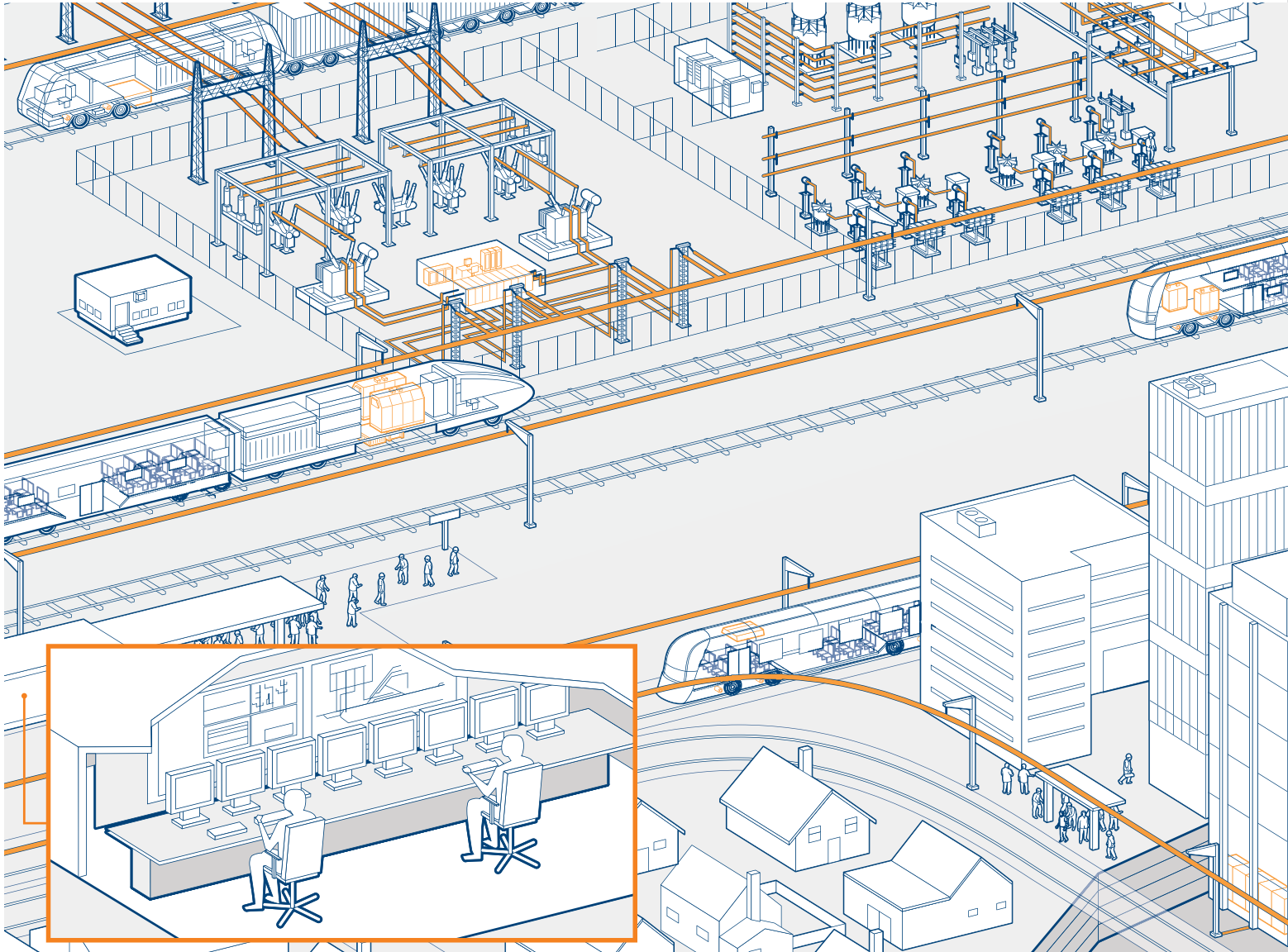


Powering the railways in the USA  
Efficient and reliable solutions  
for sustainable mobility

