



SUNDAY, AUGUST 29, 2021

ABB EV Infrastructure

Virtual Summer Internship 2021

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Agenda

Introduction and history of EV chargers

EV charging concepts

EV Infrastructure Overview

- Terra AC Wall box
- Terra DC wall box
- Terra DC fast
- Terra DC High Power (HP)
- eBus charging solutions

EV Site Solutions (EVSS) Control 100

V2G – Vehicle to Grid (Bidirectional EV charger)

ABB EV Charger in Egypt



Introduction and history of EV chargers

Electric Vehicles

The future for automakers

Carmakers face electric reality as combustion engine outlook dims

GM Is Going All Electric, Will Ditch Gas- and Diesel-Powered Cars

Combustion engines are out at Volvo: Every new model after 2019 will be a hybrid or EV

VOLVO THINKS THE TIME IS NOW TO TRANSITION TO ALL-ELECTRIC VEHICLES

VW to Build Electric Versions of All 300 Models by 2030

Chinese EV shares surge as government mulls petrol car ban

BMW to offer 12 fully electric car models by 2025

Mercedes-Benz will electrify its entire car lineup by 2022

How Electric Cars Can Create the Biggest Disruption Since the iPhone

Self-Driving Electric Cars Will Dominate Roads by 2030

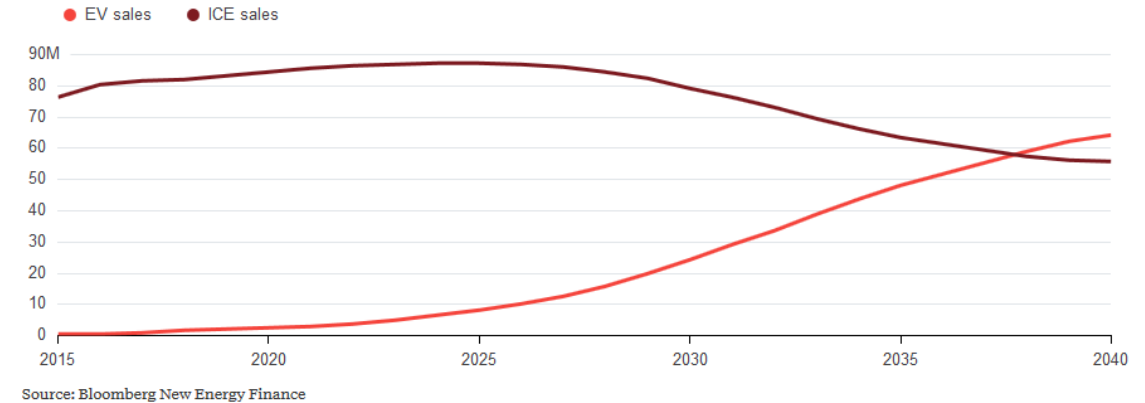
Jaguar Land Rover to make only electric or hybrid cars from 2020

Renault-Nissan-Mitsubishi to launch 12 zero-emission vehicles by 2022

Ford planning 13 electrified vehicles, including a hybrid F-150 and Mustang

Road Revolution

Electric vehicle sales will overtake internal combustion engines within just over 20 years



Electric Vehicles

BNEF's Electric Vehicle Outlook 2019 shows electric vehicles will represent **57% of global passenger car sales by 2040**.

Passenger EV sales will **rise from 2 million worldwide in 2018 to 28 million in 2030 and 56 million by 2040**. Meanwhile conventional passenger vehicle sales fall to 42 million by 2040, from around 85 million in 2018.

Since 2010, the **average cost of lithium-ion batteries per kilowatt-hour has fallen by 85%** on a mixture of manufacturing economies of scale and technology improvements.

The main driver behind accelerated uptake over the next 20 years will be further sharp reductions in EV battery costs, making **electric cars cheaper than internal combustion engine (ICE) alternatives by the mid-to-late 2020s in almost every market**. This is on the basis of both lifetime costs and upfront costs.

