
- Cable replacement
- Cable analysis
- Turnkey repair
- Guaranteed expert availability
- Fault location services

<http://new.abb.com/cables/service>



# ABB Power Grids Service delivers

## Ensure power availability Dubai International Airport



### Challenge

Dubai International is the world's busiest airport for international passenger traffic and the second busiest hub in terms of international airfreight. In 2015, it handled more than 78 million passengers and 2.5 million tons of cargo. In 2016, the airport has already seen a 6.8% increase in the number of travelers and a 3.4% increase in cargo. Even a momentary disruption in power can have devastating effects on travelers, flights schedules, baggage handling, cargo, and the many thriving retailers who cater to travelers in the airport's busy concourses.

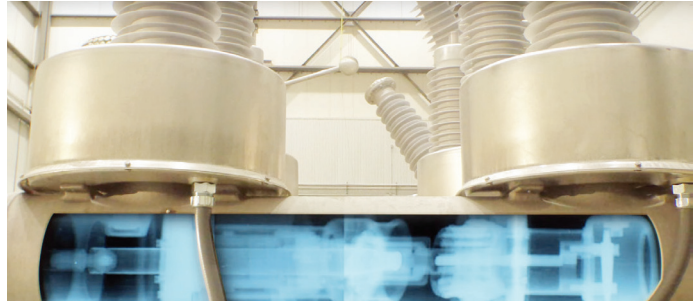
### Solution

ABB delivered the first SCADA system to Dubai International in 2004, and the monitored network has grown five-fold since then. For instance, in 2012, logic was added to automatically connect loads to the system after ramping up emergency gas turbines in the event of a blackout. In 2016, a system upgrade will replace the central computers and deploy the latest version of ABB's Network Manager software and connect it to the existing field devices (remote terminal units, bay control units, and main distribution boards).

### Result

SCADA systems and Network Manager allow system operators to keep an eye on the health of the power grid that serves the airport's many functions. In addition, as Dubai International approaches its maximum throughput capacity of 90 million passengers annually, these upgrades will increase the operational reliability and efficiency of the power network to support large-scale expansion plans.

## Reduce maintenance spend National Grid Greystones



### Challenge

The Greystones substation was formerly the feed-in point for a power station that has since been decommissioned and dismantled. As part of a wider scheme to install a new fleet of shunt reactors at several sites, National Grid wanted to give the 20-year-old HV switchgear that once controlled the output of the power station a second lease on life as the connection point for two reactor units. However, National Grid was not the original substation operator, so they did not have a full maintenance history of the switchgear, and they needed to evaluate its condition before returning it to service. Conventional methods would involve opening of the switchgear, downtime and associated risks with it.

### Solution

National Grid called on Power Grids Service to assess the current condition of the switchgear and to ensure that it will be ready for its new role. ABB conducted a Computed Radiography assessment, which uses an x-ray source and digital capture equipment to see inside the switchgear while it is live. This enabled operators to quickly gain an accurate picture of the condition of equipment, including wear on contacts and the existence of any defects with no downtime or intrusion into the equipment.

### Result

Traditional switchgear inspection requires extensive downtime to disconnect and earth switchgear before capturing insulating gas for recycling. Switchgear must then be physically dismantled for inspection then reassembled. Not only is this time consuming and expensive but it also introduces the risk of damage or error during fitting. Computed Radiography allowed National Grid to realize significant savings in the time and maintenance expense associated with the inspection of HV switchgear, and gave the utility the confidence they needed to proceed with the shunt reactor project.



## Protect assets and people Ministry of Electricity and Water, Kuwait



### Challenge

After more than 30 years in service, a 300/132kV GIS substation in Kuwait was reaching the end of its design lifetime. Substation failure could not only affect the availability of power in the area, but also potentially endanger the lives of the utility's employees as well as damage other surrounding assets. Since substation assets represent a significant investment, the Ministry of Electricity and Water needed to weigh its options: replace, repair, or refurbish?

### Solution

ABB Power Grids Substation Services conducted an onsite substation assessment based on analysis of the components' condition and how its failure could affect system reliability. This risk modeling led to a tailored rehabilitation program that included a selective refurbishment of the GIS and the power transformers as well as modernization of the protection and control systems.

### Result

The reliability modeling of the asset enabled the Ministry of Electricity to make a conscious risk-management decision to balance the investment required to extend asset life with the benefits of different technical alternatives benchmarked against multiple criteria including financial, reliability, and technical KPIs. The refurbishment, upgrades, and modernization program will allow the utility to extend the life of key assets and avoid the immediate costs of replacement while optimizing capital and operational expenditure.

## Fit for future American Electric Power



### Challenge

AEP is one of the largest electric utilities in the U.S., serving nearly 5.4 million customers in 11 states. Its 40,000-mile transmission network is the largest in the nation and includes more 765kV extra-high voltage transmission lines than all other U.S. transmission systems combined. AEP's power transformers are key assets, but over half of them are reaching or have exceeded their expected life span. To ensure reliability and control costs, AEP needed to prioritize replacement of aging transformers and optimize maintenance on the remaining assets.

### Solution

In 2012, AEP implemented ABB's Asset Health Center across all of its transmission substations nationwide. Asset Health Center combines condition monitoring and performance algorithms with business intelligence to provide visibility into the condition of critical assets and to allow the utility to spot performance issues and to prioritize maintenance and repair activities.

### Result

AEP has recognized a number of immediate benefits including:

- Safety improvements related to asset-condition awareness and failure data analysis
- Capital saving benefits based upon avoidance of unexpected failure costs and failure prevention
- Improved awareness and decision support for asset renewal (capital) spending
- Avoid/redeploy maintenance (O&M) cost via condition awareness

In one specific instance, online Asset Health Center data showed a transformer that was experiencing rapid gassing (H<sub>2</sub> and acetylene), and the transformer was immediately removed from service. Inspection showed that the transformer had loose leads that would eventually have led to failure. AEP estimates they saved \$4 million by addressing the issue before the transformer failed.

# Contact us

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<http://new.abb.com/grid>



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