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ELECTRIFICATION SOLUTIONS

# Transportation rail and infrastructures

Innovative, safer and smarter solutions  
for sustainable mobility



# Providing sustainable solutions for modern transport challenges

ABB is a world leading supplier of innovative technologies for transportation with a comprehensive range of solutions for rail, e-mobility and marine.

ABB Electrification Products (EP) division and GE Industrial Solutions (GEIS) have combined forces to strengthen our global #2 position in electrification.

Together, we will be the partner of choice in electrification. We help keep the world moving with new sustainable approaches that enable customers to use energy effectively, creating a low carbon transportation industry that operates with maximum efficiency, reliability and safety.

1



Solutions for electrification of rail infrastructure, control and signalling equipment, and rolling stock.

2



Solutions for eBus and eCars: depots and fast charging solutions for cars and buses.

3



Solutions for marine and ports.

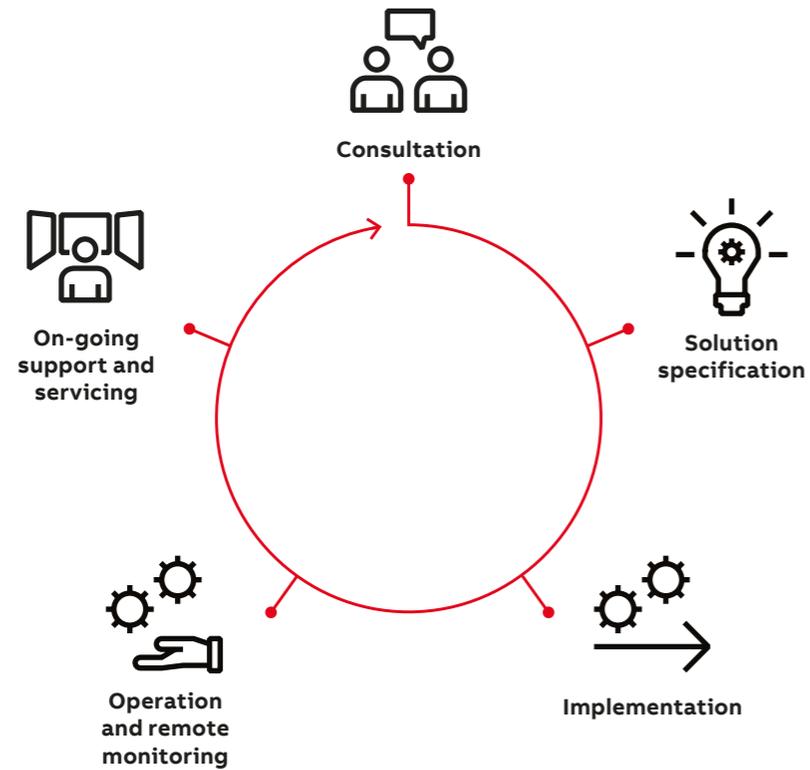


# Delivering sustainability

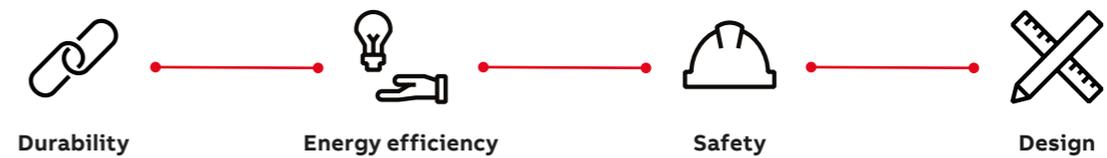
From consultation to implementation, when it comes to overcoming your challenges we provide the complete package.

Rapid urbanization is placing ever greater demand on cities when it comes to reducing congestion and pollution while maintaining an efficient network of transportation. The measure of sustainability is grounded in the ability of new and existing networks to adapt to evolving challenges and technologies.

When it comes to overcoming these modern challenges we provide the complete package. We offer on-going support to ensure true sustainability now and in the future.



We understand the complexity of implementing solutions that are both sustainable and future-proof. Whenever we approach a challenge, there are four key criteria that ensure the solutions we recommend are truly sustainable.



# Providing sustainable mobility with ABB Ability™

ABB Ability™ is our unified, cross-industry digital solution, giving you the ability to know more, do more, do better, together.

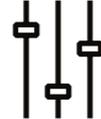
ABB Ability™ is built on a state-of-the-art hardware and software architecture for data collection, processing and storage, which has been developed together with Microsoft in order to enhance performance and guarantee the highest reliability and security.



**Monitor**  
Discover plant performance, supervise the electrical system and allocate costs.



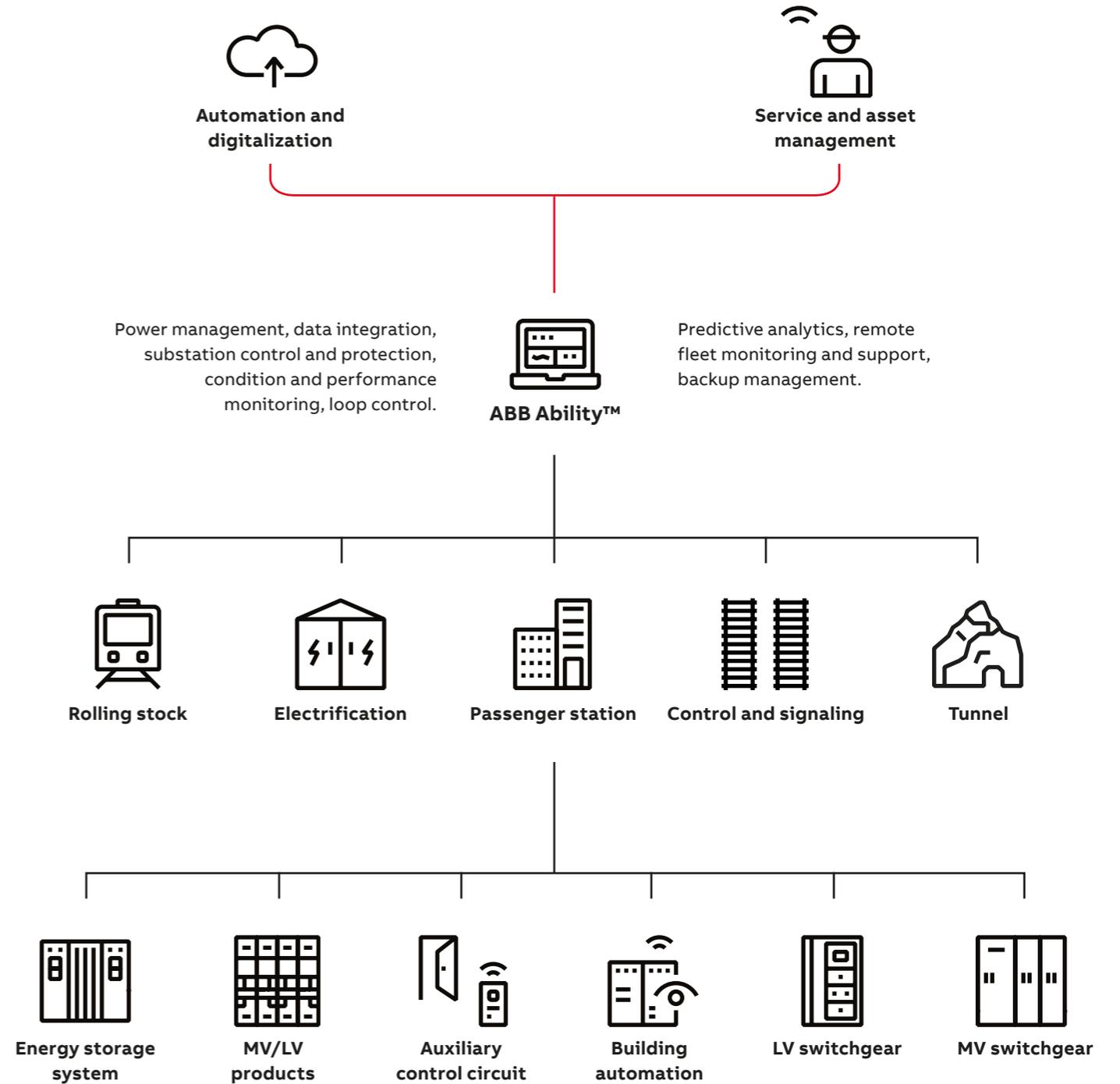
**Optimize**  
Schedule and analyze automatic reports, improve the use of assets and take the right business decision.



**Control**  
Set up alerts and notify key personnel, and remotely implement an effective power management strategy.

Our leading integrated and collaborative digital solutions build on our knowledge and expertise in transportation and infrastructure, which contributes to:

- Maximized service continuity through smart algorithms, even in an emergency
- Savings to 30% on operational costs through energy management system
- Reduction of more than 60% installed components for the same function
- Switchgear footprint reduction up to 50% by embedding logics



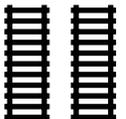
# Rail and infrastructures

Rapid urbanization and the reduction of gas emissions has sparked a shift in the railway and transportation industry.

Rail is being rediscovered as a sustainable and energy-efficient form of transport. We understand the importance and implications of running railway networks. We provide complete solutions that protect your infrastructure, and meet the expectations of users and transport stakeholders for all key applications. These include infrastructure, passenger stations, control and signaling units, tunnels and rolling stock.

