SYSTEM INTEGRATION

Railway and urban transport electrification
Energy-efficient and reliable solutions
ABB’s substation installations for the rail industry provide reliable power to the line and the vehicle, to keep main line trains, metros and mass transit networks on track. Optimized railway electrification solutions ensure availability and dependability of AC and DC power supply to enable high performance and efficiency.
Railway and urban transport electrification solutions
Sustainable and reliable mobility

ABB takes care of design, construction, testing and commissioning of complete traction power supply systems for both long distance rail and mass transit applications.

By choosing ABB as a system provider, the customer gains:
• Competent, reliable and committed partner for the overall electrical system
• Predictable and cost-efficient solutions for sustainable mobility
• Grid-compliant solutions
• Compact and modular design with a high degree of integration
• A project team that acts as a single source of responsibility which minimizes risk and reduces project complexity

Power portfolio for rail and urban transport electrification:
• AC and DC traction substations including switchgear, transformers, protection and control equipment
• Static frequency converter (SFC) stations
• Power quality systems
• Network management and SCADA systems
• Energy recuperation and wayside storage systems
Powering rail and urban transport
Selected references of core competencies put into practice

**TOSA electric bus system, Switzerland**
ABB developed the core technology for this TOSA e-bus system including the onboard traction equipment and the fully automated flash-charging technology for the bus line 23 in Geneva, Switzerland.

- Large-capacity, catenary-free e-bus
- 15-seconds flash-charging at selected bus stops
- Peak-shaving on infrastructure side
- Small and long-life on-board battery

Innovative system enabling silent and zero-emissions urban mass transportation which improves the environment and attractiveness of the cityscape while providing greater flexibility in terms of route and itinerary.

**Warsaw Metro Line 2, Poland**
Innovative traction power supply solution incorporating the world’s largest wayside energy storage system, which captures braking energy from decelerating trains and feeds it back to accelerating ones.

- Turnkey supply of five combined traction and auxiliary substations rated at 15 kV / 825 V DC and two auxiliary substations
- A 40 MJ energy storage system based on super-capacitors to exploit the recovered braking energy from metro cars

Enhanced energy efficiency of metro line through highly reliable power supply and reuse of braking energy.
E.ON Datteln, Germany

Turnkey rail frequency converter station located at the Datteln railway hub and capable of supplying up to 412 MW to the German railways.

- World’s most powerful rail converter station with four identical converter blocks with a rated power of 103 MW
- Design, engineering, installation and commissioning of containerized solution incl. static frequency converters (SFC), transformers, control and cooling systems
- Grid code compliance without line filters

Reliable power supply system ensuring high availability, high efficiency, and enabling maintenance under full-load conditions

Bangalore Metro Phase I, India

Turnkey power supply for the first phase of the modern Bangalore Metro, comprising two corridors – the East-West corridor of 17.9 km length with 17 stations and the 20.8 km long North-South corridor with 21 stations.

- Design, supply, installation and commissioning of four distribution substations rated at 66/33 kV
- 38 auxiliary and 27 traction substations
- Transformers, switchgear, capacitors, relays and the associated cables
- SCADA (Supervisory Control And Data Acquisition) system

Efficient and seamless management of various parameters of the power network, high system reliability and space saving design with compact gas-insulated and air-insulated switchgear.
Ampang Line Extension, Malaysia

Power supply for the 17.7 km extension of the Ampang Line to alleviate traffic congestion in Greater Kuala Lumpur.

- Design, supply, installation, testing and commissioning of DC traction substations and auxiliary AC substations, depot and workshop area electrification
- MV switchgear, transformers, DC switchgear, control and protection devices, stray current monitoring system and remote terminal units
- Overvoltage protection, maintenance safety devices and power-off emergency system (blue light stations) at passenger platforms

State-of-the-art technologies enabling reliable and efficient supply of traction power to the extended line. Site work meeting highest HSE standards and winning the “Best HSE Performance” award for 3 years.

Marmaray CR3, Turkey

Turnkey delivery of the entire traction power supply for the 77 km cross-city commuter corridor in Istanbul, including the 14 km cross-Bosporus link and connecting Gebze and Halkali.

- Design, supply, installation, testing and commissioning
- Six 154/25 kV 50 Hz traction substations
- Five 25 kV 50 Hz sectioning posts
- One 34.5/25 kV 50 Hz temporary traction substation
- IEC 61850 substation automation system

Innovative and reliable 25 kV single-phase traction power supply system provided turnkey by a single vendor and OEM.
Infrastructure solutions for higher capacity and power stability

Key solutions

AC traction power supply systems
ABB offers a comprehensive range of AC traction substations for 16.7, 25, 50 or 60 Hz applications comprising single- or two-phase feeder substations and switching posts, autotransformer stations and substation automation (local control and protection) systems.

Static frequency converter (SFC) solutions
ABB’s medium-voltage rail SFC solutions allow the connection of three-phase public grids to single-phase railway power grids, at rated frequencies of 16.7, 25, 50 or 60 Hz. The SFC not only acts as a voltage and reactive power source, but is also able to handle the smooth and interruption-free transition from interconnected system operation to island mode in case of disturbances in the grid. Furthermore, it is capable of acting as the sole power supply to an isolated section of railway, and of subsequently re-synchronizing with the rest of the railway grid after the disturbance has been cleared.

Power quality solutions
ABB offers a complete portfolio of FACTS (Flexible AC Transmission System) technologies to optimize power quality. Trains rely on a stable power supply from the grid, yet cause harmonics and unbalanced load between phases, thus reducing power quality. Implementing FACTS for dynamic load balancing, voltage control and harmonic suppression, alleviates these harmful effects in conjunction with railway feeding.

Network management and SCADA systems
ABB’s SCADA (supervisory control and data acquisition) systems enable remote monitoring, control and operation of traction power flow as well as data acquisition for traction substations. Featuring proven reliability and flexibility, these solutions maximize operational efficiency of mainline and urban transport systems.

System design
ABB offers a broad range of system studies and dynamic traction power supply simulations based on powerful software tools. The offering includes:
• Interface management and requirement management
• System studies (earthing and bonding, EMC, harmonics, insulation coordination, RAM and functional safety)
• Depots and workshops power system modelling

DC traction power supply systems
ABB is also an experienced partner for DC traction substations for all types of applications including urban transport systems, suburban and mainline railways, covering the standard traction voltages of 750 V DC, 1,500 V DC and 3,000 V DC. The ABB portfolio covers complete substation packages including DC switchgear, transformers, rectifiers, substation automation, control and protection systems.

Wayside energy storage and recuperation systems
ABB’s DC traction substations with energy storage capabilities allow energy to be recovered from braking trains, that would otherwise be dissipated as heat through braking resistors. Storing this energy on the wayside is one way to prevent this energy waste. Another way, also offered by ABB, is through an energy recuperation system, which feeds the recovered energy back into the AC grid. ABB’s modular energy recuperation and wayside storage systems are available for standardized traction voltages and can be used in existing and new urban transport systems as well as suburban and mainline railways.

TOSA flash-charging e-bus
ABB’s new large-capacity battery-powered electric bus system enables ultrafast charging of onboard batteries at selected bus stops and creates new opportunities for next generation silent, flexible and zero-emissions urban mass transportation. These articulated buses no longer need overhead lines, which improves the environment and attractiveness of the cityscape while providing greater flexibility in terms of route and itinerary.