

ABB rail and urban transport solutions  
Your global partner for sustainable mobility



# Rail technology that make transportation more efficient and competitive

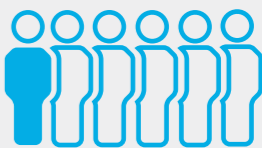
ABB is a world leading independent supplier of innovative and reliable technologies to vehicle manufacturers, railway operators and system integrators. ABB provides a comprehensive offering for rolling stock and infrastructure as well as FACTS technologies, network management solutions and SCADA systems. In addition, ABB's offering covers asset management solutions and lifetime service support, including maintenance and retrofit.

ABB is a proven and experienced partner to the rail industry, committed to ensure safe, reliable and environmental-friendly transportation.

30%

With the recovery, storage and reuse of energy produced during braking, trains consume up to 30 percent less electricity.

**Reduce energy consumption** with ABB's infrastructure solutions that stabilize the voltage of electric traction while mitigating demand peaks on the local network.



Compact technology leaves more room for passengers and enables increased operational efficiency.

Ensure continuity of service and **optimize** the total **cost of ownership (TCO)** throughout the entire life cycle.

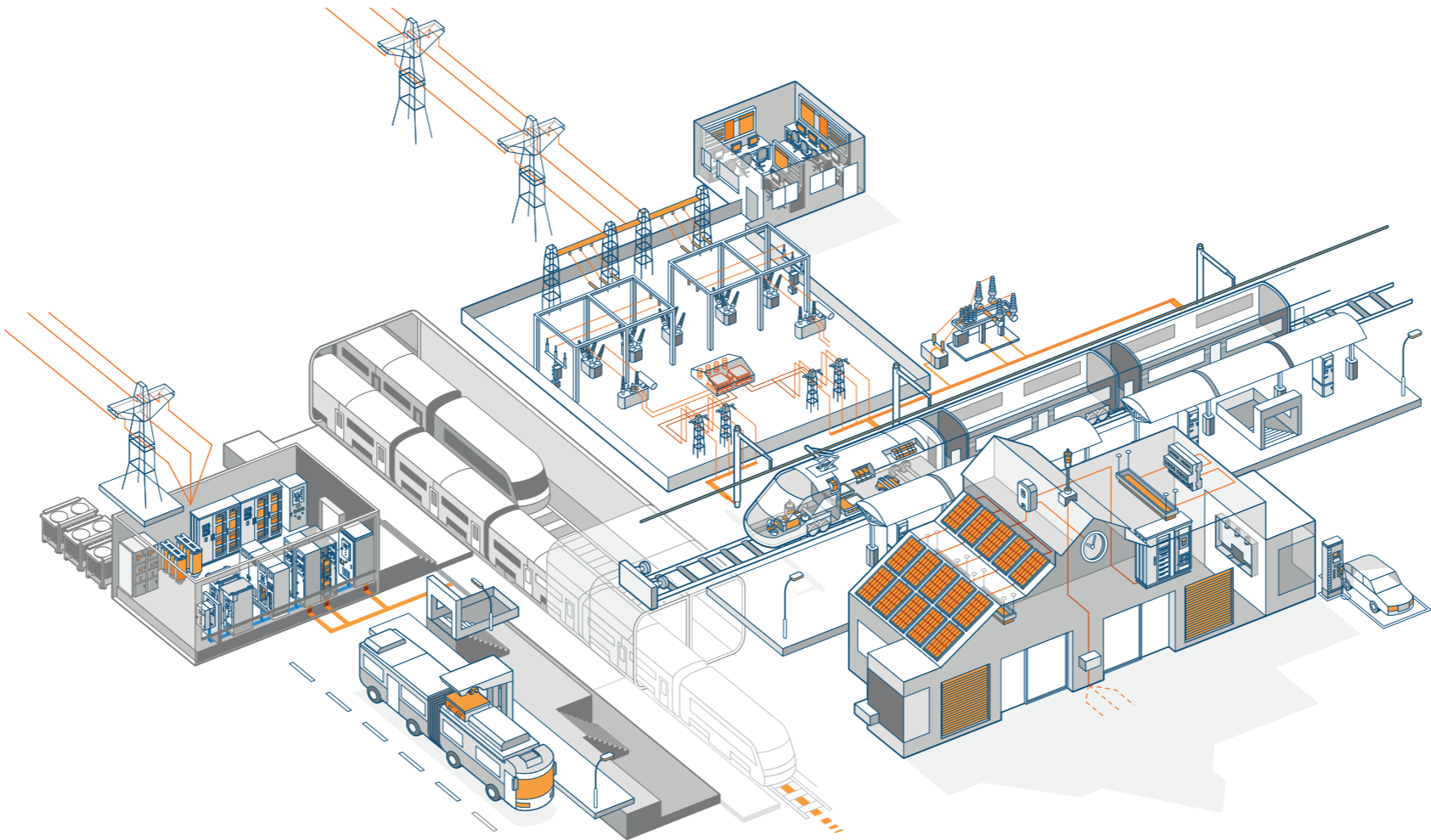


Customized service concept improve the reliability of installations, optimizing cost and service life. ABB has a global support network that provides parts, maintenance, repairs and upgrades - either in the workshop or on-site.

15"

With 15 second "flash charging" a new generation of silent, spacious and 100 percent electric buses eliminate contact lines and alleviate traffic in cities.