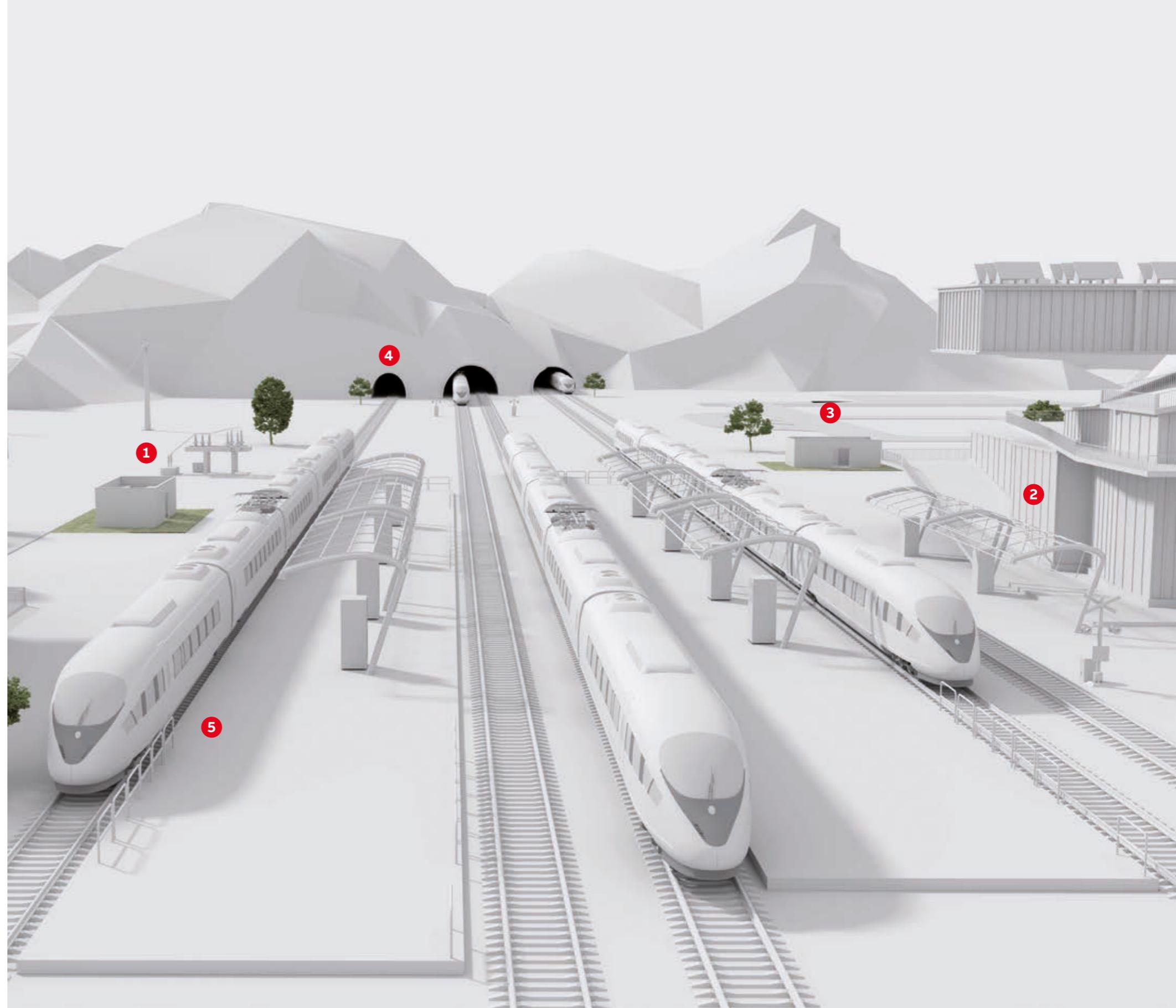
- 1

Infrastructure  
AC/DC substation
- 2

Passenger stations and  
building infrastructure
- 3

Control and signaling units
- 4

Tunnels
- 5

Rolling stock  
(metros, trams, locomotives, high speed trains etc.)





# ABB products and solutions for infrastructure Electrification

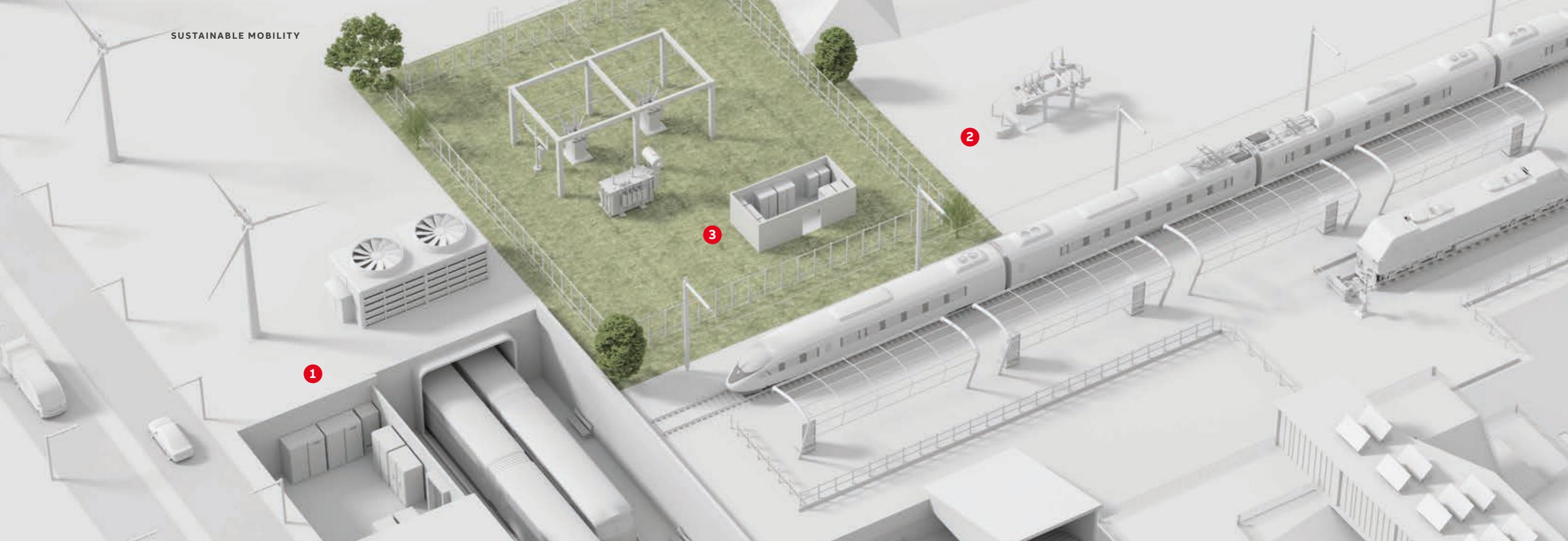
When it comes to rail infrastructure and rolling stock, the key focus areas are DC voltage, AC voltage and custom solutions.

Our innovative products are designed for heavy-duty industrial applications and are extensively tested to withstand the requirements of a transportation system, helping to ensure maximum reliability for our customers.

1 DC voltage solutions

2 AC voltage solutions

3 Custom solutions



1

2

3

## 1 DC voltage solutions



### DC eHouse

A prefabricated walk-in modular outdoor enclosure to house a medium-voltage (MV) and low-voltage (LV) switchgear, as well as auxiliary equipment. Factory assembled and tested solutions ensure that site works are moving faster and smoothly. Wide range of ratings based on layouts in steel, concrete and innovative GRP housings.



### Medium-voltage switchgear and distribution automation

ABB offers a comprehensive range of medium-voltage primary and secondary switchgear covering all needs and functionality in DC traction substations. ABB's offering also includes an all-in-one user interface, automation platform and gateway, designed for IEC 61850-based distribution automation systems.



### Rectifier groups and DC distribution

ABB provides a full range of rectifiers, converting alternating current into direct current. DC switchgear serve as control and protection equipment. The cubicles contain DC high-speed circuit-breakers type Gerapid and other proven components. A range of voltage limiting devices complements ABB's offering.



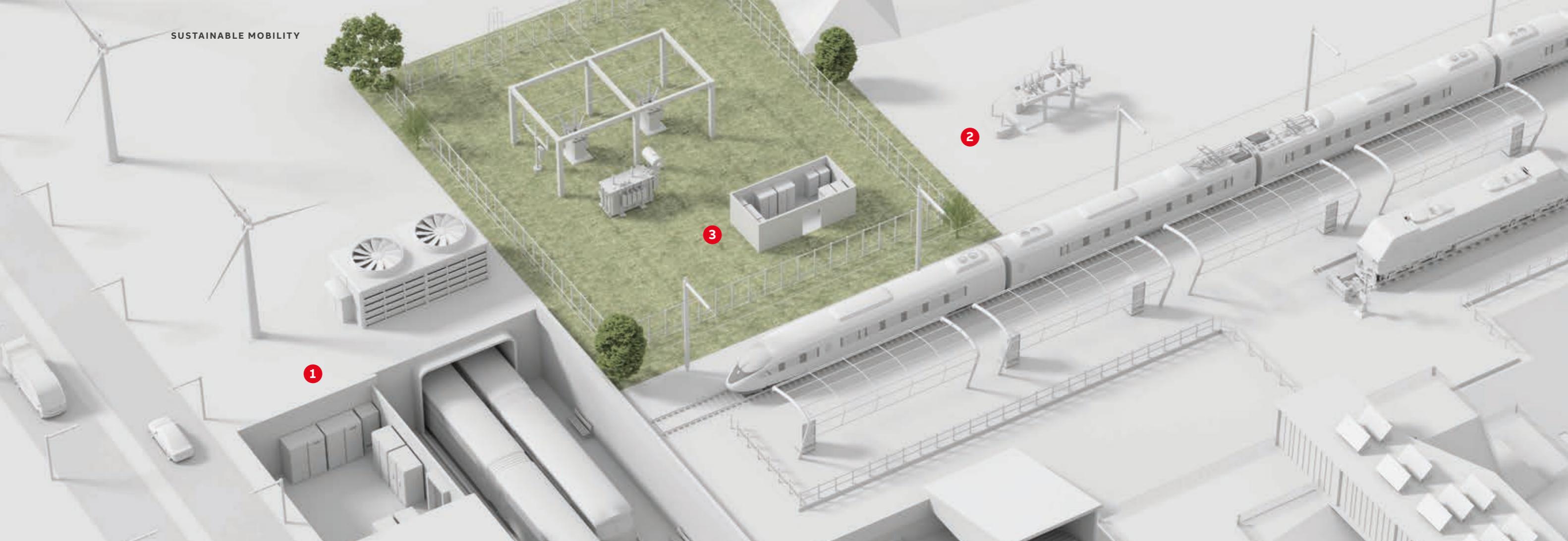
### Energy management solutions

Recycling the braking energy is the single largest opportunity to improve energy efficiency. ABB offers a complete range of smart energy recuperation and energy storage systems that can reduce the overall power consumption by as much as 30%.

1 DC voltage solutions

2 AC voltage solutions

3 Custom solutions



## 2 AC voltage solutions



### Compact secondary substation (CSS)

Prefabricated substations that include a low-voltage switchboard, transformer and medium-voltage switchgear. CSS is internal arc tested for higher safety. CSS is the perfect answer in delivering auxiliary power along the track to signalling and communication systems.



### Outdoor modules

Outdoor modules provide a new rail-specific substation, completely factory assembly and tested in outdoor conditions. By design, the offering covers single- and two-phase 25 kV and 15 kV systems, addressing all project specific concerns, e.g. optimization of the delivery schedule and mitigation of risks due to delays and errors.



