



Substations

Flexible, reliable EPC solutions built from powerful experience

Power and productivity
for a better world™





Flexible, reliable solutions built from powerful experience

Innovative substations by design

ABB has been designing and building substations for more than 100 years. In that time we have supplied thousands of substations for all voltage levels and climates, from the most congested downtown cities, to some of the most remote locations on earth. We engineer, build, deliver and service complete installations, with dedicated substation project execution capabilities, both locally and around the world.

Connecting critical loads to the electrical grid and expanding the power systems infrastructure requires significant planning and engineering to ensure a constant, reliable supply of power. Our comprehensive knowledge, extensive experience and continuous innovation enable us to provide optimized EPC substation solutions that help power plants to generate, cities to grow, industries to expand, schools to connect, and homes to be powered.

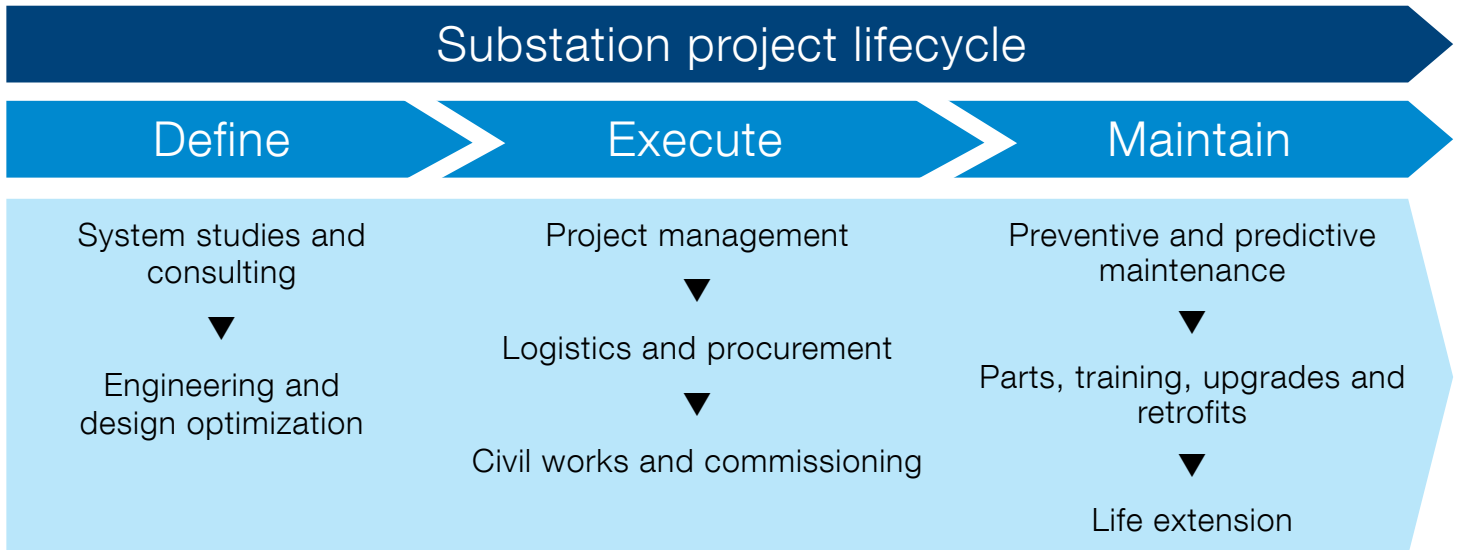
Our global footprint and local presence ensures complete support throughout the life of the substation. Our specialty is making projects easier for our customers, regardless of the project size or scope. From ultra-high transmission substations to industrial electrification projects, ABB is a partner you can rely on.



Substation application experience	
Utilities	Boosting capacity, enhancing reliability, and increasing availability of the transmission & distribution network through proven substation designs and innovative grid technologies
Industrial	Creating a reliable supply of power that supports efficient use and management of electricity, while enhancing operational performance facility wide
Renewables	Facilitating the integration and interconnection of cleaner energy while helping maintaining grid reliability and secure power supplies

EPC capabilities

From project vision through a lifetime of operational excellence



Upfront planning and system studies.