Tony Seba in *Clean Disruption of Energy and Transportation* calculates that:

Electric vehicles are up **to 10X cheaper to charge/fuel** than internal combustion (ICE) engine vehicles

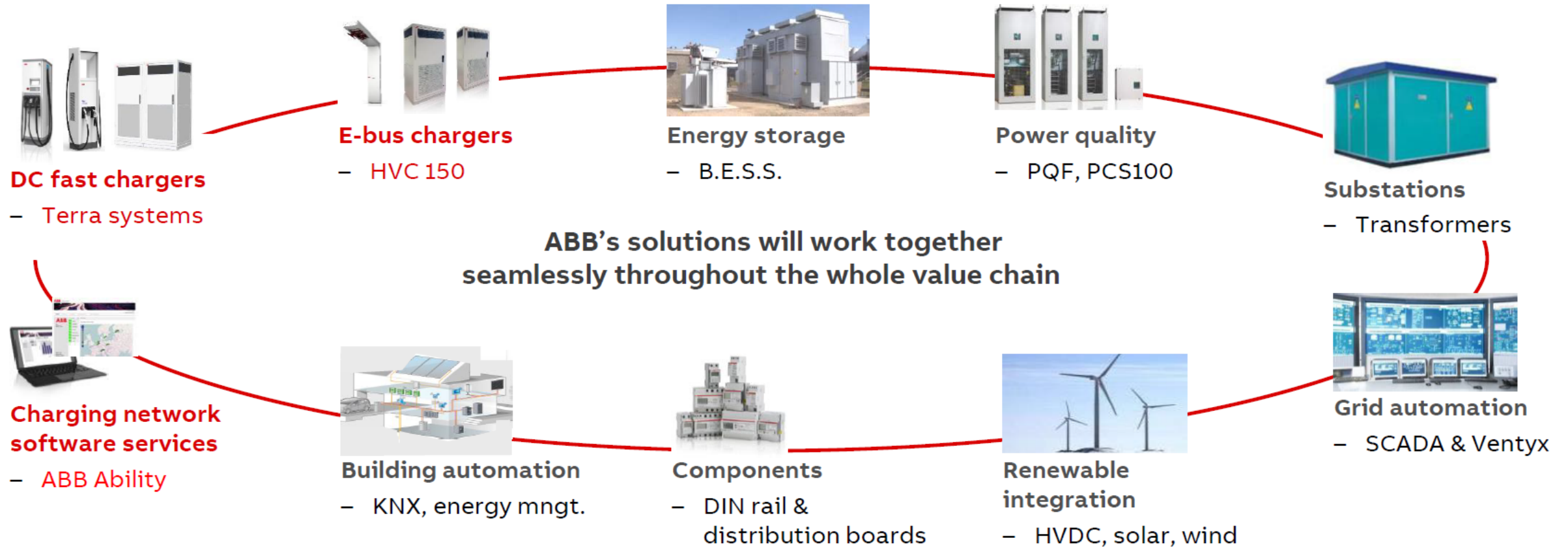
Electric vehicles are up to **10X cheaper to maintain** than ICE vehicles

Electric vehicles can **last 2.5X longer** than ICE vehicles



ABB offers solutions for the complete value chain

From power generation to the vehicle



EV Charger installation

Introduction and history of EV chargers

ABB FORMULA - E

Together, Formula E and ABB are defining the roadmap for electric mobility through motor sports.

Our partnership for the ABB FIA Formula E Championship is fostering high-performance racing around the world to pioneer the latest energy and digital technologies – one electrifying race at a time.

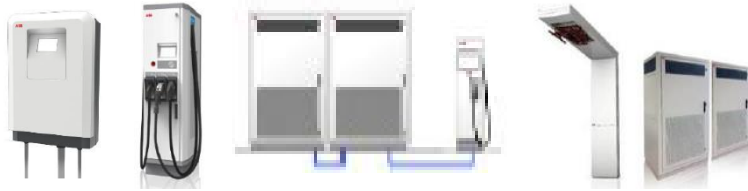
Let's write the future. Together



What we do

We offer AC and DC charging solutions for Electric Vehicles...

...from 3-600kW...



..with cloud connectivity..



...based on standards...



...using ABB technology...



...in all countries...



Present in
>80 countries

and ABB manufacturing.