# Overview of ABB's railway capability



## A global approach with domestic presence

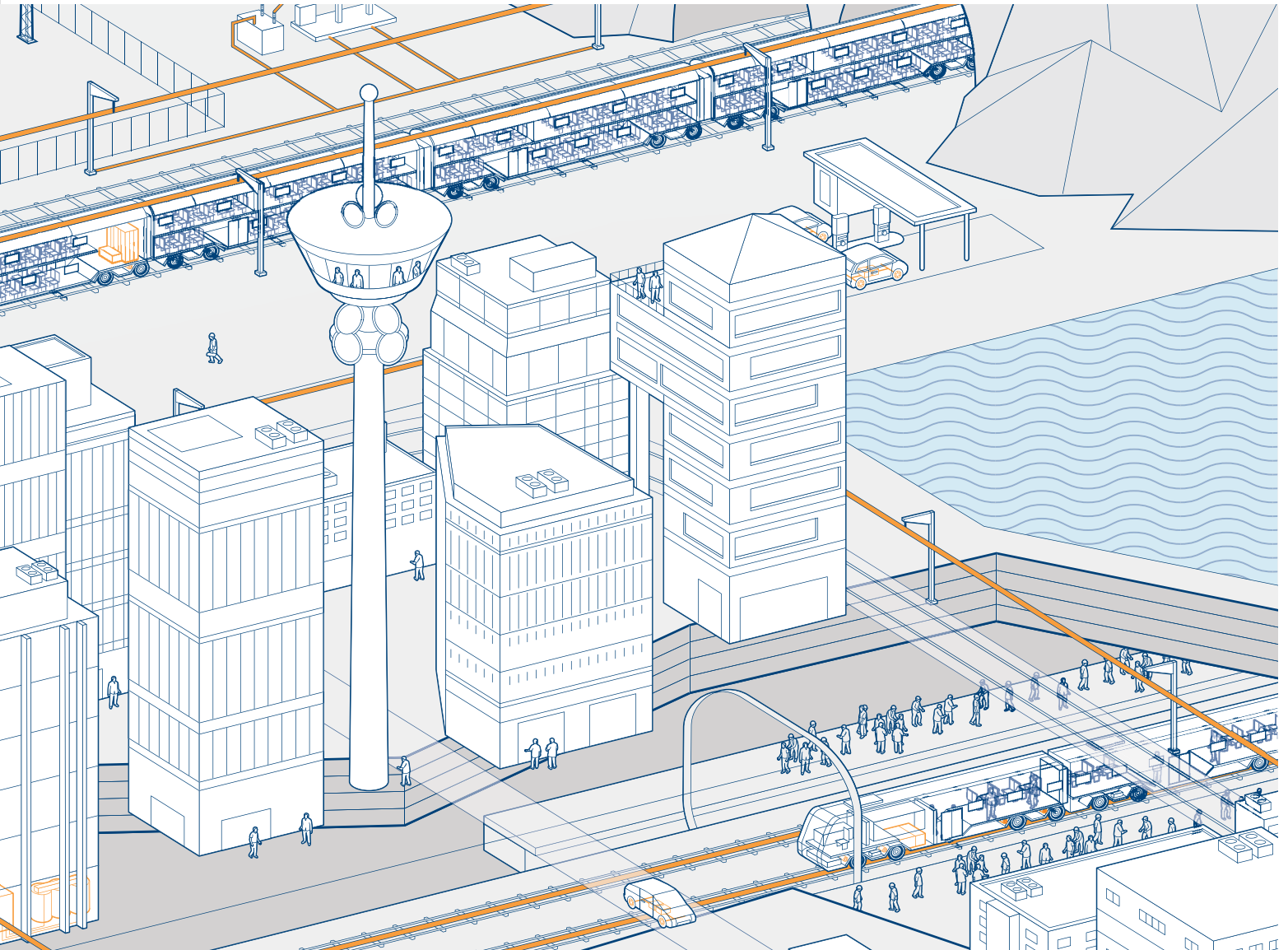
ABB's presence in over 100 countries brings its expertise into close proximity with its customers. In the United States, ABB Inc. is headquartered in Cary, NC with 20 manufacturing and service facilities located throughout the country.

