27 SEP 2023

ABB Charging Solutions for Fleet and Public Transport

E-mobility Innovation Forum 2023

Indonesia

Widest portfolio of EV charging solutions

Use cases

Single home residential charging

Apartment, hotel & workplace destination charging

Commercial fleet

Public commercial parking

Fast-charging roadside stations

Bus charging

Industrial fleet

Heavy-duty truck charging

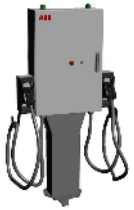
Charging products

Terra AC wallbox 3-22 kW

Terra Nova 11J (bi-directional) 11 kW

Terra DC wallbox 20-25 kW

Terra 124 60-120 kW



Terra HVC 50-180 kW

Terra 184 90-180 kW

Terra High Power (liquid cooled) 175-350 kW

Terra 360 180-360 kW

Pantograph (panto up, panto down, connectors) 150-600 kW

To come in 2024

Megawatt charger up to 3 MW

Asset, energy & fleet management

Connectivity and remote software update

Remote support (configuration, troubleshooting)

24/7 network monitoring by ABB

User interface

Plug & charge

Payment module

EV site management

Bi-directional charging

Enable energy trading[1]

Predictive load profiles

e-fleet schedules & management

Source: Company information

Note:

1. ABB E-mobility does not engage in energy trading but enables customers to do so

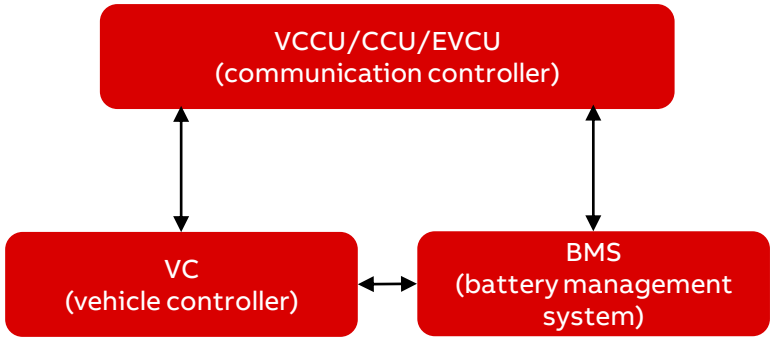
Interoperability

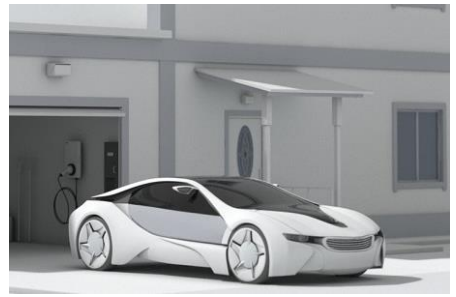
A lot of standards

Charger communication module — **Vehicle communication module**

Applied Standards (selection):

IEC 61851	(electrical EV charger)
IEC 61851-23-1	(electrical OppCharge)
IEC 61851-23	(electrical EV charger DC)
IEC 61851-24	(general digital communication EV charging)
ISO 17409	(electrical EV)
ISO 15118	(communication incl. plug and charge)
IEC 62196	(connector standard)
DIN 70121	(communication)
J1772	(US standard for EV and charger)
OppCharge	(industry standard)





A partner of choice for the world's biggest EV OEMs

– R&D partners

– R&D partners
DC fast chargers at dealers

– R&D partners
DC fast chargers at dealers

– R&D partners
– DC Wallbox
– Formula E

– R&D partners
– Swiss market activation

– R&D partners

– R&D partners

– DC fast chargers at dealers

– Global partnership
R&D partners

– Bus
– R&D partners

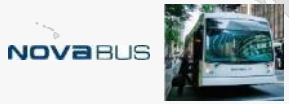
– Truck
– R&D & joint project

– R&D partners

– Cooperation
– R&D partners

– R&D partners

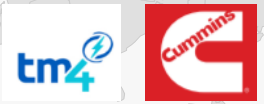
– DC charging testing & R&D



– Partnership
– R&D partners

– Cooperation
– R&D partners

– R&D partners



– Joint projects

– Cooperation
– R&D partners

– R&D partners

– DC charging testing & R&D

– R&D partners
– DC fast chargers at dealers
– Cooperation Dong-Feng

– Charging partner

– R&D partners

– R&D partners

– R&D partners
DC wall box for Denza EV

Public Transport and Depot Solution

HVC portfolio evolution

Charging interface

Depot box Gen 1
200A CCS

PD kit
150-450kW
600A pantograph

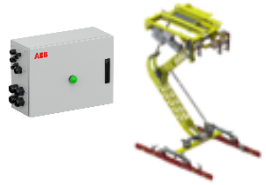
PU set depot
100-150kW

CCS control box
200A

CR control box

Depot box Gen 2
250A

Depot box Dual CCS
250A dual CCS
Sequential



PD control box
400A

Depot box Gen 3

CCS control box
NEW , higher power

Power cabinets

HVC-100/150 C
100/150kW

HVC-100/150 R
100/150kW

HVC-150 PD
150kW

HVC-100/150 PU
100/150kW

HVC-107/160 R
107/160kW

HVC-160 PD
160kW

HVC-107/160 PU
107/160kW

HVC 200/300/360
2-outlet static

HVC 200/300/360
4-outlet static

HVC 200/300/360
2/4 outlet dynamic

Version 1 (2013) 150kW / 250A Power → **Version 2 (2021)** 160kW / 280A Power cabinet → **(2023)** 360kW / 500A Power cabinet

HVC modular system

90kw-360kw

CCS control box
- Up to 200A
- Ceiling mounting
- Special cable for up-side-down installation

Depot box CCS
- Up to 250A
- Wall/ Pedestal mounting

Depot box Dual CCS
- 2x CCS Parallel charging
- Up to 250A (200A for UL)
- Wall/ Pedestal mounting

CR control box & Cable reel
- Up to 200A CCS
- Indoor and outdoor use
- Different controls (rope, remote, buttons)

Cable management systems
in case there is no space at all

Simple retraction with ‘Cable balancer’*

Easy to install - low weight and small size

Easy to use - several cable lengths

Cost effective - lower price

Motorized retraction with ‘Cable reel’