### Primary and secondary switchgear

ABB offers a range of medium-voltage primary (ZX, UniGear) and secondary switchgear (UniSec, SafePlus/SafeRing) for safe and reliable, cost-efficient power distribution for infrastructure (depots, passenger stations, tunnels, etc.). With an air-insulated and gas-insulated portfolio, ABB offers a large choice to meet specific project requirements.



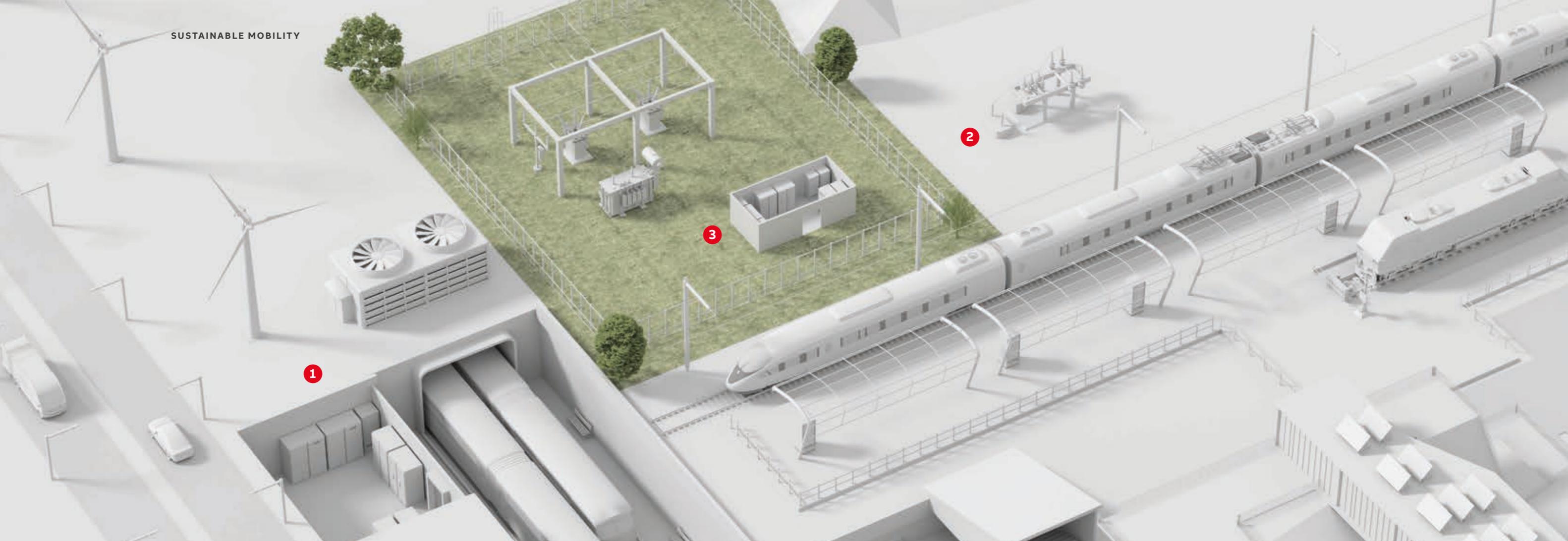
### Low-voltage switchgear

ABB offers low-voltage switchgear systems and modular construction solutions, such as MNS. Ideally suited for reliable power distribution, our products are robust, reliable, and type-tested for transportation systems.

1 DC voltage solutions

2 AC voltage solutions

3 Custom solutions



### 3 Custom solutions



**Packaging of multiple products, including simple interface engineering, provides customers a fully integrated solution under a single commercial agreement.**

Throughout a project, there may be complications of interfacing with multiple vendors during procurement, engineering and execution, along with challenges to mitigate risk. ABB is able to address these by leveraging its comprehensive product portfolio and third party offerings.

Product packaging has been developed to further enhance the offering to our customers by providing seamless integration of multiple product elements. Handling project execution under a single commercial agreement, with common project management and interface engineering between the products, helps accelerate the project and reduce total cost.

### Service

**Our global network of railway services provides you with tailor-made services for infrastructure and rolling stock.**

The broad range of services include spare parts, maintenance, upgrades and retrofit. We offer these services on and off customer sites. A customized bundle of services is available based on your operating needs and on demand, or in multi-year service level agreement.

We are committed to supporting you throughout the process of you improving operational efficiency, and providing performance improvement to your fleet while reducing the operating costs. With the knowledge gained from our vast experience in the railway industry, we are very conscious of the importance of maintaining the safety and reliability of railway systems.

- 1 DC voltage solutions
- 2 AC voltage solutions
- 3 Custom solutions



## ABB products and solutions for infrastructure

### Passenger station and building

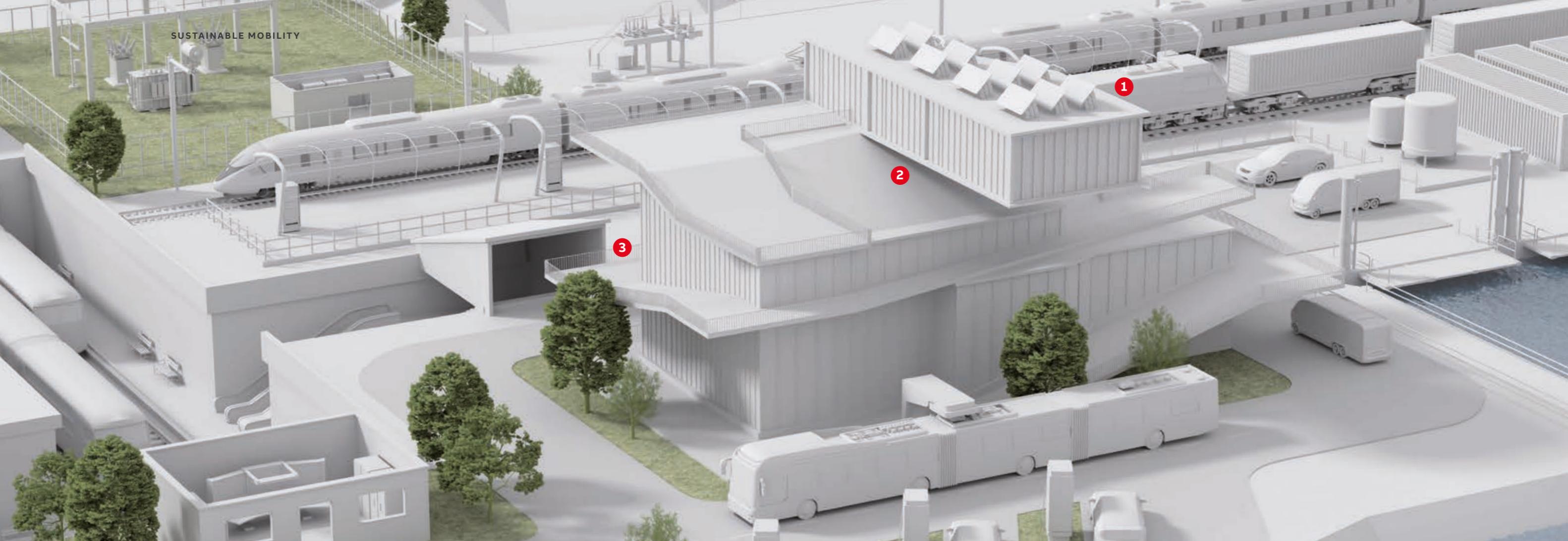
When it comes to passenger stations and buildings, the key focus areas are energy efficiency, safety and security, and building automation.

We're constantly improving our offering, looking for the most user-friendly solutions and bringing people and technology together. Smart passengers deserve smart stations.

1 Energy efficiency

2 Security and safety

3 Building automation



## 1 Energy efficiency



### Energy management

The System pro E power main distribution switchboard is rated up to 6300 A and designed to easily fulfill all electrical installation requirements in terms of protection degree, segregation form and electrical characteristics. It is simple and quick to assemble.



### Energy monitoring and asset management

ABB Ability™ Electrical Distribution Control System (EDCS) collects and processes data to provide energy consumption control in the building and passenger station, all in a single location. The ABB Ability™ EDCS predictive maintenance feature ensures high reliability with lower maintenance costs.



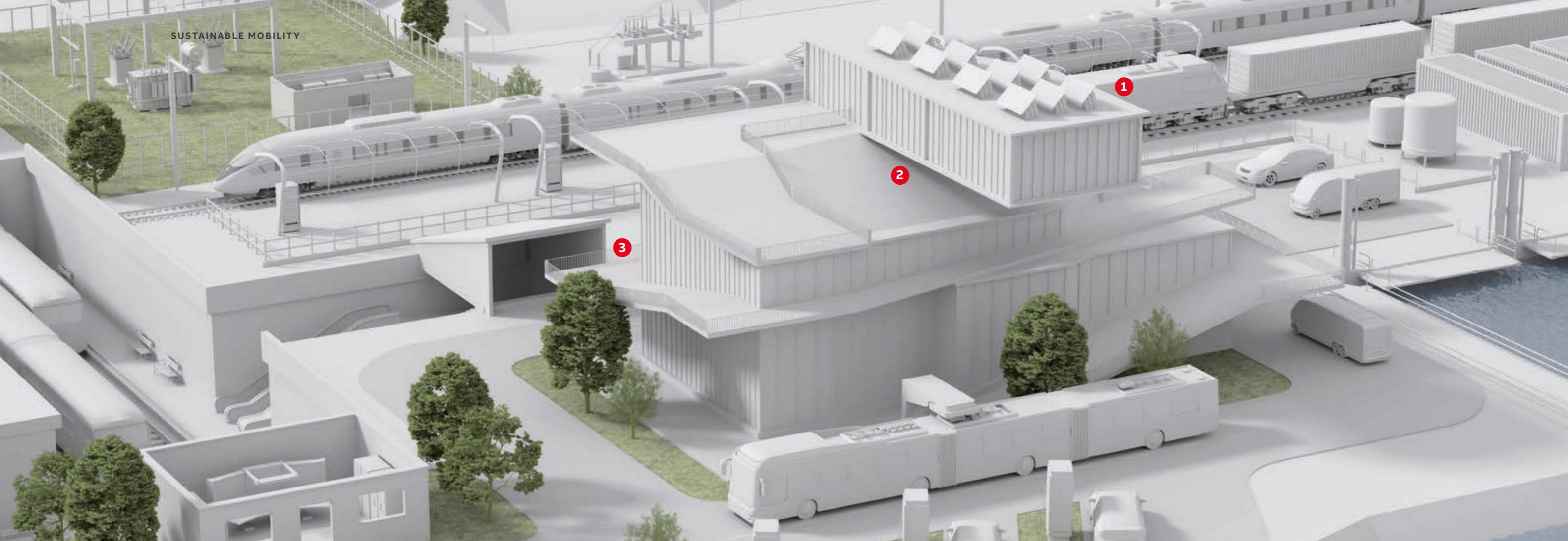
### Compact distribution boards

This broad range of products is suitable for any type of mounting, from flush-mounting and wall-mounting to hollow-wall mounting applications. All enclosures are double insulated. Degrees of protection between IP31 and IP43 are available.