Improve stations **using renewable energy**, eco-friendly products and command/control tools that **optimize efficiency**.



**Design future mobility** with revolutionary solutions that enhance the competitiveness of public transport and reduce CO<sub>2</sub> emissions and noise pollution.

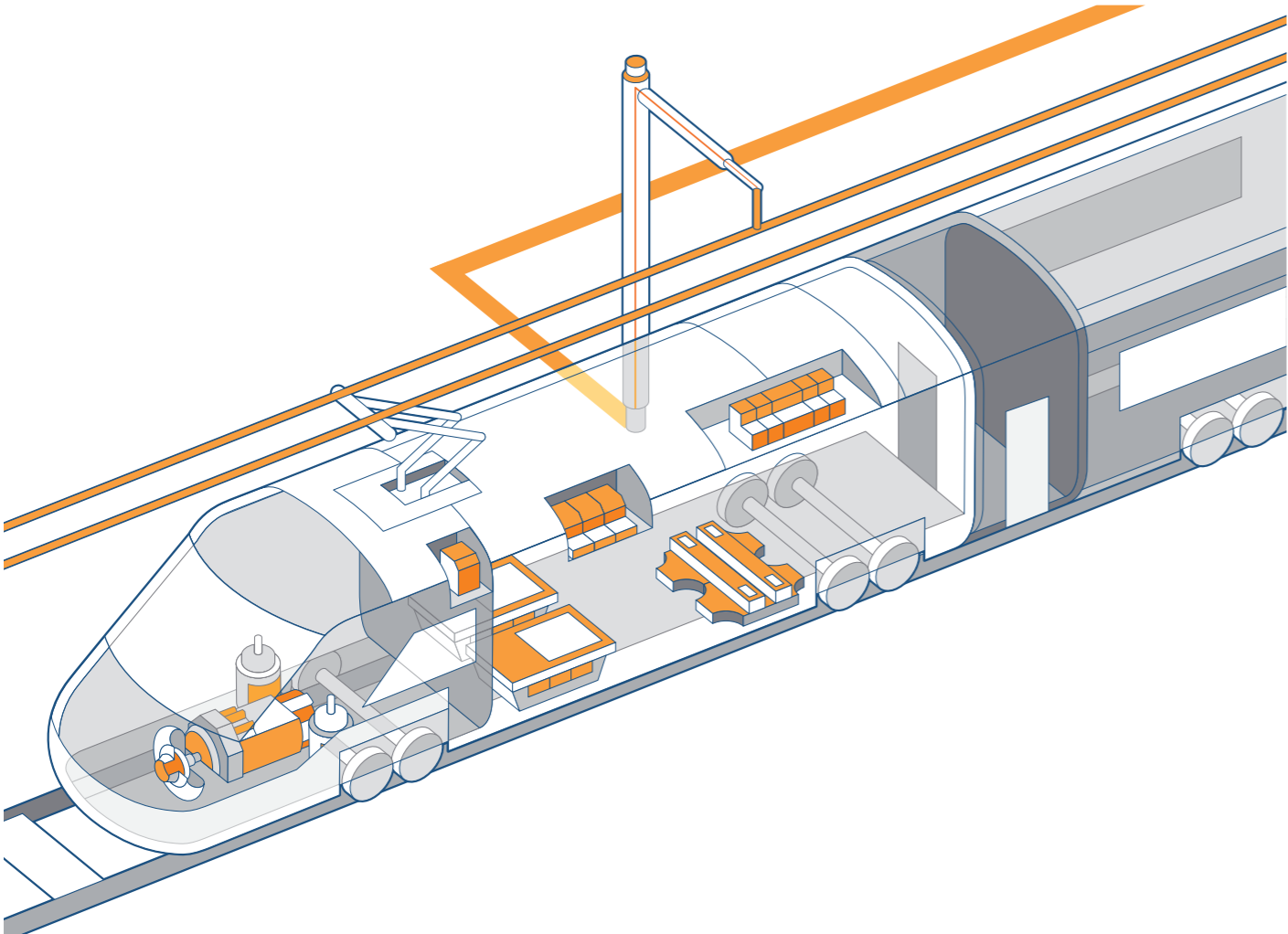
# Innovative and leading-edge traction solutions

ABB offers a broad portfolio of solutions and services for rolling stock including traction transformers, converters, motors and many other components serving in different types of rail application, ranging from freight through high-speed to suburban railways, metros and tramways.

In deep and trustful partnerships with vehicle builders, refurbishers and rail operators, ABB provides the broadest traction portfolio and innovative tailor-made solutions improving performance, energy efficiency and comfort of passengers.

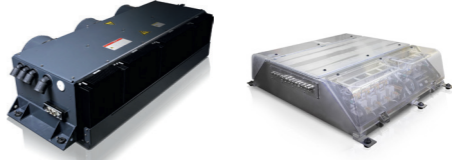
## Our expertise, your benefits

- One single partner for the entire traction chain
- Higher total energy efficiency
- Reduced life-cycle cost
- Optimization of component dimensions and interfaces
- Fast commissioning and homologation



Traction transformers

For roof, under floor and machine room installations.