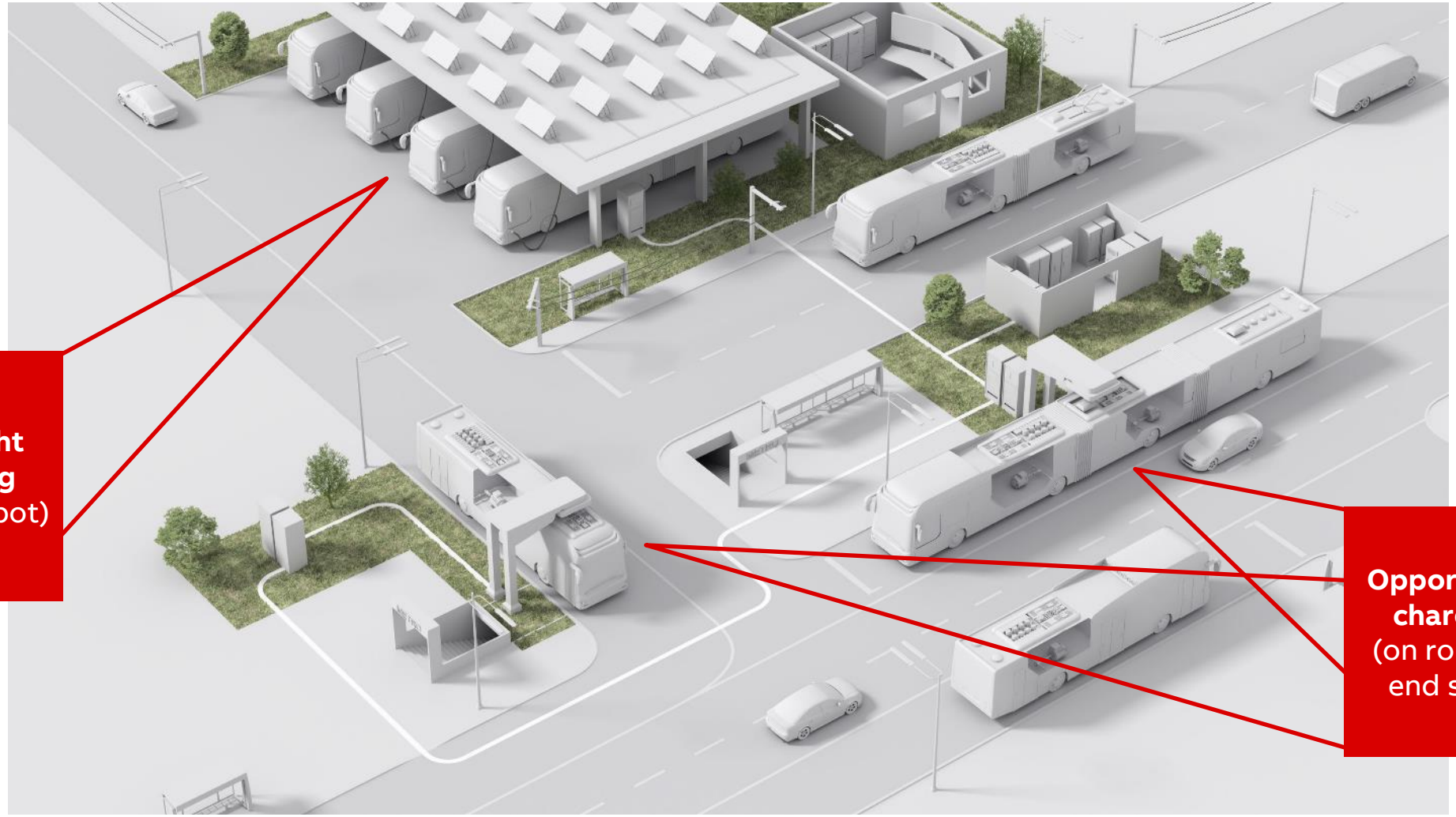
Safe operation - no hanging cables

Effortless - motorized system

Flexibility - multiple control options available

New control box in operation

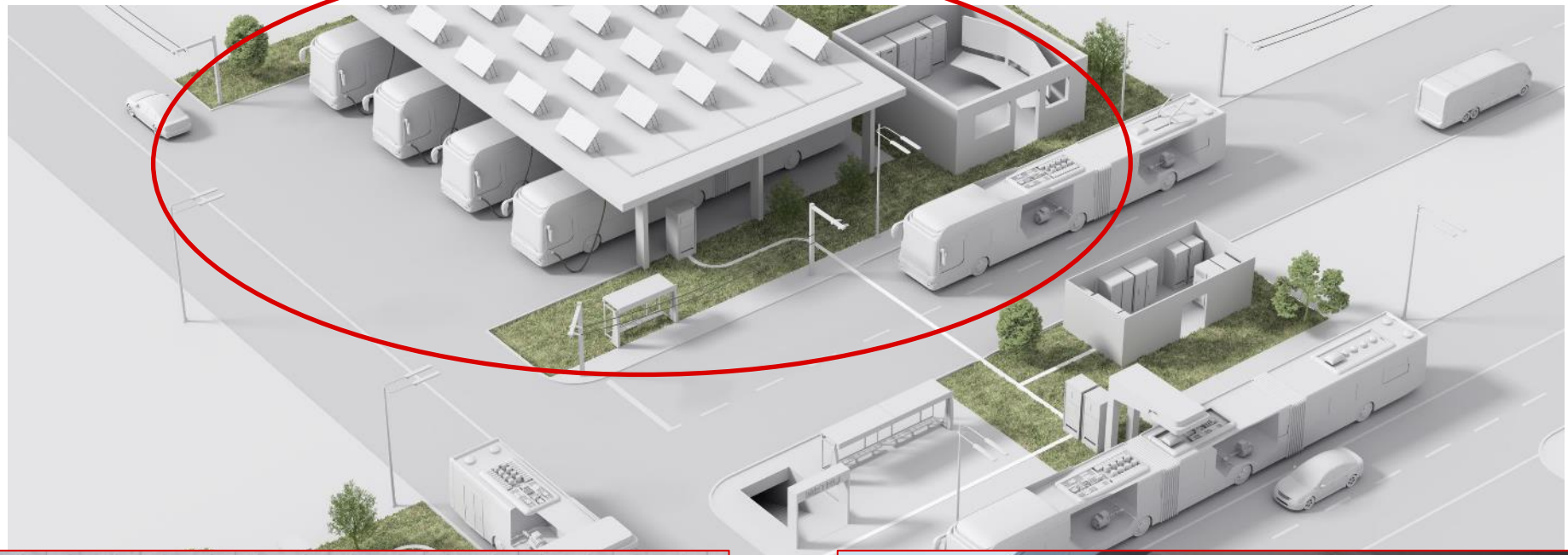
Electric bus charging landscape



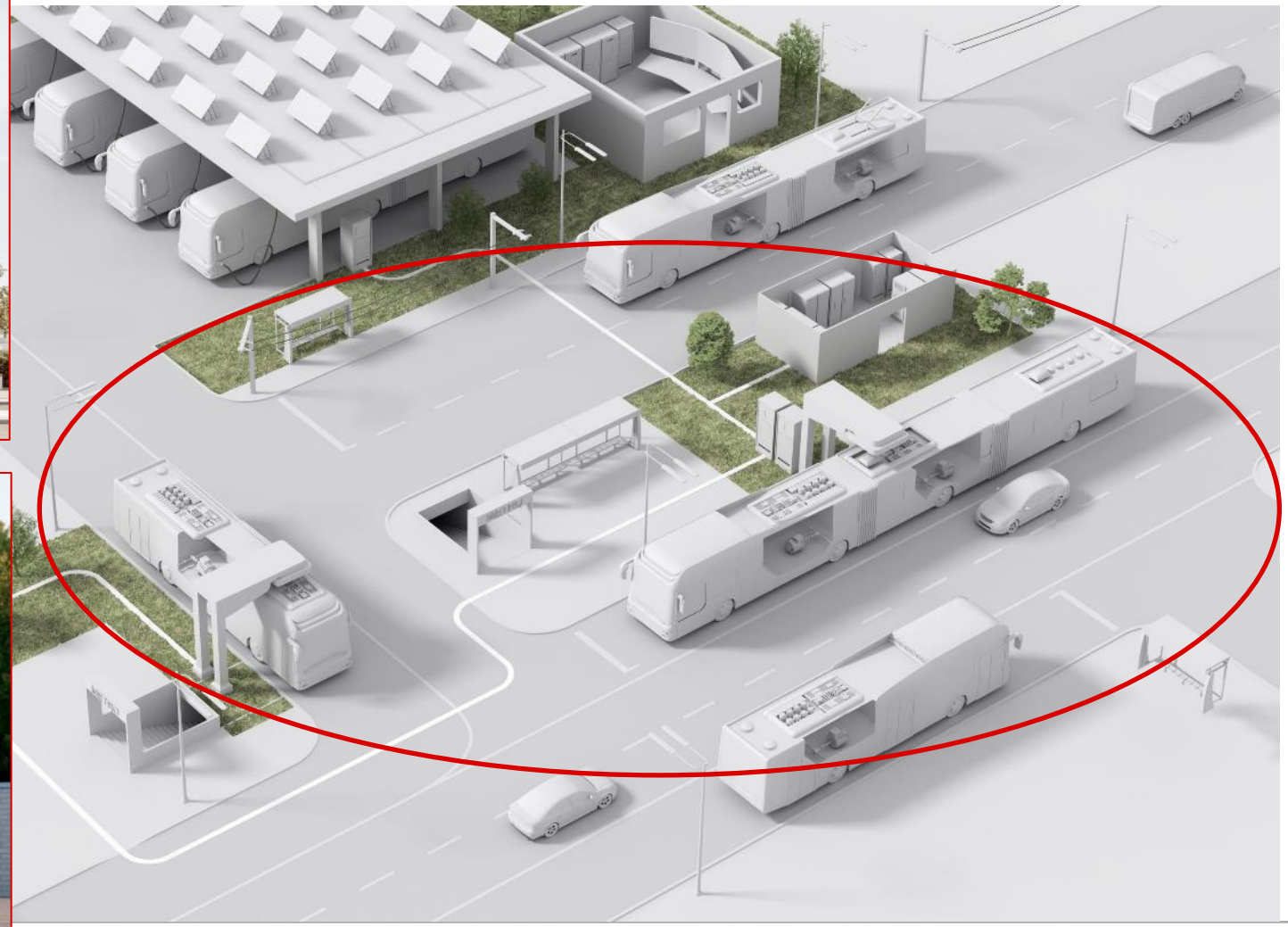
Overnight charging (at the depot)

Opportunity charging (on route or end stop)

Electric bus charging landscape



Electric bus charging landscape



Electric bus charging applications

Overnight charging

Overnight charging

After operation most buses will go back to the depot. This offers an ideal moment to charger the bus overnight.

Average parking time is between 6-8 hours.

Depending on the battery capacity charging powers are between 30kW to 150kW.

Before start of operation most buses will require pre-conditioning to either heat up or cool down the interior.

Charging can be done 1 : 1 (1 charger per bus) or 1 : 3 (1 charger per 3 buses) combined with sequential charging.

Supported interfaces: Connector

Electric bus charging applications

Opportunity charging

Opportunity charging

Charging during daily operation at any given stop or rest opportunity.

This offers an ideal solution to ensure zero-emission public transit during the day without impacting on the normal operation of the route.

Charge time typically is between 3 and 6 minutes and requires an automated connection device and high power charging.

Charging power is between 150kW to 600kW.

Supported interfaces Pantograph Down and Pantograph Up.

World’s largest electric bus infrastructure project

Qatar, Mowasalat busfleet

APPLICATION

EV charging infrastructure for over 1000 buses to transport 50.000 passengers a day

COUNTRY/CUSTOMER / SITE

Qatar, Mowasalat, depots and public locations

CUSTOMER NEEDS

Reliable charging infrastructure to operate in depots and public locations under extreme conditions (sand and temperature)

SOLUTION & BENEFITS

125 MW of charging capacity, 1,300 connectors for destination charging and 85 opportunity chargers. With this charging solution, the complete bus fleet can be charged overnight at the depots and while in use without impacting regular operations.
Data connection to connect and integrate the infrastructure into the Fleet Management System for 24/7 fleet optimization.
Chargers will be connected to the ABB Ability™ cloud to remotely monitor and diagnose the infrastructure by using more than 400 parameters. This complete solution maximizes uptime and efficiency and ensures reliable infrastructure for the public.