EV charging concepts

EV Charging Concepts

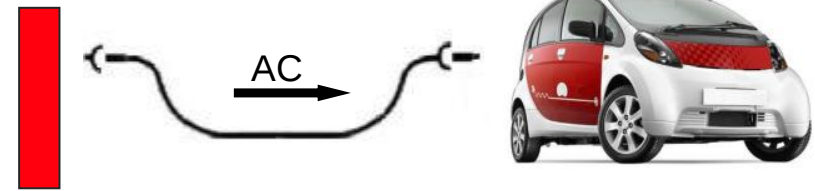
Charging Modes

Definition of Charging Modes (EU)

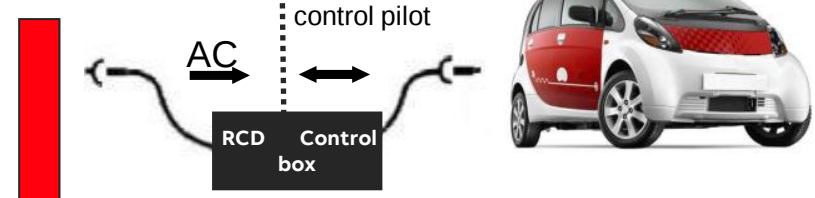
- **Mode 1** - Standard or industrial outlets. Not safe.
- **Mode 2** - Standard socket outlet. Control and protection device built into the cable.
- **Mode 3** - Control and protection devices integrated in the charging post. Special standardized socket outlets. Highest safety for charging EVs.
- **Mode 4** - DC charging