ABB products meet or exceed industry standards by complying with applicable laws and regulations such as the "Buy American" provisions contained within the American Recovery and Reinvestment Act of 2009. Additionally, ABB designs meet the ANSI/IEEE specifications and RI-9 requirements.

## Key deliverables

- Complete substations and turnkey AC and DC rail power systems, FACTS, network management and SCADA
- Onboard traction transformers
- Main and auxiliary converters, battery chargers
- Traction motors and generators
- High-, medium- and low-voltage products and systems
- Semiconductors
- Turbo chargers for diesel locomotives
- Static frequency converters
- Traction rectifiers
- Trackside power and distribution transformers

ABB is a world leading independent supplier of innovative and reliable technologies to train manufacturers and railway operators. With a comprehensive offering for rolling stock and infrastructure as well as FACTS, network management solutions and SCADA systems, ABB also provides service support, including maintenance and retrofit.



#### **Turnkey infrastructure solution and propulsion package**

ABB is able to construct and install complete, turnkey trackside power supply systems for rail networks, offering a wide variety of innovative and reliable products for every aspect of rail infrastructure. Onboard trains, ABB's propulsion package includes the design, manufacture and supply of all the main traction components. This offers the best overall solution and optimisation in costs, reliability, weight, size and energy efficiency.

#### **Efficient customer service around the globe**

ABB has a global network of services for railway providing the possibility to get tailor made and lifecycle services for rolling stock and infrastructure. ABB's broad range of services consists of spare parts, maintenance, upgrades and retrofit, on and off customer site. A customized bundle of services is available based on the customer's operating needs, on demand when needed or in multi-year service level agreements.

# Power in the vehicle

## Innovative and leading-edge rolling stock technologies

ABB offers a broad portfolio of solutions and services for rolling stock including traction transformers, converters, motors and many other components. ABB innovative technologies serve in different types of rail application, ranging from freight through high-speed to suburban railways, metros and tramways. ABB works worldwide with leading vehicle manufacturers and transport operators.



### Traction transformers

For roof, under floor or machine room installations



### Compact converters

Traction converters with integrated auxiliary converters



### Traction motors and generators

For various electric and dieselelectric rail vehicles



### Bi-directional high-speed DC circuit breakers

Suitable for EMUs, trams and metro applications



### Auxiliary converters and battery chargers

For onboard power supply



### Turbochargers

In compact construction, for diesel engines with an output of up to 3,200 kW



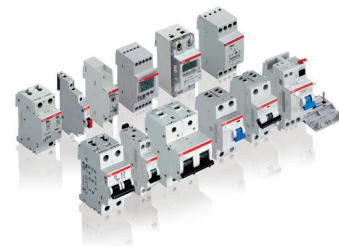
### Surge arresters

For reliable protection against overvoltage of rolling stock & infrastructure in AC/DC systems



### Semiconductors

For reliable and efficient switching in propulsion and auxiliary converters



### Low-voltage products and systems

A wide range of LV products are available for onboard applications

# Power to the line

## Energy-efficient and reliable infrastructure solutions

ABB specializes in the delivery of trackside traction power supply systems for both mainline and mass transit applications. Building upon decades of market and manufacturing experience ABB is able to construct and install complete power supply and control systems for rail networks, offering a wide variety of innovative and reliable products for every aspect of rail infrastructure.