BENEFITS

- Charging does not impact operations
- Fleet Management includes “State of Charge”
- Reliable operations in extreme conditions

Link to online story

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Fleet and Depot Solutions

Depot solutions

Depot solutions

All in one ABB Terra360

Commercial Truck Charging

ASKO ,warehouse charging
Norway

ABOUT ASKO

Sustainable food is essential for the future of our planet, and major food wholesaler ASKO is examining every link in their supply chain to further strengthen the environmental credentials of their operations. Renewable energy, autonomous warehouse vehicles and highly automated zero-emission ships all figure into the mix

As Norway's largest grocery wholesaler, ASKO is also one of the country's largest transport companies, with more than 600 trucks on the roads every day. The company's environmental goals include reducing energy consumption by 20 percent compared to the early 2000s, becoming a self-sufficient provider of clean energy, and using 100 percent renewable fuels for transportation

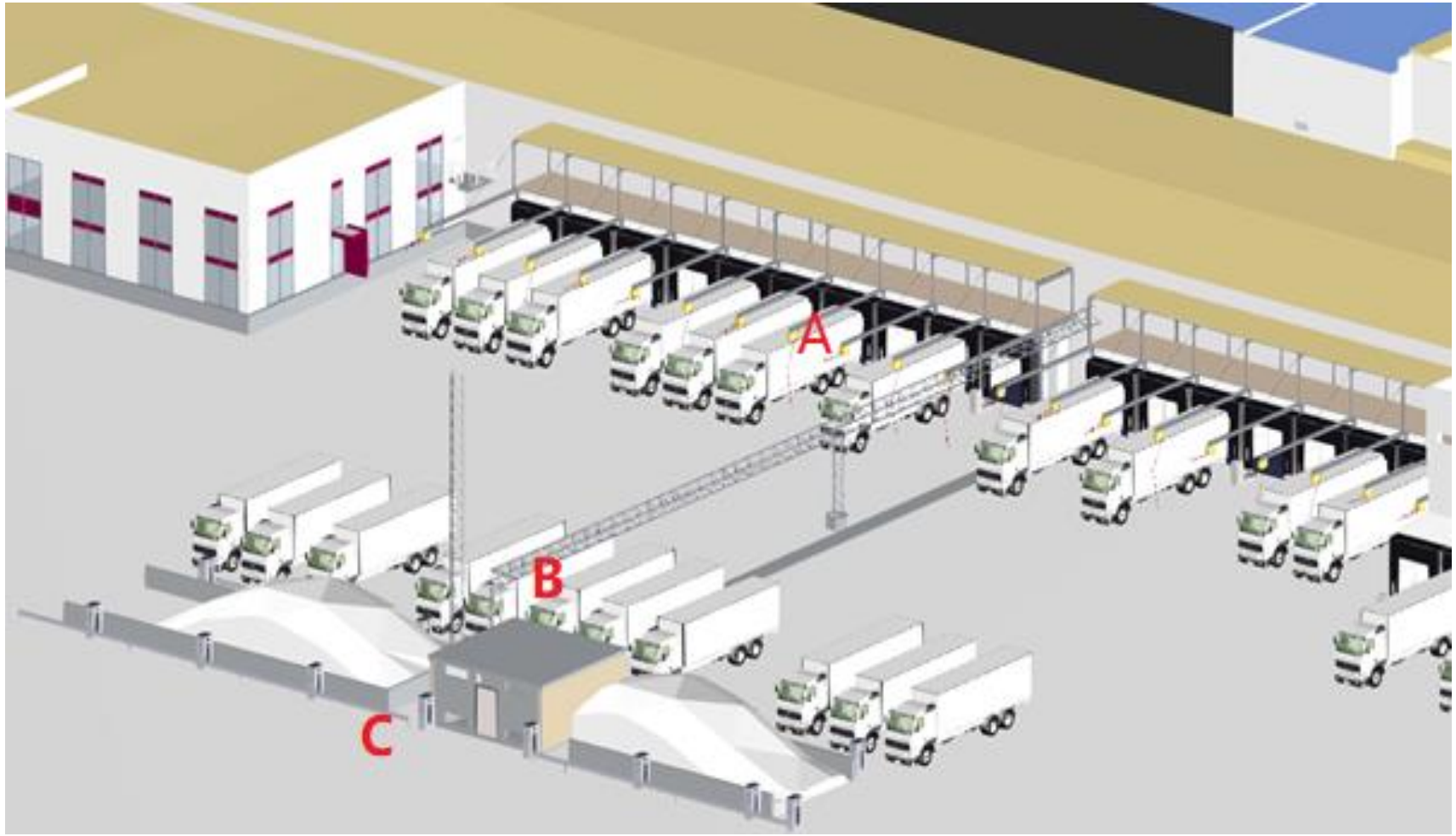
CUSTOMER NEEDS

Reliable charging infrastructure to operate in warehouses under extreme conditions (temperature) with a Sciania E-Fleet.

SOLUTION & BENEFITS

More than 30 chargers with a distributed power system or an all-in-one system were installed at multiple warehouse sites. All tailored to the routing and energy capacity of the location. Set up Megawatt charging system together

Site layout 50 E-Trucks



24/7 operation

A = 5 x HVC 360
B = 7 x T184

C = 12 x THP175

Trucks : 300kw/h

Daytime = A priority
Night = Equal Share.