### Power protection and management

Emax 2 air circuit-breakers up to 6300 A or Tmax XT moulded case circuit-breakers up to 1600 A AC and 800 A DC guarantee extremely high performance levels. It enables direct communication to the new energy management cloud-computing platform ABB Ability™ Electrical Distribution Control System.



## 1 Energy efficiency



### Energy storage

The new TRIO-TM inverter features touchless and wireless commissioning with an integrated web user interface for quick set up. Ethernet multi-communication interfaces, remote monitoring and firmware updates also enable long-term savings.



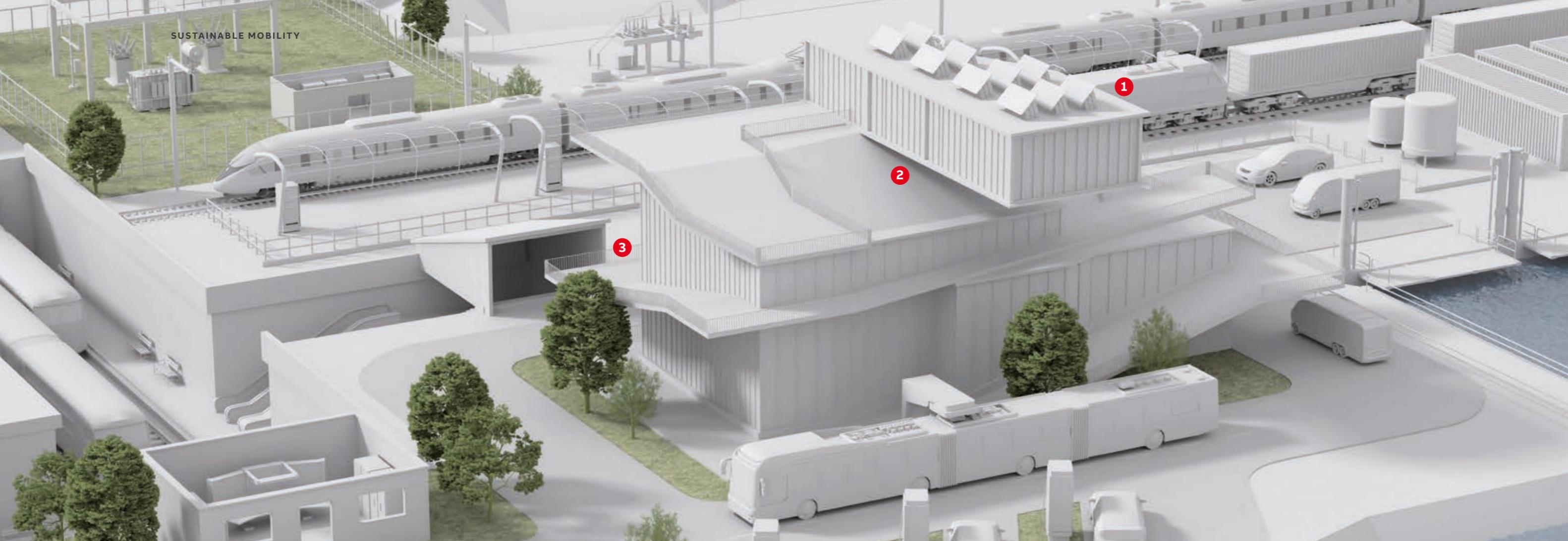
### Energy measurement

The M2M analyzer makes it possible to keep passenger station electrical consumption under control by measuring economic and environmental impact in real time. This information can be transmitted quickly to remote locations through specific communication interfaces.



### Twister® S1

The Twister® S1 is a universal and central energy source for safety purposes. It remains dormant as long as your energy provider's grid is supplying power. However, if the power cuts out just once, the Twister® S1 springs into action within one second to guarantee that the energy supply continues throughout the power outage.



## 2 Security and safety



### Constant vigilance

Safety begins with visibility, and these Busch-Watchdog movement detectors react sensitively and immediately. With a detection range of up to 280°, they're suitable for every situation, including long distances, across two corners or for large radii.



### Access management

ABB-Welcome creates the highest level of safety and comfort, and can be expanded in a variety of ways. Access has also been simplified, with transponder cards for guests and fingerprint modules for the personnel. What's more, there are several cameras which can be integrated to create safety.



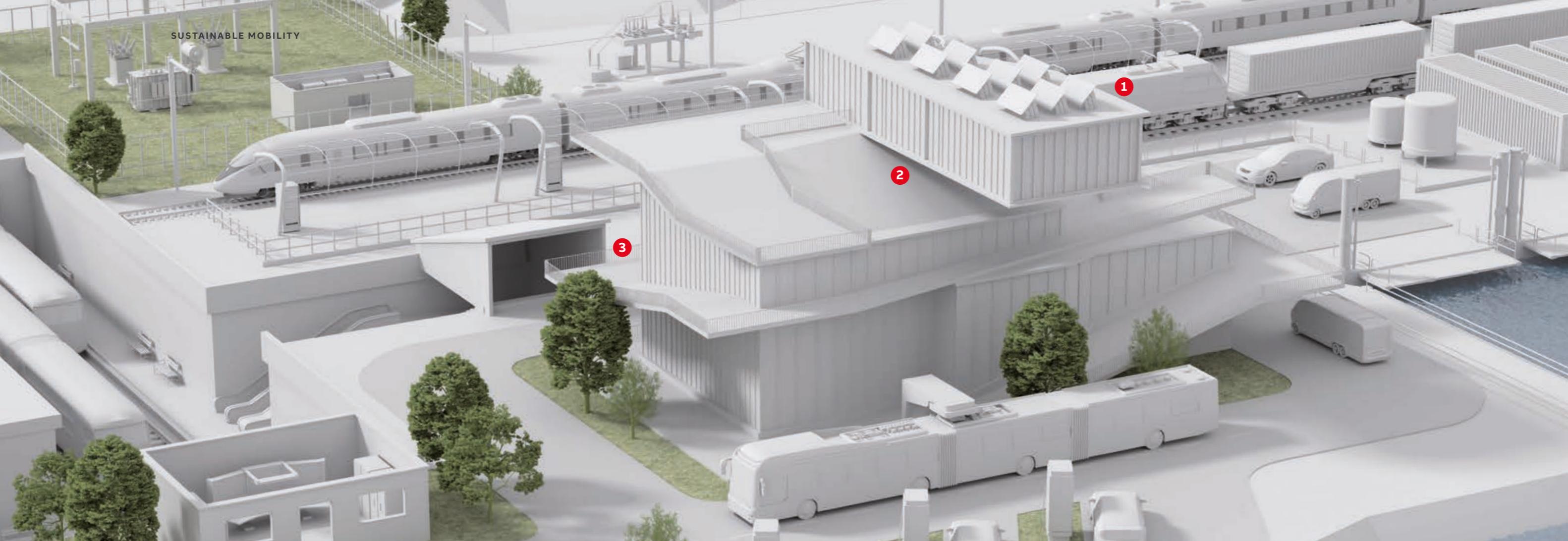
### Safe power

ABB's safe power and light sources are weather-protected with IP44 protection. These waterproof devices keep on going, even in rain or snow. The timeless design harmonizes with different architectural styles.



### Emergency lighting

Our emergency lighting provides 24/7 protection, giving you a reliable, total solution for safe evacuation. Through close cooperation with consultants, architects, wholesalers and installers, ABB solutions reduce total cost of ownership.



## 2 Security and safety



### Protection against currentline and arc faults

Top quality products such as miniature circuit-breakers and fuses, protect lines against short-circuits and overloads. Residual current devices provide protection in case of earthing faults, and ABB's pro M system provides even more advantages for protection.



### Over-voltage protection

ABB surge protective devices (SPD) detect and protect electronic systems in the event of surges from lightning events or switching operations. These devices limit peak voltage to acceptable levels for end equipment and increase the quality of service and equipment lifespan.



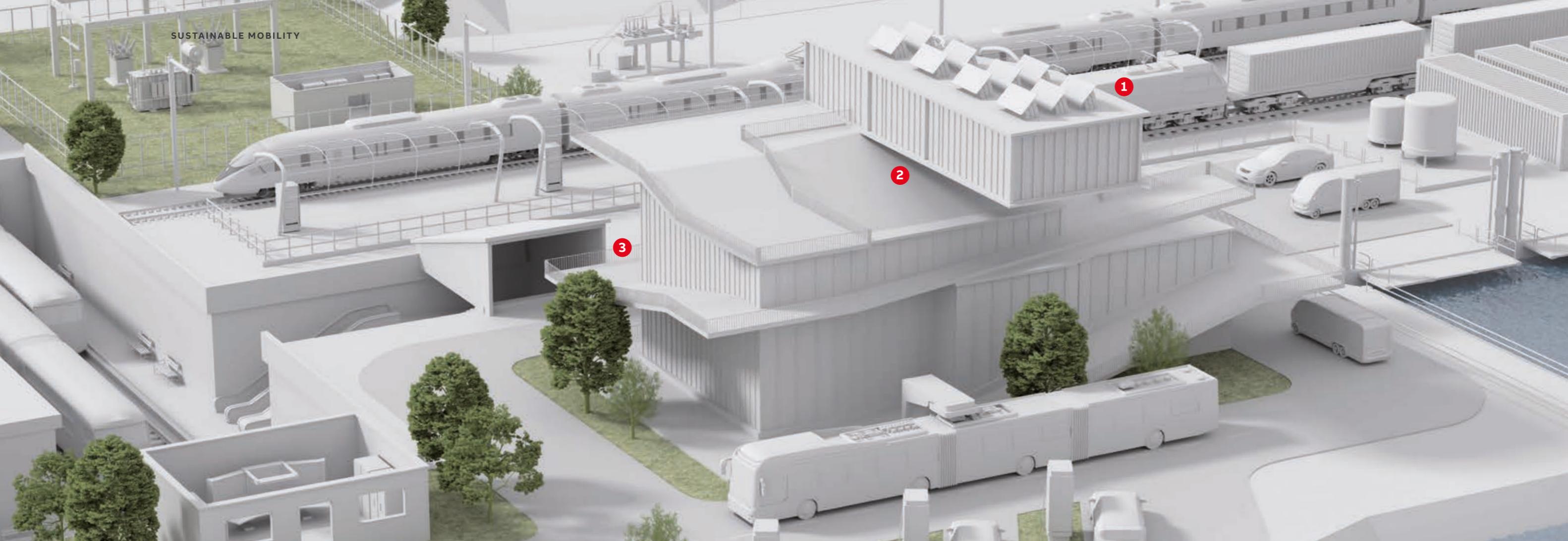
### Connectivity and lightning protection

ABB's range of power and grounding products for train station use, offer a number of benefits: reliable, high quality connections, low installation cost, easy inspection, and safe, code compliant earthing and grounding.