### Traction substations

Complete traction power supply systems for main line and mass transit applications



### Static frequency converters

Ensure a reliable supply of single phase current for railway networks



### DC traction substation converters

Traction rectifiers and inverters for DC traction supply



### Low-voltage switchgear

In modular construction, for reliable power distribution



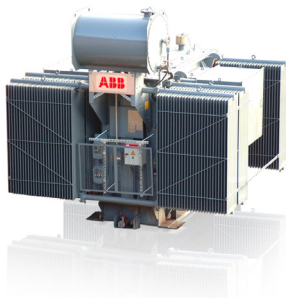
### Medium-voltage switchgear and breakers

Indoor and outdoor circuit breakers, air and gas insulated switchgear



### Medium-voltage modules

Outdoor factory assembled frame for all electric railway single-/two-phase network



### Liquid-filled transformers

Compact and low-weight power and distribution transformers for various applications



### Dry-type transformers

Vacuum cast coil dry-type transformers for a long lifetime and reliable performance



### High-voltage switchgear

In modular construction, for all voltage levels

# Power in the vehicle

## Rolling stock traction solutions for optimized performance



### High integrated traction packages for all rolling stock

ABB is a global player and one of the very few independent suppliers of traction packages. This unique positioning and strong local presence in all major rail markets helps ABB to provide optimum solutions for vehicle manufacturers and train operators.

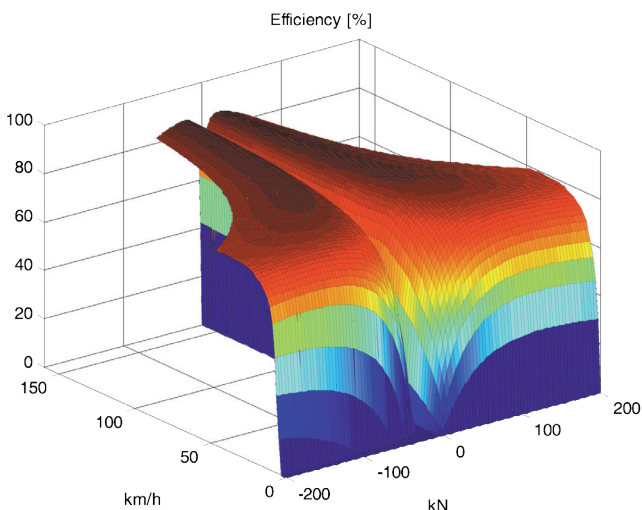
Key advantages and customer's benefits are :

- one single interface to the supplier
- total energy efficiency
- low life-cycle cost
- optimized dimensioning of components
- fast commissioning and homologation

### Full service portfolio for rail customers

A typical customer's installed base may have been commissioned up over a period of 40 years or more, and will reflect the different prevailing technologies during that period. ABB has hence developed a service portfolio to help customers face this challenge. Thanks to its vast knowledge base, ABB can provide service for rolling stock regardless of type or age. Work performed can range from routine diagnosis and maintenance to retrofitting, re-engineering and overhauls.

As a long term partner, ABB has a proven track record of service packages with railway customers in which ABB commits to improve the equipment performance and reduce the operating life cycle costs.



# Power to the line

## Infrastructure solutions for more capacity and power stability

### Turnkey railway infrastructure solutions

ABB offers a comprehensive range of AC traction substations for both 25 Hz and 60 Hz applications comprising single- or two-phase feeder substations and switching posts, autotransformer stations and substation automation (local control and protection). For DC traction substations, ABB is also an experienced partner taking care of system integration such as rectifier substations up to 3000 V DC.

### Network management and SCADA systems

SCADA (supervisory control and data acquisition) 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.

### FACTS solutions for improved power quality

Trains taking power from the grid must be able to rely on the supply to be stable. Similarly, power quality in the grid must not be impaired, despite harmonic generation and unbalance between the phases of the load. Time as well as money can be saved by implementing FACTS (flexible AC transmission system) in existing systems rather than investing in new transmission or sub-transmission lines, and/or building new substations and feeding points.

Adequate power quality can also be achieved with in-feed at lower voltages as it may be sufficient to feed a railway system at 132 kV rather than at 220 kV or even 400 kV, which enables a lower investment cost and in shorter time. FACTS for railways comprises SVC, SVC Light® and Dynamic Energy Storage.



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