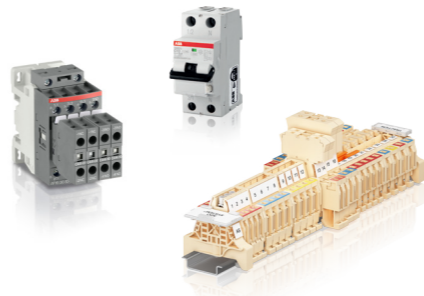
Compact Converters  
BORDLINE®

Traction converters, auxiliary converters and battery chargers. Highly integrated or stand-alone solutions.



Traction motors and generators

Customized solution for electric and diesel-electric applications.



Low voltage products and systems

Circuit-breakers, contactors, entrelec® terminal blocks.



Cable management

Ty-Rap® : Innovative cable management solutions for the railway industry.

Cable protection systems

PMA: High-quality cable protection systems for all rail and infrastructure applications.



Trasfor

Transformers and filter choke assembly used for locomotives, wagons and high speed trains.



Semiconductors

For reliable and efficient switching in propulsion and auxiliary converters.



Surge arresters

Overvoltage protection for rolling stock.



Turbochargers

TPR turbochargers for diesel locomotives engine.

# Innovative and leading-edge traction solutions

## More space and comfort on board

ABB's traction solutions are both compact and lightweight and configured to meet specific customer needs. Mounting is based on the requirements of the vehicle design: on the roof, under-floor or in the machine room.

## Reduced noise and vibration

ABB has developed cutting-edge technologies to respond to all customer needs. Thanks to our expertise, new solutions have been developed (dampers, auxiliary windings) which significantly reduce vibrations and optimize noise level.

## Low operating costs

Energy consumption, maintenance costs and incidence of failure have a direct impact on the profitability of vehicles. ABB solutions offer the best advantages in terms of total cost of ownership (TCO) and reliability throughout the entire life cycle.

## Increased speed

Speed is slowed down by weight, so ABB uses composite materials that optimize the mass of the components without affecting performance.

## Ensure continuity of service

ABB protects its customers' investments by improving the strength, longevity, reliability, and availability of systems. Support services include supply of spare parts, maintenance, repairs and upgrades.



# Flexible service solutions around the globe

ABB has a worldwide network of specialized centers for customer assistance and after-sales services. The broad range of services include spare parts, maintenance, upgrades and retrofit, and we offer these both on and off customer sites. ABB offers custom-made multi-year service agreements, based on a detailed study of customer operating needs.

### Service agreement

Our service agreements provide you a customized maintenance and service solution that ensure the maximum reliability and availability of your equipment.

### Upgrade and retrofit

The upgrade your existing equipment by retrofitting with our latest technologies. Upgrades improve the performance and extend the lifetime and functionality of your equipment.

### Maintenance

We support you with effective preventive and corrective maintenance services to maximize the reliability of your rail equipment.

### Repairs

Our extensive network of service centers guarantee you a rapid response to optimize the lifecycle of your equipment by offering on-site or factory repairs.

### Why ABB

We are committed to support you across the lifecycle of your equipment enhancing the operational efficiency and providing performance improvement to your fleet while reducing the operating life-cycle costs. ABB's deep railway industry expertise means that safety and reliability requirements are the foundation of all our railway system solutions.

15%

The retrofit of the electric traction system improves reliability, reduces obsolescence problems and reduces energy demand up to 15 percent.

Your partner of choice for upgrading electrical systems

Train operators seek higher reliability, efficiency and power to make their fleets' lifespan more cost-efficient. Maintaining old electrical components is often neither economical nor attractive. Furthermore, spare parts may be difficult to procure.

Our premium solutions will help operators to benefit from the forward-compatible, reliable, robust, easily maintainable and highly adaptable components of our retrofit package. Our traction system design carefully considers all operating conditions and ensures an optimized overall solution that meets today's passengers' expectations for an entirely new travel experience.

# Energy-efficient and reliable power solutions

With decades of built-in expertise and experience in railway fixed infrastructure, ABB products and technologies ensure reliable installations. ABB supports the electricity transfer from the overall network to the line with all the components of the substation. ABB scope of supply covers AC and DC electrification for both mainline and urban transport.

ABB supports its customers in all phases of the project and throughout the entire lifecycle of their installations.

ABB offers a level of system integration adapted to the needs of your project from the product to the full execution of key turnkey project and the supply of complete subsystems ready to install direct to site.

## ABB's portfolio

- High-voltage switchgears
- Trackside power and distribution transformers
- Medium-voltage outdoor modules
- Medium-voltage switchgears and breakers
- Traction rectifiers
- Low-voltage switchgears
- Energy storage systems
- Uninterruptible Power Supply (UPS)
- Complete AC and DC traction substations
- Static Frequency Converter (SFC)
- Supervisory Control and Data Acquisition (SCADA)
- Flexible Alternating Current Transmission Systems (FACTS)
- Consulting

### Products

Large portfolio dedicated to meet rail infrastructure needs.



Products

### Modules

Factory prefabricated and tested solution.



Modules

### Systems

Complete AC and DC traction substation, energy storage systems.



Systems

## FACTS solutions for railways

ABB is a world leader in FACTS technology and offers a complete portfolio by producing all the key components in-house. FACTS for railways comprises SVC, SVC Light® and PCS 6000 STATCOM. More than 800 systems are installed around the world.