Every project has a unique set of requirements and goals. ABB's planning experts are able to provide an in-depth analysis of your system and its performance characteristics. From load flow and dynamic stability analysis, to system protection and controls coordination, we uncover the true potential of your critical assets, while managing risks. Our goal is to provide the optimal solution that maximizes asset value and financial returns.

Substation optimization: from design to delivery

Through upfront system design and consulting, our team will take into account all your functional requirements and preferences, while exploring possible alternative solutions to deliver the most optimal substation configuration. We perform complete primary and secondary engineering from design and short-circuit calculation to the engineering of the digital substation automation systems.





Project management and execution

Building out the electrical grid has two recurring themes: increasing complexity and constant change. In order to be competitive, productive and profitable, experienced professionals are required to successfully execute a project. ABB's highly qualified team of internationally certified project and site managers oversee engineering, manufacturing, site assembly and testing to ensure that the project goals and milestones are realized.

Logistics and procurement

Working with ABB ensures thorough supply chain management and coordination. As an ISO-9001 certified company, our prequalification process for both ABB and non-ABB suppliers, along with our oversight of onsite logistics, assures our customers that their project is meeting all necessary requirements.

Civil works and commissioning

Prior to construction, ABB carefully evaluates the site to assess the requirements and the support needed to achieve a safe and cost effective on-time delivery. With our highly trained and certified site and project managers, partnering with regional and local contractors, we are able to determine potential challenges along the way, and prepare for the unexpected. We can execute projects of any complexity, from greenfield sites in open land, to brownfield retrofits in densely populated metropolitan areas.

Simplified service contracts

As an equipment and service provider, ABB can reduce O&M costs by simplifying service contracts. With a complete portfolio of services from training, to troubleshooting, to upgrades and retrofits, ABB has the product experience and project capabilities to provide warranty, post-warranty and general service contracts to keep the substation fully operational.

Value delivered

Streamlined and simplified, for the lowest risk project experience

+ World class safety record

Proactive 'safety through design' program that incorporates safety into the entire project lifecycle, from preliminary engineering through construction and facility service life

+ One contract with costs clearly defined

Single source provider for managing the design, engineering, procurement, installation and commissioning with upfront risk identification and management

+ Lowest project risk

Technical reliability coupled with professional project management for risk mitigation, scope control and schedule assurance

+ Designed to meet all reliability and safety standards

Easily meet federal and local standards, avoiding substantial fines from regulators and securing the safe operations of your critical assets

+ Innovative and flexible substation designs

GIS, AIS, hybrid and modular design options allow for flexible substation layouts to accommodate any environment

+ Integrating cutting-edge grid technology

Leverage existing and emerging technologies to ensure grid reliability and maximize operational performance

+ Fast track completion of project

Ability to fast track substation projects and offer modular packages held to the latest performance, reliability and safety standards

+ Save on operation & maintenance costs

With direct access to substation equipment experts, ABB provides robust system designs that are managed under one service contract to ensure performance



Reliability and resiliency by design



Substation components
Power transformers for stepping the voltage up and down
Instrument transformers for measuring the current or voltage
Switchgear and circuit breakers for interrupting rated and short-circuit current
Ground switches for connecting parts of the substation to ground
Surge arrestors for protecting the switchgear from high overvoltages caused by lightning
Substation automation, control and protection systems for the electrical equipment in the substation
Power Distribution Centers (PDCs) and e-houses, housing the medium voltage switchgear and/or electrical control and protection systems

Substation services

ABB delivers customized substation service solutions that include engineering assessments, substation upgrade or retrofit additions, and full service maintenance agreements.

Assessment services

Maintaining already installed or legacy assets in the field requires detailed analysis and careful evaluation. ABB's in-house system experts can provide substation condition assessments, life extension analysis through ABB's proprietary Substation LifeStretch™ methodology, reliability studies, hardening and physical security recommendations, arc flash studies, design & engineering only services, and power quality solutions.

Retrofit and upgrades

System upgrades and retrofits can be a challenge as you are forced to work in the confines of existing infrastructure. ABB has the experience and skillset to best optimize your current assets and ensure compatibility of new equipment, without compromising operational performance. From complex specialty projects such as gas-insulated substation, battery

energy storage, STATCOMs and synchronous condensers to small upgrade and expansion projects, ABB has the technology and the project management skills to ensure a quick and cost effective upgrade of your current system.

