

## T&D substations and power supply solutions

### Customized solutions for high-quality power supply

ABB provides turnkey substations with leading-edge technologies including air-insulated, gas-insulated and hybrid switchgear for applications in utilities, industries, transportation and renewables integration.

Comprehensive domain knowledge, global experience and continuous innovation enable us to provide optimized solutions up to 1,100 kV.

#### ABB provides solutions for all types of applications including:

- Transmission and distribution substations for utilities
- Substations and related power supply solutions for industrial customers and EPCs
- Power supply solutions for railways and urban transportation including braking energy recuperation
- Grid access solutions for renewables and distributed power generation
- Power supply solutions for smart grids and urban operators
- Shore-to-ship power and smart port solutions
- Datacenter solutions
- E-mobility solutions
- Indoor and underground substations
- Mobile, prefabricated and containerized solutions
- Battery energy storage systems (BESS)
- Harmonic filters, shunt reactors and capacitor banks

#### Indoor solutions – Compact design

Minimizing footprint and visual impact, the solutions blend in with their surroundings.

#### Mobile solutions – Power on the move

Providing high-quality energy supplies to temporary and moving loads, and during maintenance procedures and emergency repairs.



#### Urban and underground solutions – Out of sight, out of mind

Enabling up to 98 percent of the installation's volume to be hidden and freeing surface areas for other purposes such as shopping malls or parks.

#### Railways and urban transport solutions

Providing reliable AC and DC traction power for both long distance rail and mass transit applications, as well as increasing energy efficiency through energy recuperation and wayside storage systems.

#### BESS solutions – The power to control energy

Balancing demand and supply in real time, efficiently integrating renewable power and providing back-up power during mains failure or blackouts.

#### Containerized and prefabricated substations

Allowing easy transport and fast installation and commissioning at site, the compact drop-in and connect solutions are well-suited for applications ranging from small distribution systems to integration of renewable generation.

# ABB's substations powering various applications around the world

## Selected references

### **MBR Solar Park, 400 kV and 132 kV S/Ss, Dubai**

- Turnkey 400 kV and 132 kV S/Ss containing 18 bays and two power transformers
- IEC 61850 substation automation, control and protection systems

**Grid integration solution enhancing transmission capacity, boosting power supplies and strengthening the power network of Dubai**

### **Transmission project, 220/66 kV S/Ss, Bahrain**

- Eleven 220/66 kV GIS S/Ss including cabling and routing
- IEC 61850 substation automation, control and protection
- Extension works at two existing S/Ss

**Compact solution ensuring high availability, reliability and minimizing substation footprint and maintenance**

### **Reem Island, indoor 400 kV and 132 kV S/Ss, U.A.E.**

- Turnkey 400/132 kV and 132/22 kV GIS S/Ss including power transformers and reactors
- Uniform IEC 61850 automation, control and protection systems using substation-proof components and redundancy concepts

**Urban solution with small footprint for the reliable power supply of the huge real estate development on the island**

### **Al Rayyan village, underground 66/11 kV S/Ss, Qatar**

- Supply of four new 66/11 kV underground S/Ss and upgrading of four existing S/Ss, including GIS and AIS, shunt reactors, power transformers and cables
- IEC 61850 substation automation, control and protection systems

**Architectural substation design to blend in with surrounding landscape**

### **Tierfehd and Linth Limmern HPPs, Linthal 2015, 380 kV, 220 kV and 50 kV S/Ss, Switzerland**

- Turnkey 380 kV, 220 kV and 50 kV GIS turnkey S/Ss
- Complete substation automation system, several gantries, surge arresters, current and voltage transformers, disconnectors and isolators
- Demounting of the existing Tierfehd AIS S/S

**Stable regional grid, better use of the available generation capacity and highly reliable peak power supply**

### **Gulf Interconnection Phase I, six 400 kV S/Ss**

- Six turnkey 400 kV GIS S/Ss, three in Saudi Arabia and each one in Kuwait, Bahrain and Qatar
- One of the biggest power transmission projects worldwide carried out by a single supplier