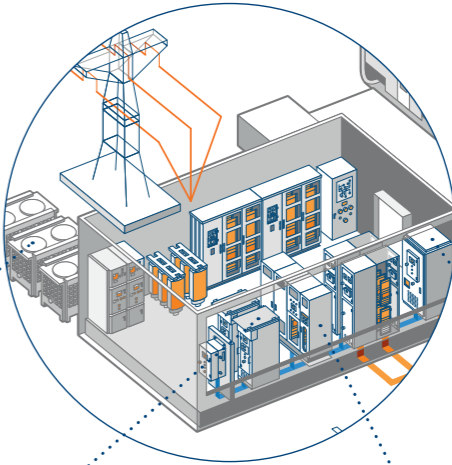


## DC wayside traction power solutions and energy management

ABB's ENVILINE™ product portfolio offers a full spectrum of solutions and systems for DC wayside infrastructure by optimizing energy performance to reduce costs.

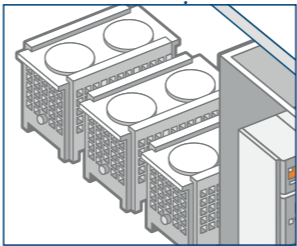
Offering:

- DC traction power supply equipments
- Energy management solutions
- Protection technologies

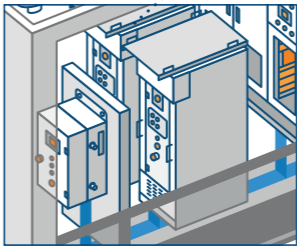


The + ABB

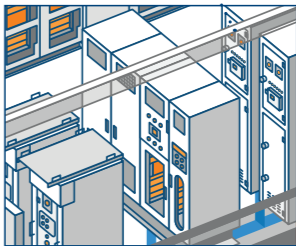
ABB DC traction substations allows the capture of excess energy that a train produces every time it brakes at a station, returning the energy seconds later to assist the train's departure – reducing the overall energy consumption by up to 30 percent.