### Earthing and lightning protection

ABB is a leading global provider of earthing and lightning protection solutions to train stations. Code compliant products provide increased safety, high quality manufactured components, and low installed costs through intelligent design.



### 3 Building automation



#### ABB i-bus® KNX

ABB i-bus® KNX is based on KNX technology, accepted as the world's first open standard for the control of all types of intelligent buildings. It's easier to manage and control, resulting in increased flexibility, security, economic efficiency and convenience.



#### Shading control

Sun protection devices have a significant role, providing anti-glare protection (e.g. for PC workstations) and protecting furniture color from fading. These devices can also regulate room temperature and direct available sunlight by tracking the sun's position.



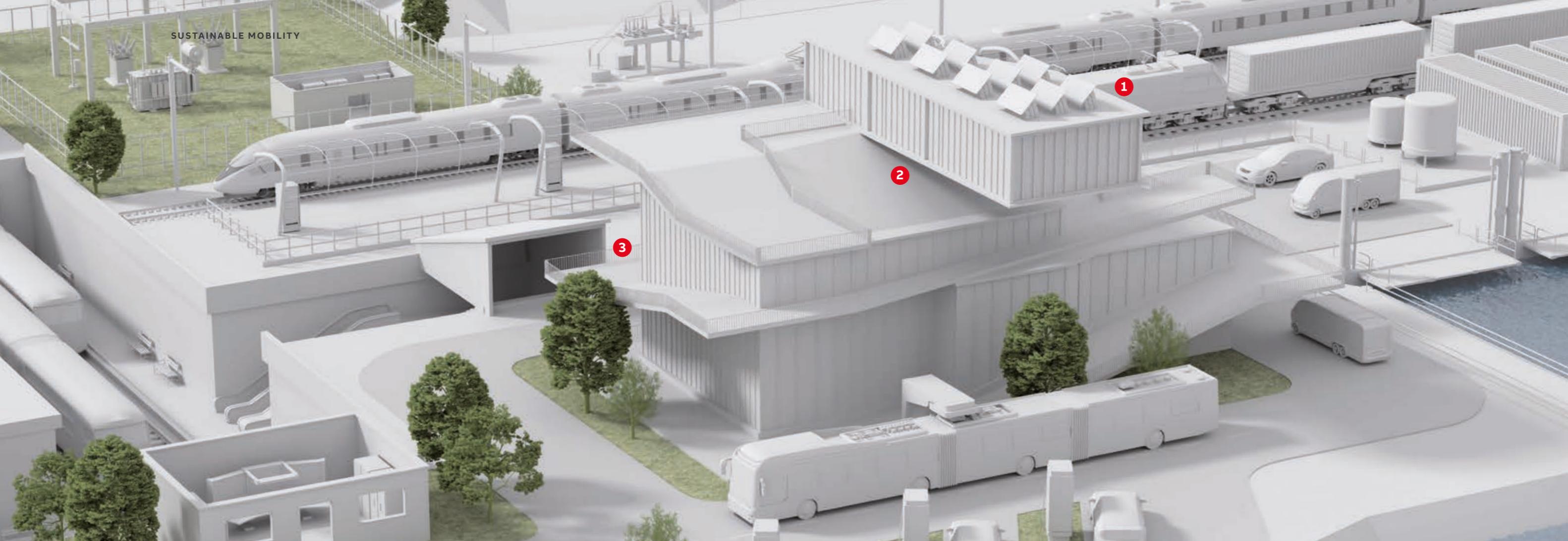
#### Ventilation

Natural ventilation is often an effective and efficient method for exchanging "used" room air and improving its quality. If room air quality is monitored with sensors (temperature, humidity, CO<sub>2</sub> concentration), ventilation flaps can be opened automatically to keep it at a comfortable level.



#### Heating and cooling

The KNX Fan Coil room temperature controller can be operated individually and adjusted precisely for personal comfort. Fan speeds can be selected by push buttons. Even very large rooms can be quickly heated or cooled with additional air-conditioning units.



### 3 Building automation



#### Switch, dim and control light

Coordinating light sources such as spotlights, indirect lights or decorative wall lights – and even daylight controlled by blinds – can create a warm welcome in an impressive setting. It's very simple to operate and automate whole environments with switches and dimmers.



#### Energy management EQmatic

ABB's new EQmatic series stores, displays and analyzes the consumption data of electricity, gas, water and heat meters. This allows energy flows and costs in the building to be monitored and made transparent, increasing energy efficiency and providing a basis for further operational optimizations.





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## ABB products and solutions for infrastructure

### Control and signaling

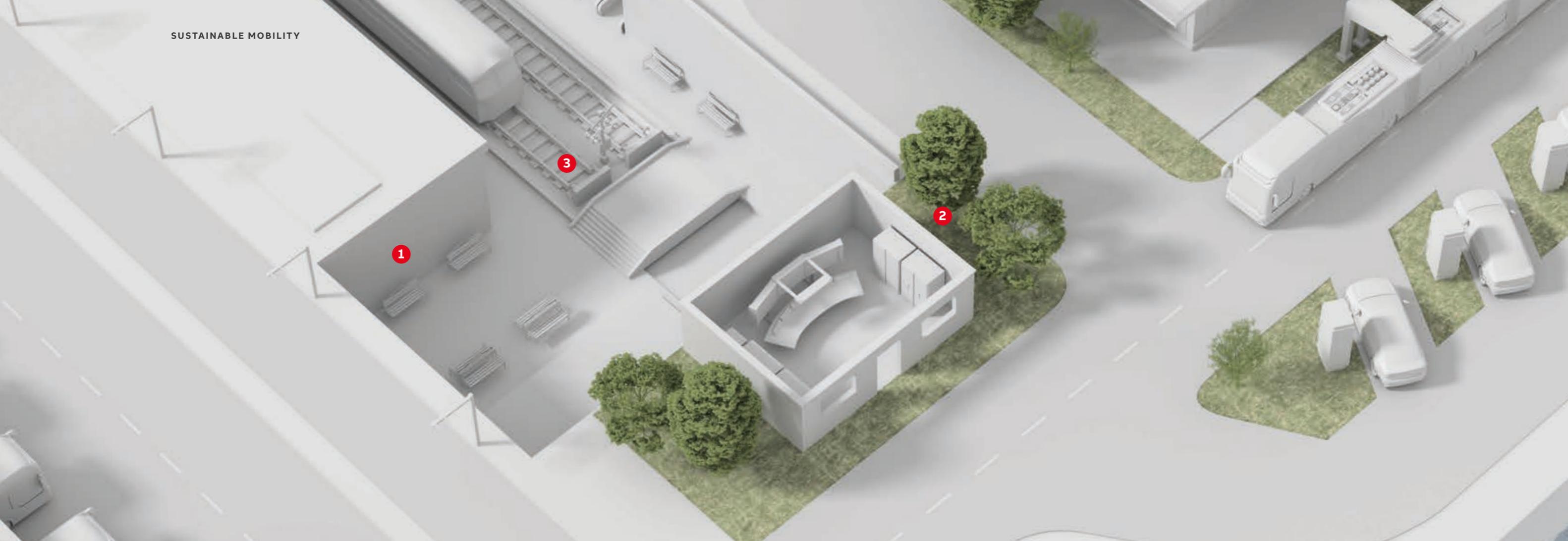
When it comes to control and signaling, the key focus areas are power protection, power management, and switching and control.

Our expertise allows us to propose a wide variety of solutions, ranging from products to systems. We support our customers in managing energy consumption, reducing failure rates and optimizing maintenance costs.

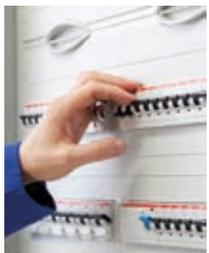
1 Power protection

2 Power management

3 Switching and control



## 1 Power protection



### Current line and arc faults

Complete assortment of first-class quality products such as miniature circuit-breakers and fuses to protect the lines against short-circuits and overloads. All using the full pro M system will give infinite advantages for protection as well as smart and efficient solutions.



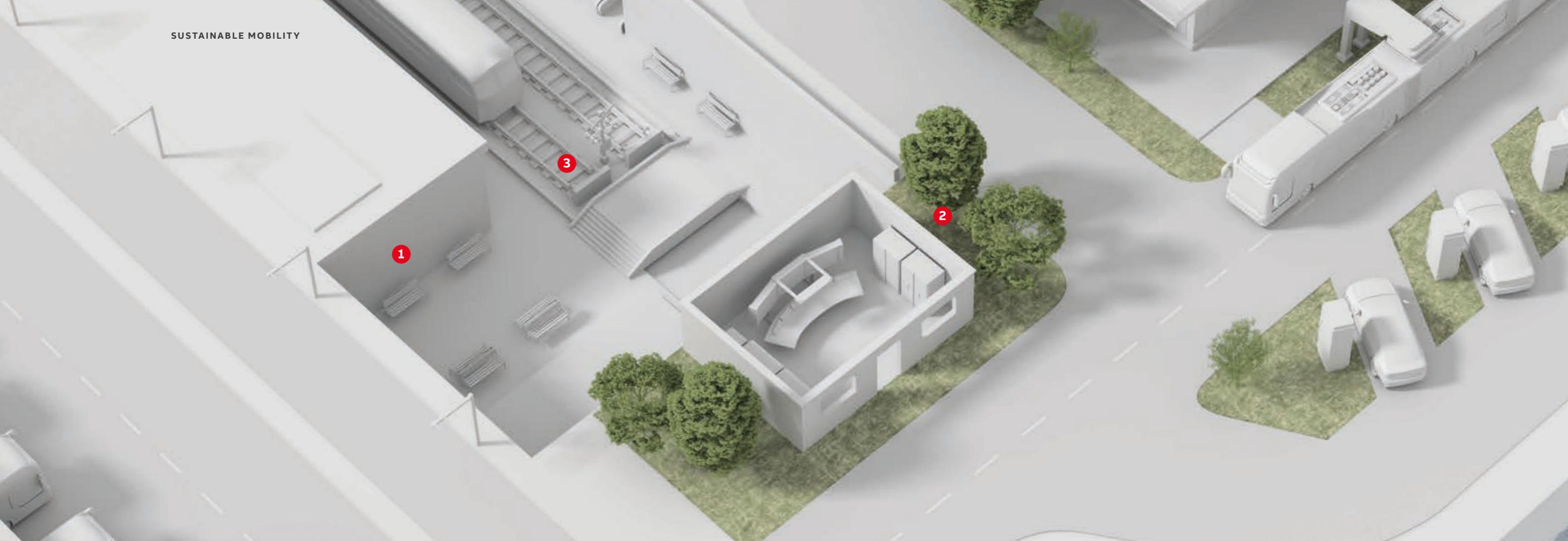
### Overvoltage protection

ABB surge protective devices (SPD), detect and protect electronic systems in preparation for any surges coming from lightning events (direct and indirect impacts), or switching operations. This also limits the peak of voltage to an acceptable level and increases the quality of service and equipment lifespan.