Asko in progress

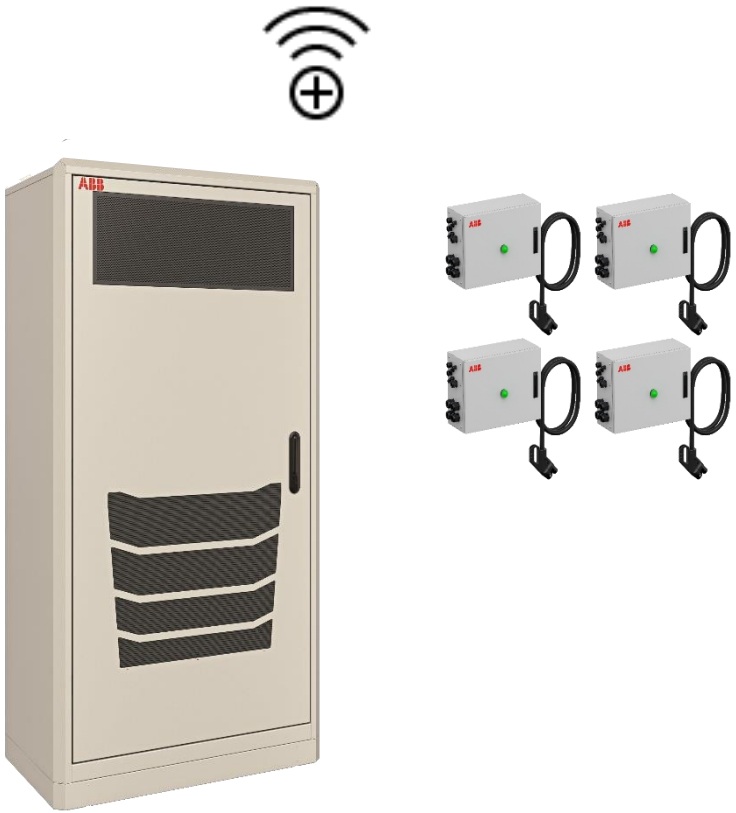
BAMA truck, Norway

Asko THP 350 kw

Connectivity

- Charger Management

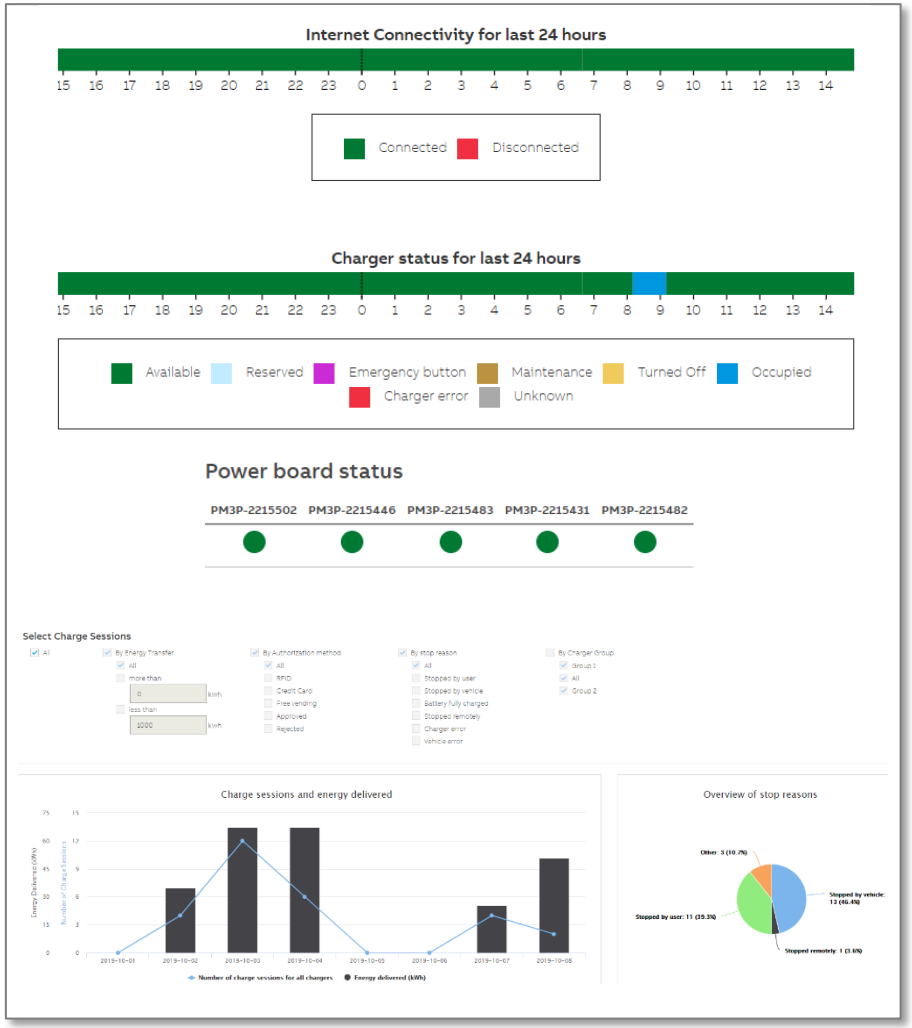
Run a successful and profitable business with connected ABB chargers



Connectivity is needed to:

1. Monitor and operate a network of chargers
2. Maintain and service chargers at the lowest cost
3. Manage the load and energy on site

Web tool – Asset Professional (Easy Operational Tool for Operators)



Customer Value	• **Quickly start to monitor and operate your ABB charger network in a professional manner** • **Provide the best customer experience to EV drivers**
Benefits	• **Manage how your charging network is used, and understand how you can optimize without the use of an additional advanced OCPP backend** • **Fast insights in charging issues to provide an optimal driver support** • **EV drivers trust and prefer to use your charging network**
Main features	• Monitor the status of the EV network and of individual chargers • Gain insight by standard reports, and export complete data sets • Authorization Mgmt. (RFID card & PIN management) • Access Mgmt. (User access to portal features, and charge groups) • Receive automated notifications from the Service Platform • Configure the opening hours of your charger network • Solutions Library (diagnose and repair guidelines) Case Mgmt. (create support cases for ABB Service)
Remarks	• Works for all products (past, now and future)

eMSP = Emobility Service Provider
CPO = Charge Point Operator

Energy Management for Fleet

Fleets

Challenges and pain points

Decarbonization of business

- High CAPEX investment.
- Grid is limited, grid upgrades are expensive with long waiting times.
- Overall infrastructure change is expensive.

Business continuity at risk

- Find new and sustainable technologies to meet the requirements.
- How can I make sure I can effectively use my infrastructure without endangering the operations?
- How can I make sure buses/trucks will be charged considering the changing conditions of running a depot?
- Charging infrastructure deployment.

Operational costs

- Cost of ownership.
- Higher TCO by underutilized grid.
- High OPEX with under optimized energy bill.

Fleet / Bus Depot

Use Case – Limited grid connection

The utility does not have enough power to upgrade the grid connection in the depot to transition to an electric fleet

The grid upgrade is too expensive and stops the possibility for electrification of the fleet

Terra Gateway Pro with **static capacity control** will receive a static limit of the available grid power on site and distribute it among the active charging sessions.

The TGP coordinates all chargers making sure the limit is not exceeded.