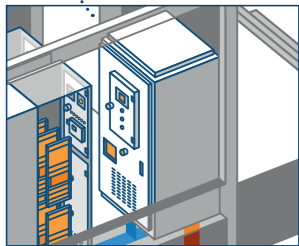
Resistor bank for outside



Energy storage system



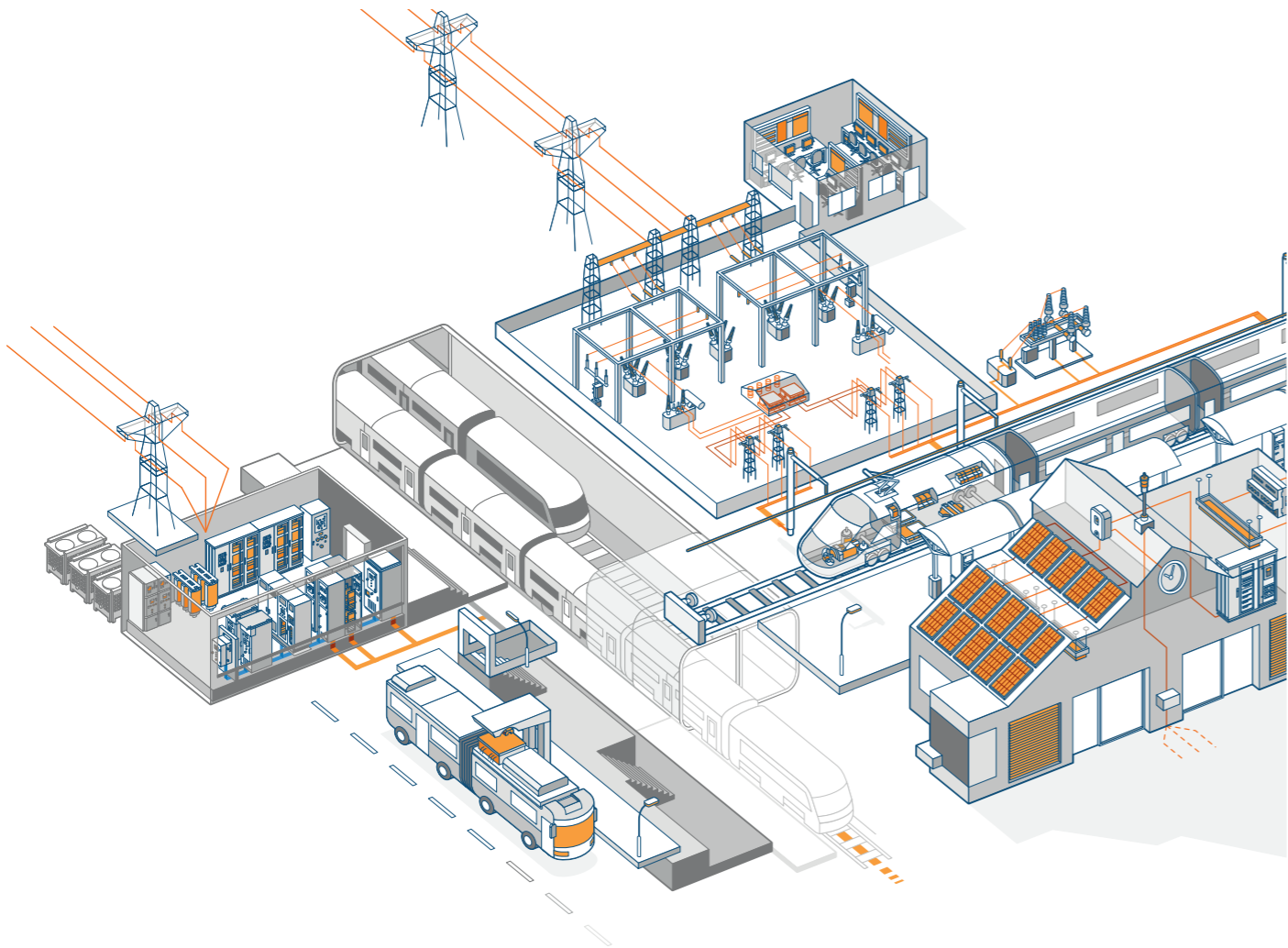
Energy recovery system



Energy dissipation system

# Energy-efficient and reliable power solutions

ABB offers a comprehensive range of equipments for fixed installations as well as complete AC and DC traction substations. Special emphasis is placed on optimizing the footprint of the AC and DC substations and on having a high degree of prefabrication by adopting a modular design. ABB provides a comprehensive range of prefabricated high-voltage and medium-voltage modules, thus reducing on-site installation and commissioning works significantly.



## Static frequency converters

For connection of three-phase public grids to single-phase railway power grids, at rated frequencies of 16.7, 25, 50 or 60 Hz.



## High voltage switchgear

Air isolation (AIS) or gas (GIS), surge arresters, capacitors.



## Oil and cast resin transformers

Traction transformers, autotransformers, rectifiers transformers



## Medium-voltage switchgear and components

Indoor or outdoor circuit breakers and disconnector, air- or gas-insulated switchgears.



## Rectifiers

Diode rectifiers, thyristor rectifiers, from 600 to 3000 V DC.



## ENVILINE™ Energy management solutions

Recovery and receptivity of braking energy for DC rail transportation.



## Low voltage panels and equipments

750 V DC and 1500 V DC switchboards, distribution boards, main LV boards.



## Uninterruptible Power Supply (UPS)

Autonomous or modular product, from a few kV to MW applications.



## Programmable automation

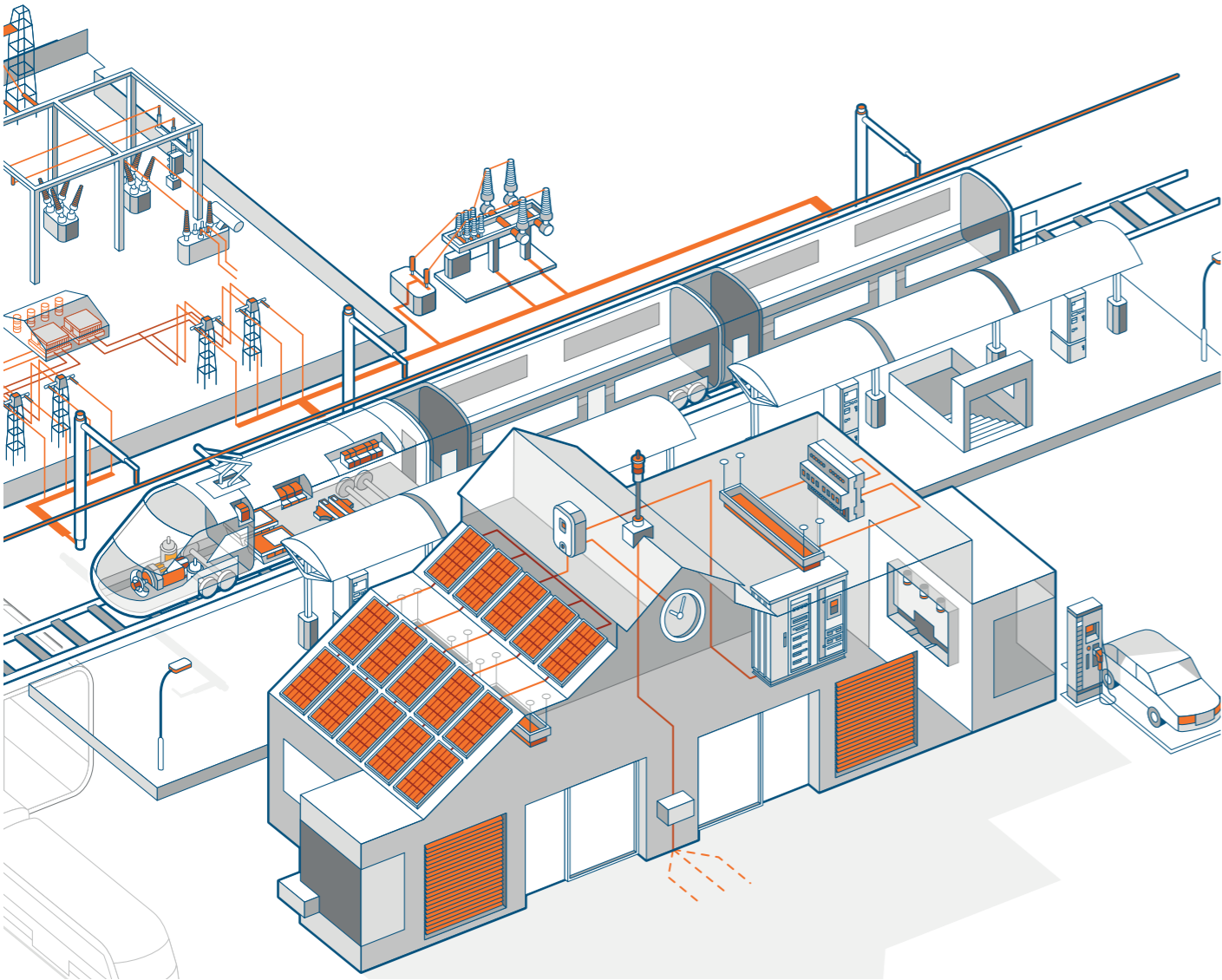
For remote monitoring, control and operation of the traction substations.