### Modular combi

Modular combi is a cost-effective system that can be placed close to the track for maintenance teams, and comes with different types of outlets, RCDs and MCBs in one location. Modular combi is very easy to install, and thanks to the solutions and design, it saves time and money. The range consists of two lines, one product line in plastic, and the other one in metal. It can be mounted with an already existing 4-wire as well as 5-wire cable, and the modules are easy to modify for additional future needs.



## 2 Power management



### Switches

The switch family consists of a wide range of high quality power switches, such as switch-disconnectors, switch fuses, transfer switches, bypass switches and cam switches. ABB's switches are designed for flexibility and reliable performance in a wide variety of applications.



### Power contactors

We offer a large and innovative range of power contactors, manual motor starters and overload relays. The compact solutions and modular frame sizes positively reduce space and weight required for installation. Innovative AF coil technology cuts energy consumption, improving power management.



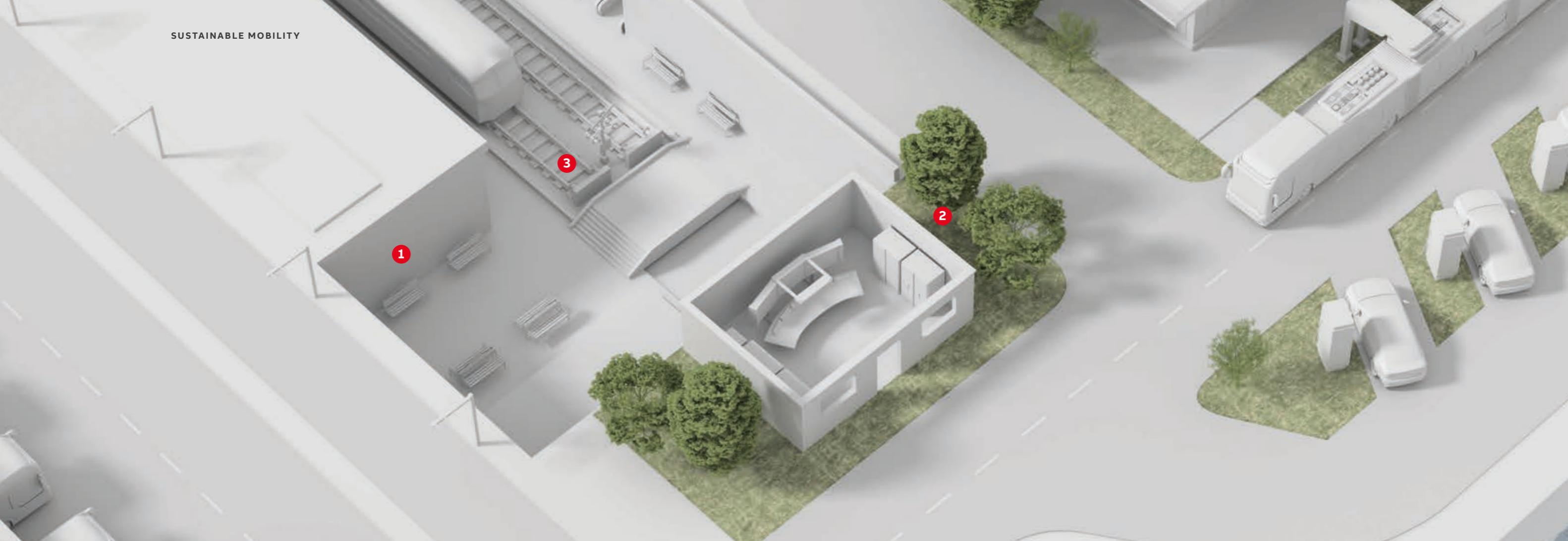
### Fusegear

ABB Fusegear products are designed for an easy, safe and reliable installation and operation in substations, cable distribution cabinets (CDC), distribution boards in compact secondary substations (CSS) and distribution boards. Our product portfolio is a suitable solution for short-circuit and overload protection in low-voltage electrical distribution networks.



### Cable distribution cabinets

Kabeldon solutions are designed to provide excellent protection in even the most demanding environmental conditions. They are designed for outdoor environments. Optimized to work together and are tested and verified as a system. The full IP2X classification provides a safe solution for the installer as well as the surrounding environment.



## 2 Power management



### Energy measurement

There are places all around the railway tracks that need metering, such as railway roundhouses, workshops or temporary parking places. For these applications we introduce the new A42 Platinum for 16.7 Hz single phase EQ meters. There are two types: A42 552-120 for Modbus communication and A42 553-120 for M-Bus communication.



### Energy monitoring and asset management

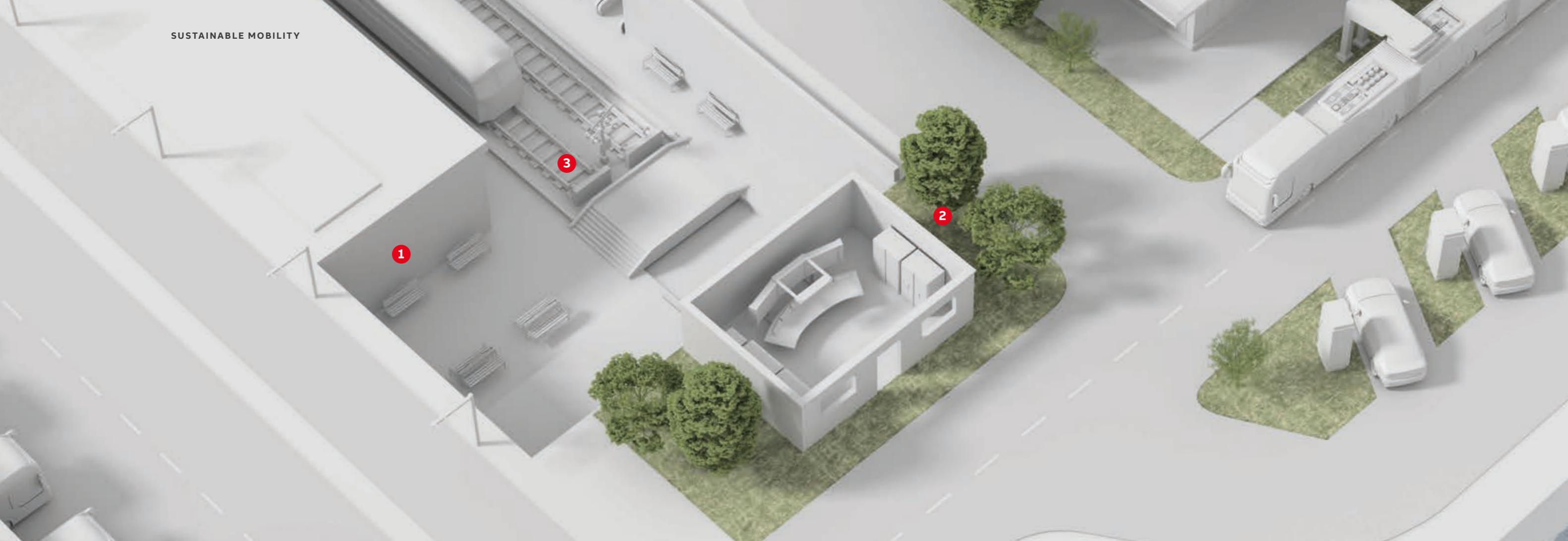
With the innovative cloud-computing platform, ABB Ability™ Electrical Distribution Control System (EDCS), the train lines' energy consumption will be monitored and analyzed, getting alerts about equipment health statuses, all on a single, user-friendly dashboard.



### Power protection

Modular and reliable UPS systems ensure the safe and continuous flow of rail traffic. Optimized investment in control and signaling systems maximizes the use of rail networks and lowers the cost of new infrastructure and railway lines.

UPS systems ensure rail networks deliver efficient, punctual, secure and reliable service and maximizing uptimes.



## 3 Switching and control



### Interface relays and optocouplers

ABB's interface relays and optocouplers provide a reliable voltage conversion between peripherals and higher-level control systems, and are capable of switching AC or DC loads. They are available in a wide range of different coil voltages, standard and logical sockets and with an assortment of plug-in functional modules.



### Primary switch mode power supplies

The CP range offers the latest technology in a compact construction of power supplies. Modern power supply units are a vital component in most areas of energy management and automation technology. ABB pays the utmost attention to these requirements.