Charging ecosystem: central "mission control" platform - InControl

ABB InControl

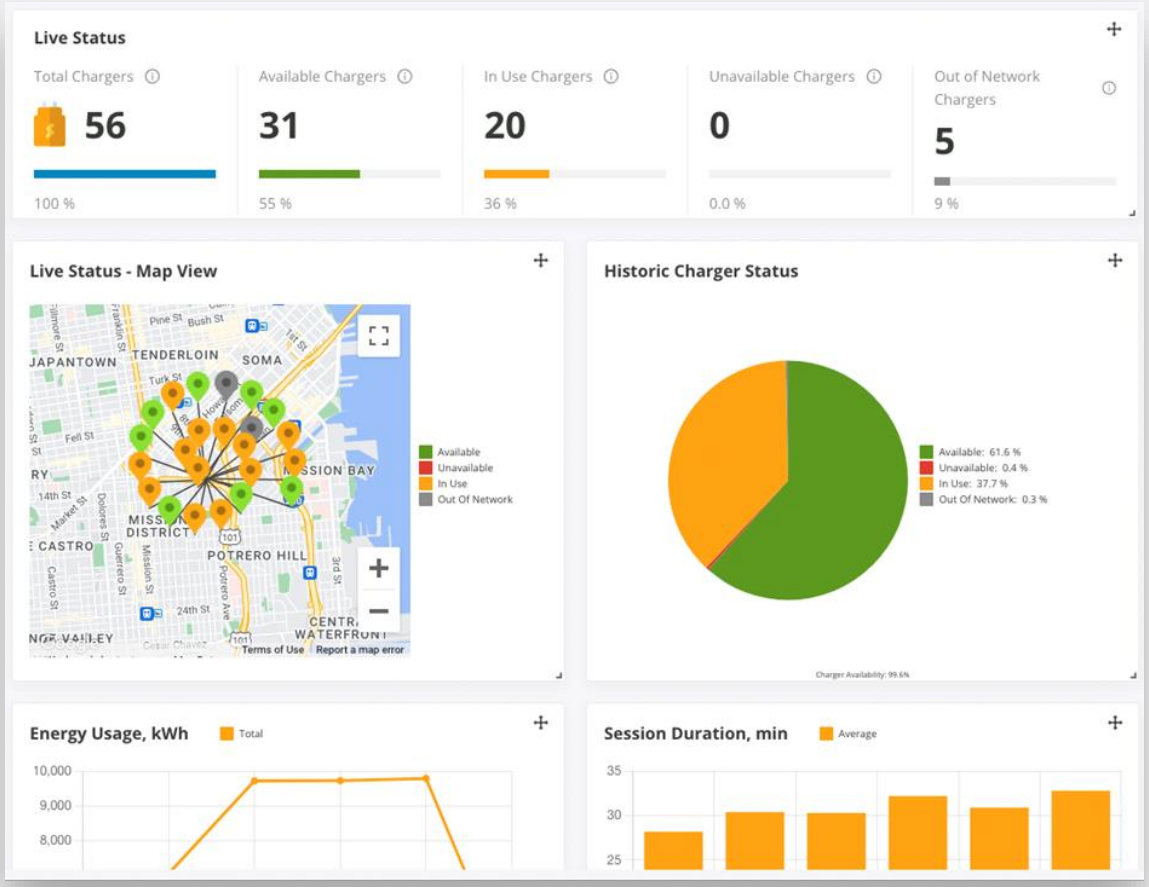
Charger & Fleet Management System

- Manage your entire charging infrastructure with one dashboard
- Monitor, troubleshoot, and maintain your chargers from a single interface
- Email alerts provide real-time updates on performance

Dashboard

Manage your entire charging infrastructure with one dashboard

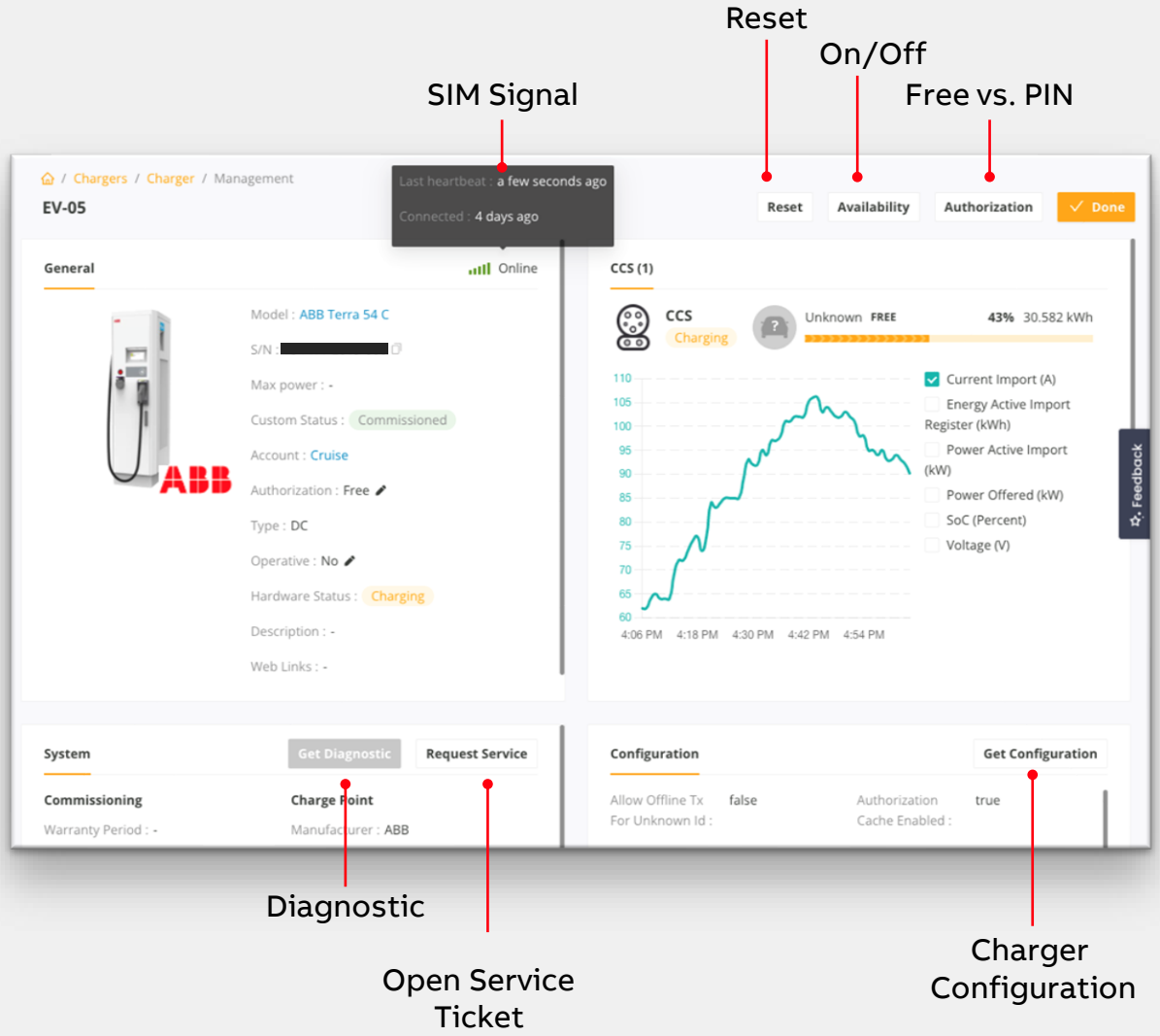
- Drill down from an account-wide view to a single charger
- Retrieve live data with up to the second accuracy
- Filter for fast analysis by historical time period, site, charger, and more
- Quickly understand energy demand, charger authorizations, and session duration
- See live interactive maps of your charging stations