# Solutions for buildings and stations

We are committed to providing technical solutions that deliver benefits for investors and contractors:

- Long-term investment
- Improvement of the energy performance of the building
- Asset valuation

ABB's smart building solutions ensure the most comfortable experience and that your teams can work professionally and to an optimum level.



Low-voltage panels

ABB offers custom-made for all type of buildings:

- Main LV boards
- Passenger station distribution boards



KNX intelligent installation

All devices communicate with another via a single bus cable which is installed alongside the normal power lines to get a network enabling the control of the building and the energy management.



EV chargers

DC chargers offering fast and semi-fast charging for all type of applications.



Lighting and emergency lighting

Complete offering covering emergency lighting systems and fire detection systems.



Lightning protection

- Lightning conductors
- Surge arresters



Photovoltaic inverters

PV installations with high performance, robust enclosures, ease of installation, and a quick return on investment.



Emergency Power Supply

The Twister® S1 is a universal and central safety power supply source.

## Electrical installations for tunnels, stations and tracks

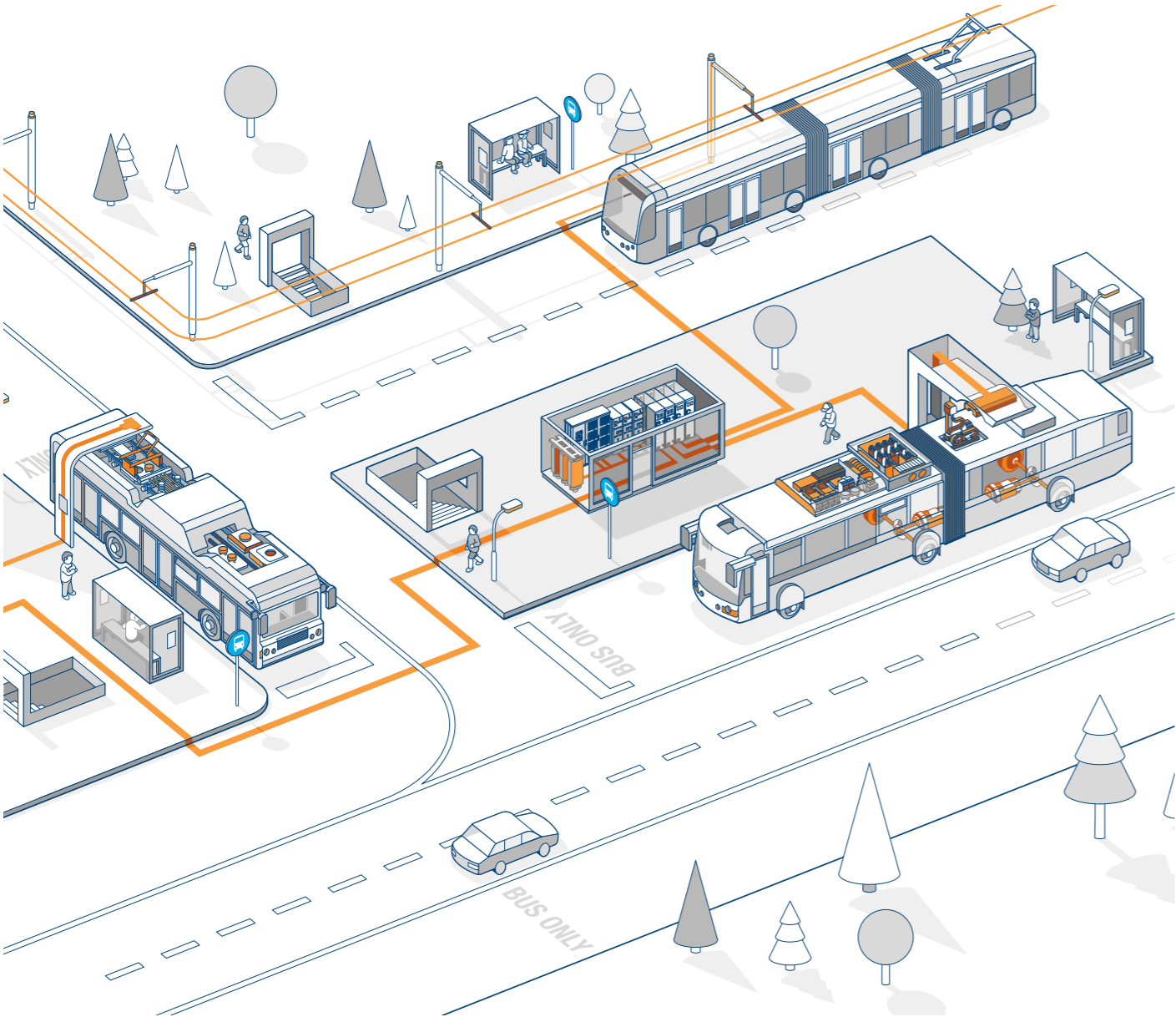
ABB provides all the devices and systems to supply electricity to tunnel infrastructure and ventilation, ensuring high energy efficiency.