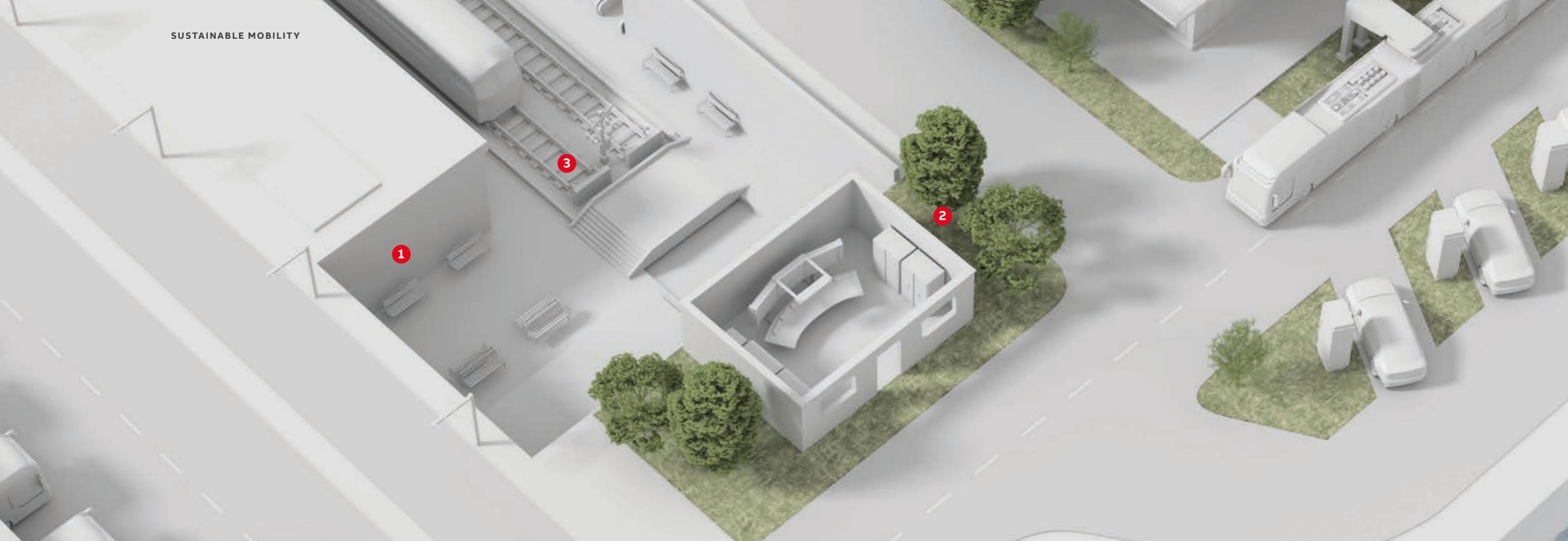
### Safety products

ABB offers a complete range of premium intelligent machine safety products and solutions, including safety PLCs, safety controllers, safety relays, safety sensors, switches and locks, optical safety devices, emergency stops, safety control devices, pressure sensitive devices and fencing systems.



### Arc Guard System™

The Arc Guard System™ increases safety to personnel and equipment and minimizes downtime after an arc accident has happened. The easy-to-read interface makes reading status information quick and easy. A simple start-up menu quickens installation and setup. SIL-2 approval ensure maximum reliability.



## 3 Switching and control



### Universal motor controller

The intelligent universal motor controller UMC100.3 combines motor protection and control functions, fieldbus and Ethernet communication, as well as fault diagnosis in just one device. It provides flexible configuration options, detailed operational, diagnostic and service data required by modern predictive maintenance systems.



### Electronic compact starter

ABB's HF range combines 30 million electrical switching cycles and a wide array of functions in a compact housing only 22.5 mm wide. Direct-on-line and reversed starting as well as motor overload protection up to 3kW/400 V AC are possible in just one device.



### Pilot devices

Our products are engineered for total reliability. Their innovative design simplify the entire process, from selection to installation.

- Modular range for flexible solutions with high electrical ratings
- Compact range with all-in-one design reducing installation time and cost.



### Limit switches

Our limit switches combine different types of actuators, casings and contacts to cover most applications as they are designed to operate in the most difficult environments. They will secure your installation and your uptime.

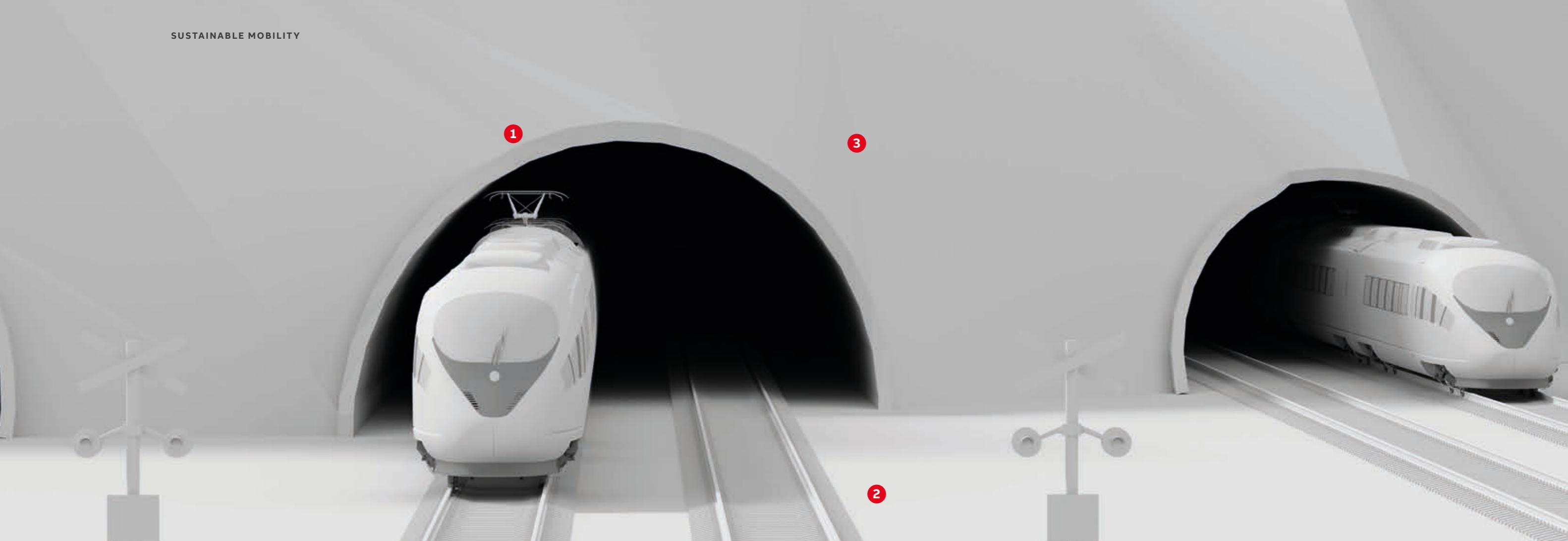


## ABB products and solutions for infrastructure Tunnels

When it comes to tunnels, our key focus areas are power distribution, power management and power protection.

Our expertise and experience allow us to support our customers in their challenges, such as harsh climates with equipment exposed to aggressive salts, brake dust, soot particles, as well as track and wire particles.

We help to protect, control, measure and monitor the network to ensure optimal security across the entire tunnel.



## 1 Power distribution



### Medium and low-voltage distribution

Safety through intelligence and experience: our switchgear and transformer solutions are perfectly aligned to meet the local standards and your individual needs. You can choose from air or gas-insulated cells and gas or vacuum power-cutout switches. Voltage range is between 1 and 40 kV, for all possible technical combinations.



### Powerful energy input

Switchgear and transformer solutions can be adapted to local standards. Customer requirements – even the incredibly specific ones – are fulfilled, regardless of whether they refer to the premises, high environmental standards or other basic conditions.



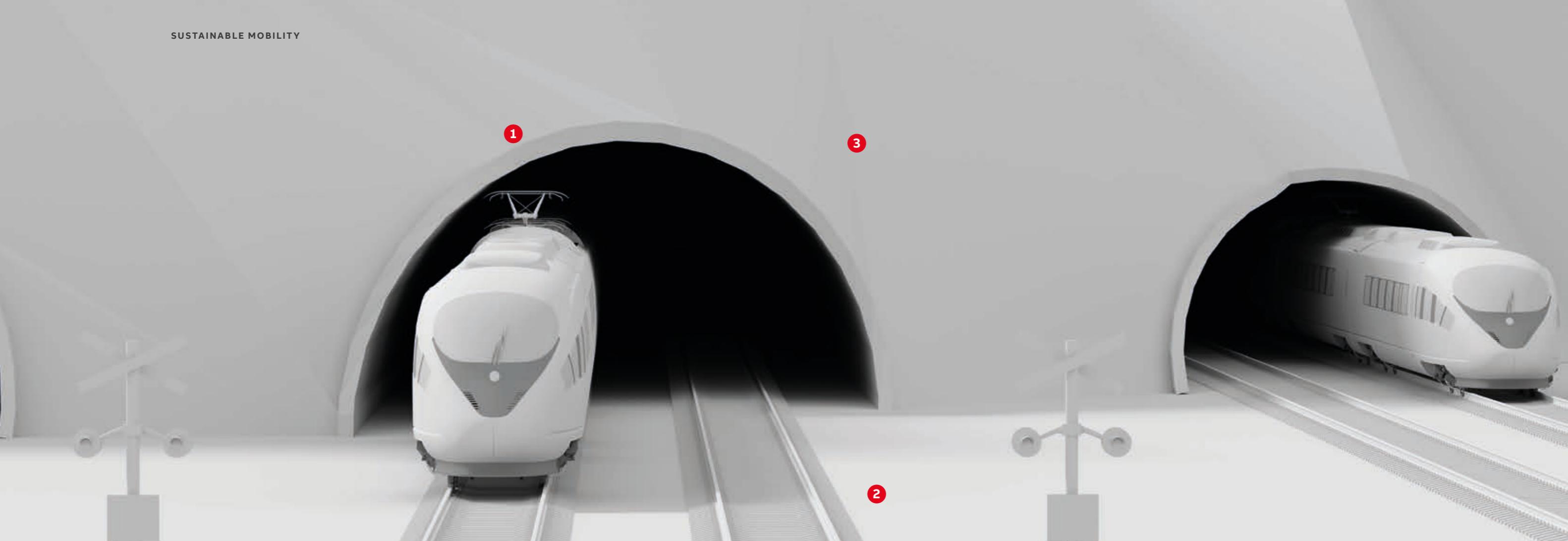
### Main distribution switchboard

System pro E power is the innovative solution with a rated current of up to 6300 A. Designed to easily fulfill all electrical installation requirements in terms of protection, segregation form and electrical characteristics.



### Power supply systems

In the event of a general power failure, the Twister® S1 battery-powered motor generator converter, secures all of the important powered building functions within a matter of seconds. The viaFlex central battery system provides total reliability with its high storage reserves.



## 2 Power management



### Power protection and management

Emax 2 all-in-one is the first circuit-breaker that matches new grid requirements. It enables a direct communication to the new energy management cloud-computing platform ABB Ability™ Electrical Distribution Control System. It sets a new benchmark for circuit-breakers.



### Distribution automation for low-voltage switchgear

Leveraging our digital innovation, Ekip UP updates basic switchboards with new monitoring, protection and power control solutions. The external unit can be interfaced with every switching device, from switch disconnectors to breakers.



### Distribution automation for medium-voltage switchgear

ABB's IEC 61850 compliant solutions offer a unified user-experience for operating power distribution systems from the secondary substation level up to the NCC level. The protection and control devices collect and measure data from the power system and the intelligent network.