Maintenance services

ABB provides full-service substation maintenance agreements that includes equipment testing and commissioning, trouble shooting, equipment repairs & replacement. When building new substations, switch yards, or grid specialty projects, ABB can provide a single and comprehensive maintenance package allowing for an easy to understand and manage service agreement instead of multiple contracts. Outsource your substation experts and rely on the ABB substation services to ensure critical assets are operating at their full potential.

Portfolio of technologies

Greenfield, hybrid, expansion or retrofit...

GIS Substations

Compact and resilient substations

ABB substations with gas-insulated switchgear (GIS) are unmatched when it comes to compactness, reliability, efficiency and safety, ensuring maximum power availability. The robust, low-maintenance GIS design minimizes the substation footprint allowing it to be installed indoors, in urban areas and in harsh environments. With significantly reduced space requirements and enclosed substations sheltered from the elements, the GIS substation enables customers to save on operation throughout the service period of the substation. ABB pioneered the development of GIS technology, delivering the world's first GIS substation in 1967. Since then, we have delivered over 10,000 high-voltage GIS bays.



AIS and Hybrid Substations

Cost-efficient, proven and reliable

Air insulated switchgear (AIS) is the most commonly used type of equipment for substations. It offers flexibility in terms of equipment configuration, as well as comparatively low installation costs. Substations using AIS are found in transmission networks of all sizes, all over the world. ABB has been designing and building substations for nearly 100 years.

ABB also offers hybrid substation solutions that combine gas and air insulated switchgear technologies to make installation more compact, minimize maintenance requirements and maximize availability and reliability.



Modular and Skid-mounted Substations

Standard design, short delivery time and minimal site works

ABB's modular and skid mounted substations are designed to save time and money by minimizing upfront engineering hours and reducing civil works, installation, testing and commissioning at the customer's location. Our modular substations are designed so that each of the major sub-systems of a substation can be assembled and tested in a factory environment and then transported to site for on-site erection with minimal assembly. For substations up to 420 kV, ABB can provide skid-mounted substations where the entire substation is on a single platform and is factory-assembled and tested, then easily transported to the site.



... a solution for every requirement



Substation automation protection and control

World-class protection and control solutions

Substations are the building blocks for any grid, requiring adequate protection to ensure reliable power delivery through the energy value chain. ABB's range of protection and control devices and software offer real intelligence at the point of data collection for the protection, control, measurement and supervision of generation, transmission, sub-transmission and distribution systems.



Power quality solutions

Reactive power needs

From SVCs to STATCOMs and synchronous condensers, ABB provides reactive power solutions that ensure power quality and whole system efficiency. By instantly absorbing or injecting reactive power in AC electrical grids, these solutions are able to provide voltage support and regulation, power factor correction, harmonics mitigation, and improve transit stability of the grid. These technologies integrate power generation, from transmission through distribution and delivery, ensuring the grid stays up and the lights stay on.



Energy storage

The power to control energy

With over a decade of expertise in energy storage, ABB is a pioneer and leader in the field of distributed energy storage systems. ABB's EssPro PCS and EssPro Grid solutions provide you with the ability to solve power quality, stability and availability issues. Strategically placed energy storage systems can increase operational performance and grid reliability, better integrate alternative energy sources, balance supply and demand, and ensure that energy is readily available when primary power sources are interrupted. The benefits of energy storage can span power generation, through transmission and distribution, and all the way to users.

Substations experience

Thousands of projects, engineered and constructed, across many industries and environments



Improved reliability at site with limited footprint

ABB installed a GIS substation for a large investor owned utility in California, the utility's first operational GIS. The existing 60kV air-insulated switchgear (AIS) and bus infrastructure on site was razed and replaced with 12 breaker 60kV GIS and building. The 60kV reliability was improved with a converted bus configuration from double bus single breaker (DBSB) AIS to breaker and a half (BAAH) GIS, replacement of existing dead ends, and upgraded with a Modular Protection Automation & Control (MPAC) building. In spite of an extremely tight site surrounded by wetlands, an existing natural gas power plant, and an on-going nuclear plant decommissioning effort, the project was completed early.