- Medium and Low-Voltage electrical distribution
- Controlling and motorization of the fans
- Installation supervision



# Products and solutions for electric busses

ABB provides flexible drivetrain solutions and fast-charging infrastructure solutions for electric buses cutting carbon emissions and providing real alternatives to gasoline-powered public transportation.



## Drivetrain solutions

- Traction converter
- Motor
- Battery unit
- Energy Transfer System (ETS)
- Trolleybus DC/DC input converter



## DC Fast charger for electric cars

- CCS (Combo) standard fast chargers
- Connected platform for remote management.



## DC Fast charger for electric busses

- Automated fast charging system
- Integrated in existing bus lines
- High power DC charging with modular design: 150 kW, 300 kW or 450 kW.



## Prefabricated e-bus substations

Compact, prefabricated and factory tested:

- Reduced footprint, simplified civil works (foundations) and quick installation
- MT cables, DC feeders easily accessible
- Remote Terminal Units (RTU)



## TOSA e-bus system

**TOSA catenary-free high-capacity fully electric articulated bus system with flash-charging at selected bus stops during dwell time.**

ABB developed the concept of TOSA, the on-board traction equipment and the new type of fully automatic and flash-charging system for the world's first high-capacity (up to 140 passengers) electric bus articulated version. A controlled moving arm on the roof of the TOSA e-bus automatically connects with a charger at selected bus stops in less than a second. The high-power flash-charging technology is activated and feeds the onboard batteries for 15 seconds while the passengers enter and leave the bus. At the end of the bus line a 3 to 4 minute boost enables the full recharge of the batteries.

# Protection, control and management solutions

## Keeping your assets on track

ABB offers a comprehensive range of network and fleet managements solutions to ensure customer keep their networks operating safely, efficiently, and on schedule.

### Enterprise Software solutions

ABB's solutions provide a full, clear view of an organization's asset infrastructure and the workforce maintaining it.

Ellipse is a purpose-built EAM / ERP solution for asset-intensive industries such as transportation, helping ensure your critical assets deliver better business results aligned with ISO 55000. Ellipse has been designed specifically for rail infrastructure operators and its superb functionalities that address linear assets. It is also a perfect solution for operators enabling an optimal control of maintenance costs while ensuring availability of critical assets at the same time.

Ellipse SELECT solutions are already pre-configured with best rail business practices, with industry specific logic and process definition. Implementation for rail operators is highly accelerated and can be completed in as few as 90 days, which provides an outstanding and rapid time to value.

Fieldreach for Ellipse is a robust mobile solution that takes

work and asset management processes to the field. It supports users who carry out inspections, maintenance and data capture activities. The solution enables field teams to capture asset data electronically and transfer it to the ABB Ellipse system. It's licensed on over 50,000 devices in leading organizations such as Network Rail or Transport for London.

Asset Health Center (AHC) is a software solution enabling predictive maintenance of your assets that gives a precise view of the risks of failure for each asset. This solution enables to prioritize repair, maintenance, refurbishment or replacement activities.

### Network management and supervisory control and data acquisition (SCADA) systems

SCADA automation systems enable remote monitoring, control and operation of traction power as well as data acquisition for traction substations. ABB SCADA system is the customer's choice for mainline and urban transport systems worldwide, due to its proven reliability and flexibility.

# Your service partner

## Throughout the life-cycle of your assets



ABB has a global network of rail specialized centers to ensure tailor made assistance. The broad range of services include spare parts, maintenance, upgrades and retrofit, and we offer these both on and off customer sites.



### Rapid response

Our experts are at your service through service agreements that guarantee performance and reliability.

### Lifecycle management

We provide you with powerful tools, coupled with our extensive knowledge base to optimize and extend the lifecycle of your equipment.