Charge Session Monitoring

Monitor, troubleshoot, and maintain your chargers from a single interface

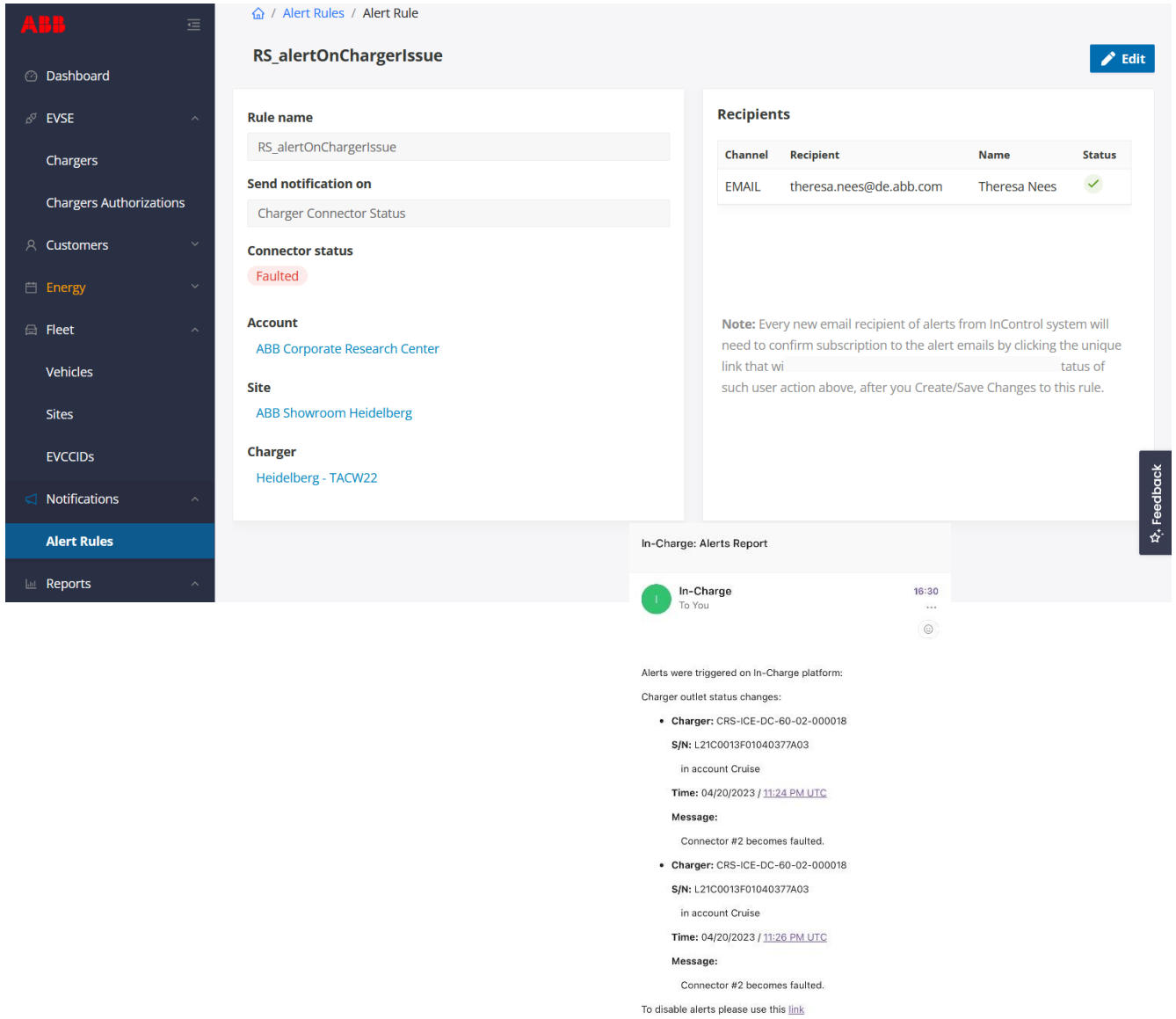
- **Live** charging session **reporting** and interactive graphs
- **Over-the-air software updates**
- Get and set **charger configuration**
- Monitor **cellular signal** & heartbeat
- **Remote start and stop**
- Remote hard and soft **resets**
- Tracking for every meter reading