Caribbean island grid benefiting from GIS technology

As a smaller island, Puerto Rico's electrical grid is more vulnerable to power disruption and outages than larger interconnected grids. The most proven and reliable technology is required to ensure grid stability and reliability. As a result, the local utility partnered with ABB to build a GIS substation with a full scope of ancillary equipment. ABB provided the engineering, procurement, construction and commissioning of the three substations ranging from 115 kV to 38 kV, to finally 13.2 KV with a combined total of 122 bays. The project has demonstrated superior reliability, enhanced system stability, and lowered operating and maintenance costs.



Wind farm collector substation in Oklahoma

ABB was the substation EPC provider of a collector substation in central Oklahoma, utilizing its 34.5 kV MV GIS switchgear technology. This project included a generator step up transformer complete with high voltage breakers, switches, instrument transformers, capacitor banks and the switchgear featured in a Power Distribution Center (PDC). In addition to the collector substation, ABB's scope of supply included a 6 MVar STATCOM used for reactive power compensation to help regulate voltage and power factor to enable a reliable connection to the utility network.

Substation upgrades and expansion for a steel company

A steel company in Alabama was experiencing operational and reliability issues with existing electrical infrastructure. To help solve these growing concerns, ABB designed and provided power transformers for the planned upgrade of their 500kV substation. Additionally, ABB upgraded the cold mill substation by splitting the existing 46kV line into two taps, circuit breakers at each line tap, 15kV switchgear lineup, protection and control panels, duct banks and manholes to support cable modifications, a power transformer, and the installation of distribution cables. ABB also provided electrical facilities to help power their new galvanizing line building, installing a new switchgear lineup, new protection and control panels, a lengthy duct bank and power cables. Upon the completion of both projects, ABB was able to solve several operational issues, increase reliability, and enable company expansion and growth.



115kV turnkey GIS switchyard

In order to improve service reliability, an investor owned utility needed to upgrade a 115 kV transmission substation located in a densely populated area with significant soil issues due to its location near San Francisco Bay. To address these site concerns, ABB converted the 115 kV air-insulated double-bus-single-breaker (DBSB) switchyard into a new gas-insulated breaker-and-a-half (BAAH) design. ABB provided full EPC scope of supply including engineering, equipment and construction labor to design, build, test and commission the switchyard. The switchyard includes new 115kV dead end structures, underground high voltage cable, gas insulated switchgear (GIS), enclosed in a weather proof enclosure and the latest in modular protection, control and automation technology, adhering to IEC 61850.

Hidden substation on a college campus

A North Carolina utility, responsible for providing power to a major college campus, required a new substation to support a steam generation plant and emergency black start equipment. The university preferred a solution that aesthetically blended in with the campus community and chose to house part of the substation in an architecturally designed building. ABB engineered the GIS ring bus and medium voltage switchgear to fit within the dimensions of the building, and leveraged the structure to semi-shield two transformers from outside view. The end result was a highly reliable, efficient, site-optimized GIS substation for smoother campus operations, with no degradation of the aesthetics of the campus environment.

Connecting power along the Trans-Alaska Pipeline

In Prudhoe Bay, located on the northern coast of Alaska, resides the world's largest pipeline system, the Trans-Alaska Pipeline. This 800 mile system transports oil from the Arctic Ocean south, consisting of feeder pipelines and 12 pump stations, each 75 miles apart. These pump stations are located deep in the arctic tundra, and are susceptible to soil upheaval, shrinkages, snow accumulation and exposure to wildlife. To ensure the reliability of the power connection and preserve the delicate surrounding environment, ABB engineered, delivered and installed an elevated, skid mounted 138 kV to 13.8 kV, 20 MVA Substation. This modular substation safely provides power to the pumping station, while avoiding becoming a nesting place for the local wildlife population

Meeting the power demands of the entertainment industry

ABB has performed several EPC Substation projects in Burbank, California, serving the power needs of multiple movie and television industry facilities nearby. With real estate at an absolute premium in this area, ABB's GIS technology has minimized site footprint and maximized operational reliability in 35kV and 69kV projects. These substations have supported electrical reliability for the dramatic increase in local generation that sustains a high population density region, along with the motion picture industry's unique energy demands.

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