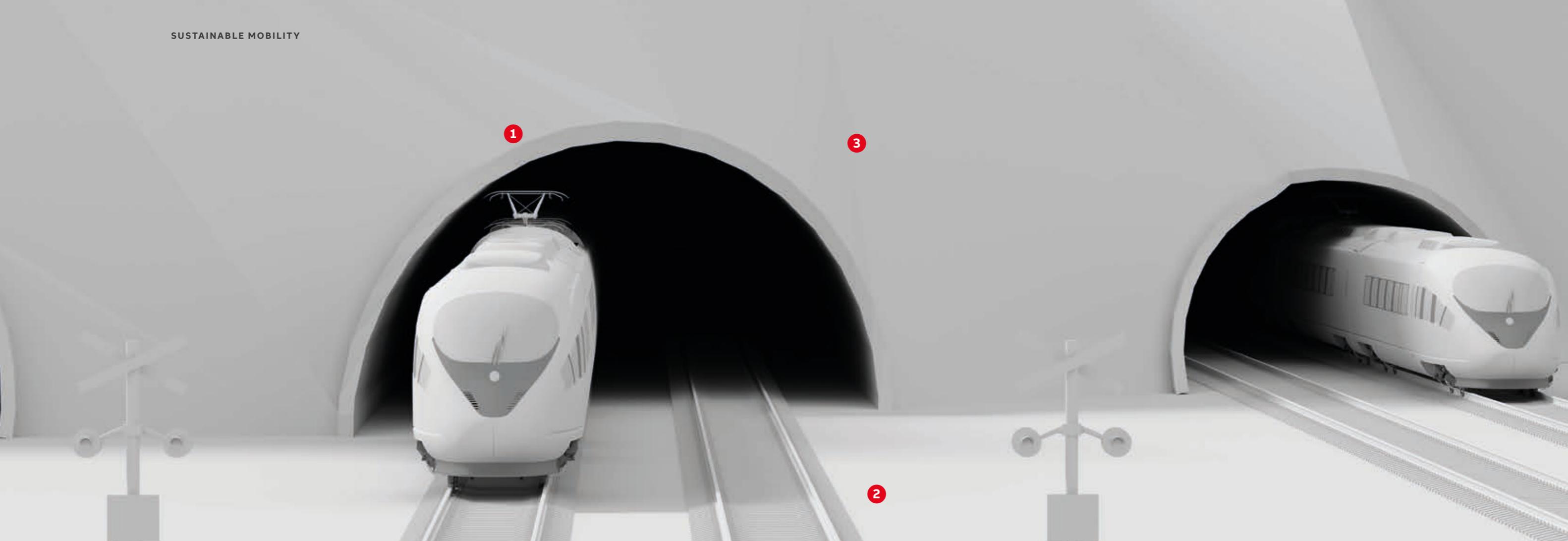
### Energy monitoring and asset management

ABB Ability™ Electrical Distribution Control System (EDCS) is a cloud-computing platform designed to monitor, optimize and control the electrical system, in particular the control and signaling station. With ABB Ability™ EDCS, the train line's energy consumption will be monitored and analyzed with a single, user-friendly dashboard.

1 Power distribution

2 Power management

3 Power protection



### 3 Power protection



#### Transfer switches

ABB offers a wide variety of open transition, motorized and automatic switches. ABB's transfer switches are compact, easy to install, safe to operate and our newest addition, TruONE ATS features cloud-based connectivity through the ABB Ability™ Electrical Distribution Control System (EDCS).



#### Uninterruptible power supplies

ABB's PowerLine DPA makes the advantages of ABB's unique modular UPS architecture available for locations that are usually rough on electronic equipment. It's based on ABB's Decentralized Parallel Architecture (DPA) that ensures the very best UPS design in terms of availability, flexibility, cost and ease of use.



#### Cable protection systems

Our products contribute to safe rail systems worldwide, providing ideal protection for the cabling used in track-related installations. Our products are reliable to ensure functioning of signal installations, power supplies to high-voltage rails, train protection and control systems, and monitoring/information systems.



#### Emergency lighting

Designed to be safe and aesthetic, the frameless pictogram panel of the Primora emergency exit lighting signals the escape routes just as clearly as it does elegantly. The vandalism-resistant and water-tight Aqualux 25 safety lamp features means it is ideal for outdoor use.

1 Power distribution

2 Power management

3 Power protection



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## Packaging solutions

**Packaging of multiple products, including simple interface engineering, provides customers a fully integrated solution under a single commercial agreement.**

Throughout a project, there may be complications of interfacing with multiple vendors during procurement, engineering, and execution, along with challenges to mitigate risk. As a market leader delivering electrification solutions for project applications, we are able to address these challenges by leveraging our comprehensive product portfolio and third-party offerings.

On a daily basis, we offer a combination of products and services to customers. Product packaging has been developed to further enhance the offering to our customers by providing a seamless integration of multiple product elements.



# ABB products and solutions for infrastructure

## Rolling stock

When it comes to rolling stock, the key focus areas are control and protect, monitor, and connect and protect.

By developing solutions and products which are innovative, reliable, safe and easy to install, we are consistently meeting the high standard of safety expectations for transportation.

We can contribute to the increased efficiency of your equipment and support transport operators throughout the whole life-cycle of the traction chain, i.e. in the areas of service, maintenance, upgrades, and retrofit projects.

1 Control and protect

2 Monitor

3 Connect and protect



## 1 Control and protect



### Breakers

Tmax XT moulded case circuit-breakers guarantee a high-performance level. They are smaller in size, simple to install and able to provide increasingly better safety. The range is complete with seven frame sizes, from 160 A up to 1600 A AC and up to 800 A DC. Designed to maximize ease of use, integration and connectivity.



### Circuits

Our miniature circuit-breakers S200 MT UC can protect AC or DC applications, useful for systems like HVAC, brakes and doors that can have a backup supply in case of issues with main supply via batteries. Specially designed for rolling stock, the residual current device DS201T will provide protection against overload and earth fault.



### Miniature circuit-breakers

The high-performance circuit-breaker S800S is designed for power distribution systems with a breaking capacity up to 50 kA. It can be used to protect the lines of HVAC equipment, compressors, oil pumps, etc. Available in 1-, 2-, 3- and 4-pole versions with an optimized pole dimension allows for a space-saving installation.



### Contactors

Power contactors with compact and modular design, light-weight, low coil consumption and connection for standard ferrules or ring tongue ferrules. Our products have been developed in order to meet the main standards for rolling stock application where high reliability levels, safety and energy efficiency are required.

1 Control and protect

2 Monitor

3 Connect and protect



## 1 Control and protect



### Traction chain

Medium-voltage high-speed bi-directional DC circuit with power supply up to 1800 V DC, 1500 A. The DCBreak circuit-breaker family for rolling stock combines a small footprint, reduced weight, high flexibility and reliable operation with minimal maintenance. It is designed to meet high safety standards.



### Motor starting solution

Complete range of high performance devices for motor protection and control: manual motor starters, contactors, contactor relays and overload relays. The compact, modular and light-weight design decreases the space required in installations, using less energy by axle and lowers coil consumption for energy saving.

## 2 Monitor



### Safety PLC

Pluto safety PLC is a powerful and cost effective PLC system that simplifies safety system design and complies with the highest safety level, PL e/SIL3. It also complies with all relevant rolling stock standards. Together with Eden safety sensor, it can be used for monitoring doors, pantographs or brake systems.



### Time relays

ABB's time relays not only offer standard screw type terminals but also push-in terminals with excellent vibration resistance. They are available as single or multifunctional devices, covering all timing control needs in passenger compartments, or other railway infrastructure applications.

1 Control and protect

2 Monitor

3 Connect and protect



## 2 Monitor



### Energy consumption and maintenance

Telemetry data collected through ABB Ability™ Electrical Distribution Control System (EDCS) inside the train will be sent and analyzed remotely to gain insights for assets and overall energy consumption. Moreover, the predictive maintenance algorithm will be applied to reduce and better schedule the maintenance windows with a significant cost reduction.



### Measuring and monitoring relays

ABB offers all the important measuring and monitoring relays required for a wide range of applications, all electrical key parameters of single- and three-phase networks can be monitored. The products are offered with standard screw type terminals and push-in terminals with excellent vibration resistance.

## 3 Connect and protect



### Cable protection solutions

We offer high quality cable protection systems, developed to adhere to and exceed global industry certification standards. Our cable protection systems fulfill the highest requirements, are designed to perform in a wide variety of environments, from high temperatures to freezing sub-zero. Suitable in and outside for rail, rolling stock and infrastructure applications.



### Wiring duct

Wide range of innovative wiring duct & trucking products for routing and concealing wiring in control panels. They are available in numerous configurations, materials, sizes and colors to accommodate any application. The halogen-free thermoplastic conduits are the ideal solution for all application contexts in which security is a fundamental requirement.



### 3 Connect and protect



#### Fastening and connection solutions

Our high performance, premium cable ties with "Grip of Steel" locking barb, secure and manage cables. The rounded edges prevent cable damage, the smooth body makes the cable ties stronger, while the ribbed surface prevents ties from slipping under vibrating conditions and external shock.



#### Connection solutions

A full line that includes insulated and non-insulated terminals, splices, wire joints, disconnects, ferrules, heat-shrinkable terminals, splices and disconnects in imperial and metric sizes. We offer crimping technology for shield termination on shielded cables. The compact connector has low overall height and no soldering required without risk of damage and heat. A set of tools is included.



#### Compression cable lugs and tools

Our method of installing compression lugs on power cables provides a high degree of reliability. We offer a complete range of IEC & UL/CSA approved compression lugs in metric (Color-Keyed and Spec-Kon) and imperial American Wire Gauge (AWG) sizes (Color-Keyed). All systems utilize compression tools with matching dies to provide an optimum electrical bond.



#### Wiring accessories

Now smartphones, tablets, cameras or MP3 players can be charged at your seat using the new SCHUKO® USB socket outlets. Waiting to be back home to re-charge your smartphone is something of the past. Watching a film or working on your PC on the train is now possible.

1 Control and protect

2 Monitor

3 Connect and protect



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## After Sales Support for Maintenance, Repair and Operations



### Higher reliability and energy efficiency for your equipment

Our expertise and know-how of the railway industry makes us a supplier of choice when it comes to rail upgrade projects.

We can support and advise you on the feasibility of upgrading your existing ABB or third-party equipment by retrofitting it with new technology.

We provide you effective solutions to reduce operating and maintenance costs, increase equipment life, improve reliability and operational efficiency.



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