**Balanced and high-quality power supply in major Gulf countries**



### **UW Forsthaus West, WTE Bern, 132 kV S/S, Switzerland**

- 132 kV S/S containing four bays GIS and three power transformers
- HV cable connection
- Substation automation, control and protection system

**Replacement of old switchgear and optimized technical solution to meet growing energy demand of waste to energy plant**

AIS – Air-insulated switchgear  
GIS – Gas-insulated switchgear  
S/S – Substation

### **Warsaw metro line 2, traction power supply including braking energy recuperation, Poland**

- Turnkey supply of five combined traction and auxiliary S/Ss rated at 15 kV / 825 VDC / 400 VAC and two auxiliary S/Ss rated at 15 kV / 400 VAC
- A 40 MJ (megajoule) wayside energy storage system based on super-capacitors to exploit the recovered braking energy, the world's largest such system

**Enhanced energy efficiency of metro line through reuse of braking energy**



### **Formosa Ha Thin steel complex, 230/35 kV S/S, Vietnam**

- Four turnkey S/Ss including HV and MV GIS, transformers and harmonic filter units
- Network SCADA system, telecommunications equipment and IEC 61850 substation automation, control and protection systems

**Reliable and high-quality power supply to sustain high productivity and increased grid stability and flexibility in the region**

### **Marmaray CR3, traction power supply, Turkey**

- Six 154/25 kV traction S/Ss
- Five 25 kV sectioning posts
- One 34.5/25 kV temporary traction S/S
- IEC 61850 substation automation, control and protection systems

**Turnkey solution with state-of-the-art and high quality power technology**

### **TOSA, high-capacity, flash-charging, battery-powered bus, Switzerland**

- Mobility solution without overhead lines
- Zero emissions with hydro-powered electric bus
- Short charging times

**Enabling urban mass transportation, improved urban environment and landscape while providing greater route flexibility with no interference of bus schedule**

### **EKZ, battery energy storage system (BESS), Switzerland**

- Turnkey BESS providing 1 MW for 15 minutes including system studies and specification
- Containerized Li-ion-battery-based solution including converter, transformer, switchgear, control and protection systems
- Standard and advanced control algorithms

**Possibility to evaluate grid-linked BESS for peak shaving, frequency regulation and integration of renewables**

### **Fairbanks, battery energy storage system (BESS), Alaska**

- BESS providing 27 MW for 15 minutes or 46 MW for 5 minutes
- Power conversion modules, metering, protection and control devices and service equipment
- Won the Guinness World Records entry in 2003 as world's most powerful battery

**Power boost to get generators online, leading to 90 percent reduction of power outages due to grid faults over the past five years**

### **New Pinnacle Facebook data center, 170/24 kV S/Ss, Sweden**

- Supply of two turnkey 170/24 kV GIS and AIS S/Ss including switchgear, transformers and MV equipment
- IEC 61850 substation automation, control and protection systems

**Reliable and high-quality power supply for three server buildings of 84,000 m<sup>2</sup>, in harsh environmental conditions (Facebook's first data center outside the USA)**

# Optimized turnkey solutions and engineered equipment packages ABB is a partner you can rely on throughout the substation lifecycle



## Gas-insulated switchgear (GIS) substations

Offering compactness, reliability, safety and low maintenance. ABB pioneered GIS and commissioned the first GIS substation in 1967.



## Hybrid substations

Combining the advantages of AIS and GIS technologies. ABB supplies hybrid solutions since the late 1990ies.



## Air-insulated switchgear (AIS) substations

Cost-efficient and reliable solutions offering high scalability. ABB has a track record of more than 100 years in building AIS substations.



## Disconnecter circuit breaker (DCB) substations

Integrating the disconnection function into the circuit breaker to reduce footprint and maintenance. ABB supplies DCBs since the year 2000.

### Benefits

- Complete solution portfolio for all grid requirements
- Comprehensive domain knowledge and continuous innovation
- Global experience and local execution
- Highest safety and environmental standards
- Execution of complex turnkey projects
- Proficient project management
- Innovative control, protection and substation automation systems based on IEC 61850
- Worldwide presence ensures customer support throughout the lifecycle of the substation

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