### Operational efficiency

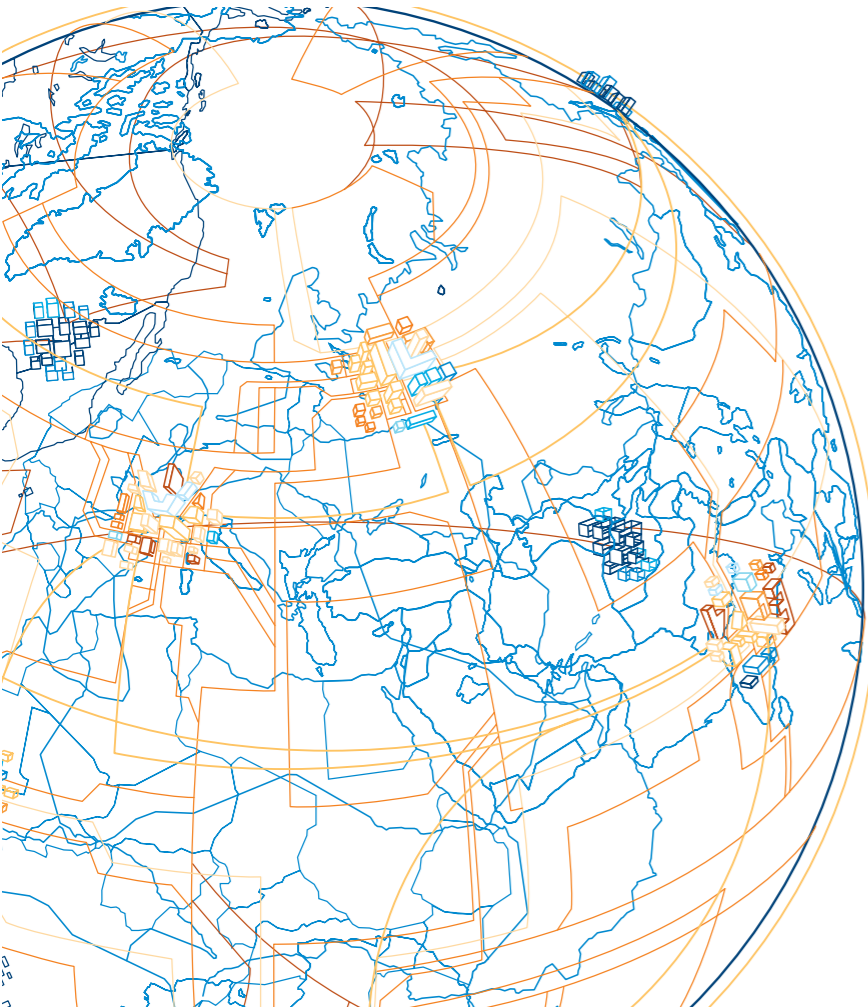
We help you to optimize the usability and efficiency of your equipment and systems to increase productivity.

### Performance improvement

ABB is your strategic partner to improve productivity, usability, reliability, safety, cost-efficiency, energy-efficiency and emissions control.

# Case studies

ABB has extensive experience in the management of rail projects worldwide and has the skills and know-how to provide customized solutions for a wide range of applications.



**Traction equipment for Rhaetian Railway, Switzerland**  
ABB supplied a powerful and energy-efficient traction system for the challenging route profile of the Rhaetian Railway network, with steep climbs and high-alpine climate. The traction system's sophisticated software recognizes when ice is building up on overhead lines, automatically creating an artificial arc to keep electricity flowing and vaporizing any ice left on the wires. As the trains brake while descending grades across the network, the braking energy is fed back into the power grid.



**Traction technologies for the Gautrain Express, South Africa**  
ABB played a vital role in the South Africa's high-speed railway, the Gautrain, linking Johannesburg, Pretoria and the country's largest airport. ABB provided advanced traction solutions to power the entire line as well as to equip the 24 electric trainsets with traction transformers and motors. The trains operate at speeds of up to 160 km/h. ABB's solution was designed with exceptionally high levels of reliability, redundancy and safety to ensure 99.99 percent availability.



**Retrofit traction solution for ICE 1 high-speed trains, Germany**  
ABB replaced the traction converters in the first fleet of high-speed intercity trains operated by Deutsche Bahn, Germany's national rail operator. This was the first project worldwide involving the exchange of high-speed train converters while leaving all other components of the traction chain and interfaces unchanged. The new converters minimize energy demand by at least 12 percent and reduce overall operating cost.



**Optimized asset management for London Underground, United Kingdom**  
London Underground, the second longest metro in the world, is using Ellipse, ABB's enterprise asset management (EAM) solution designed specifically for the management and maintenance of both rolling stock and infrastructure assets. These solutions enable optimal management and maintenance strategies for the most critical assets, especially during refurbishment and improvement of the infrastructure, with minimal disruption and better work order management.



**Wayside energy storage solution for SEPTA, US**  
ABB led the design, supply and integration of the "Wayside Energy Storage Project" within SEPTA's aging transit infrastructure. Originally installed in April 2012, the system captures braking energy for redistribution into the SEPTA power network while generating revenue with behind the meter load response to sustain the local grid and the wholesale energy market. ABB deployed the ENVI-LINE™ ESS which connects to the catenary or "third rail" of the train system to recover this otherwise wasted energy.



**FACTS systems for the Evron and Mesnay substations, France**  
The French railway companies SNCF and RFF have chosen to equip the Evron substation, between Paris and Rennes, and the Mesnay substation on the Jura line between Switzerland and France, with two SVC Light® installations of 90 and 63 kV. In both cases, these next-generation technologies, based on the principle of synchronous voltage source compensation, make it possible to dynamically balance the asymmetry between phases due to the method for supplying rail traction power.



**Turnkey substations with the largest DC wayside energy storage system, Poland**  
The central section of Warsaw's second metro line is powered by seven underground turnkey substations supplied by ABB. To improve the ecological footprint of the new east-west connection, the Stadion Narodowy substation is equipped with a super-capacitor-based DC wayside Energy Storage System (ESS), the largest of its kind in the world. The 40-megajoule system recovers and stores braking energy from decelerating metro cars and makes it available again for acceleration.



**Fresh air for the Gotthard Base Tunnel, Switzerland**  
The commissioning of the world's most powerful ventilation system in the Swiss "structure of the century" has been successfully completed with a maximum power of 15.6 MW. ABB supplied the entire power engineering and the control system. ABB also supplied the major electrical components for the entire 50-Hz power supply of the tunnel infrastructure including gas-insulated medium voltage ZX0 switchgears and several hundred vacuum-impregnated dry type transformers.

# Contact us

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