Alerting

Email alerts provide real-time updates on performance

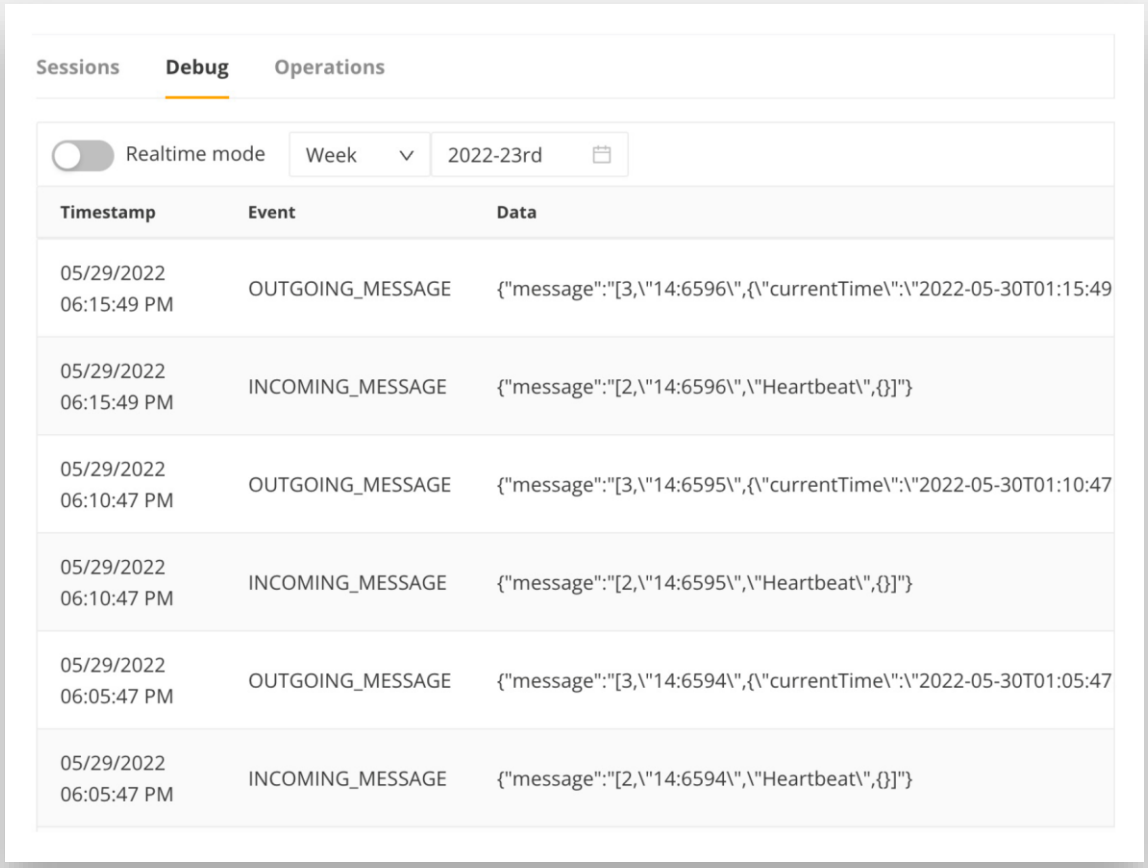
- Lost and restored **data connection**
- Status changes, including **faults**
- Alert on any combination of account, site, and/or charger basis
- Unlimited email recipients
- Unlimited number of **alert rules**
- Simple alert toggle on/off



Cost Control

Keeping chargers running as top priority

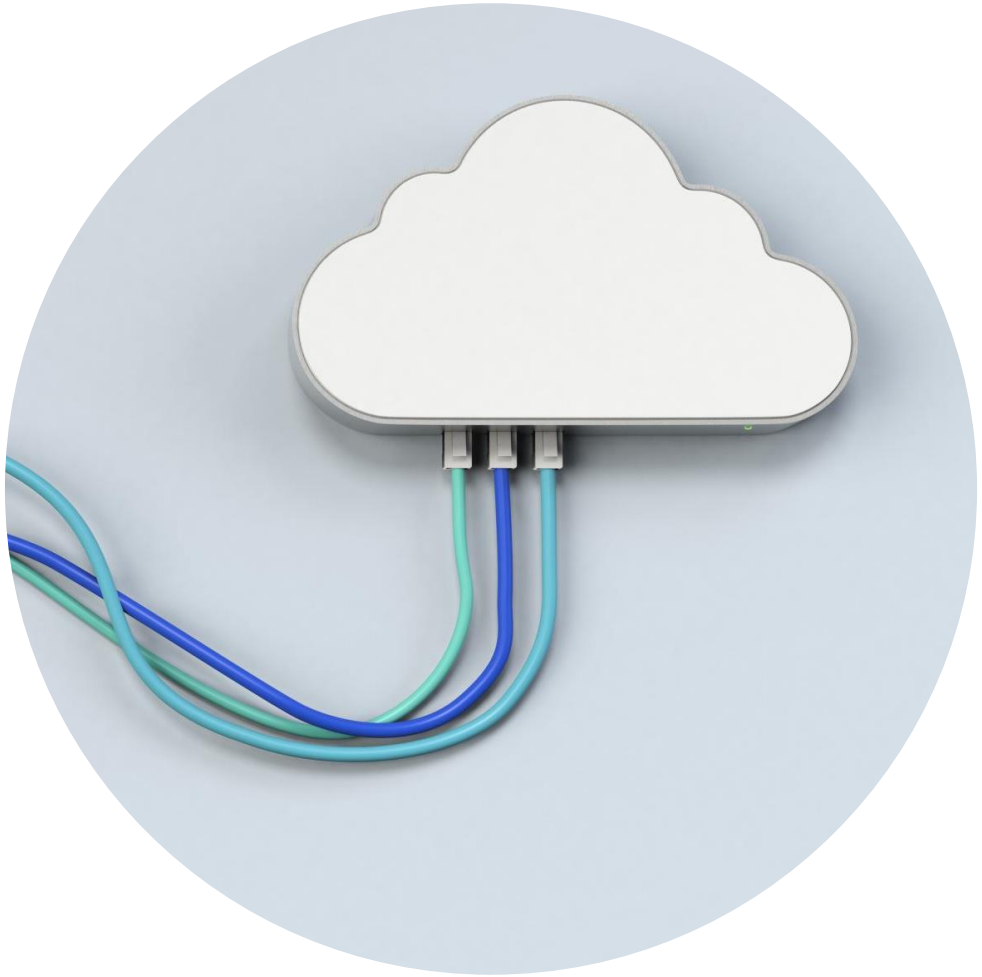
- Create and track **service requests**
- Inspect event and service logs
- Update firmware over-the-air
- **Remote features** include:
  - configuration
  - start and stop
  - reset



Architecture

Built for security, scalability & performance

- **Cloud-based** SaaS product
- **No desktop installation**, no local controllers to maintain
- GraphQL API built for performance & development speed
- **SOC2 certification**
- **Multi-factor authentication**
- **End-to-end encryption**




ABB

Let’s connect!