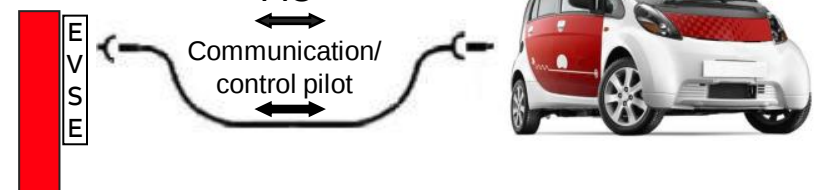
Mode 1



Mode 2

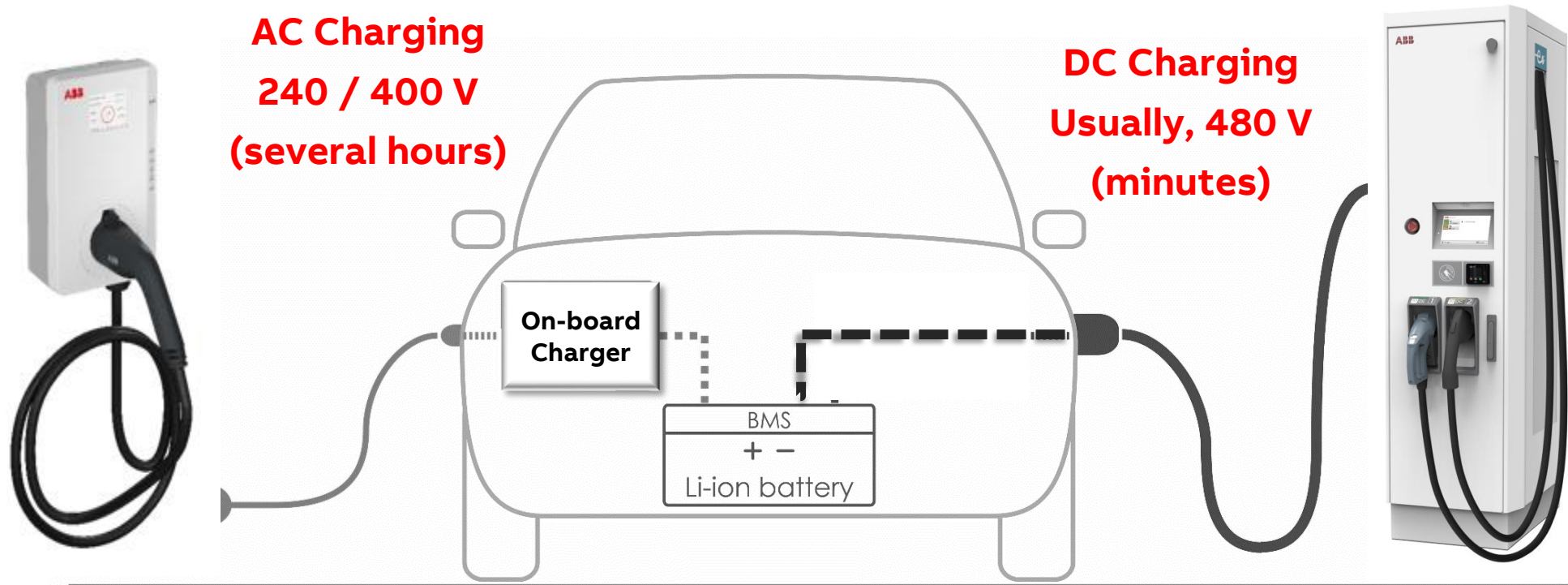


Mode 3



AC charging versus DC charging

On-board versus off-board equipment

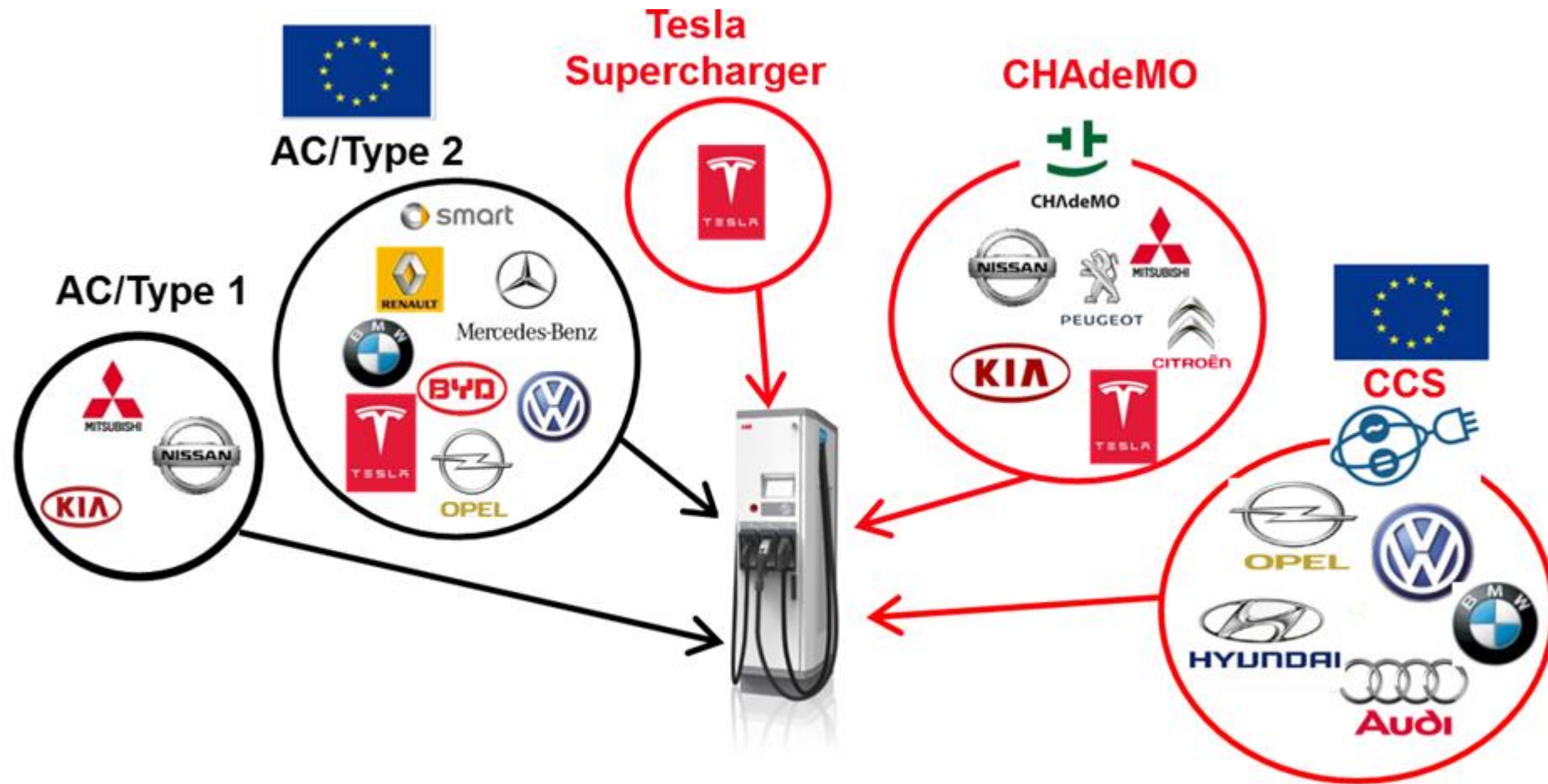


The AC-DC inverter is built into the car. The inverter set the charging current based on the input from the charging station

The inverter is outside the car in the DC charger. The battery management system (BMS) tells the charger how much the charging current shall be

EV Charging Concepts

Charging Plugs



EV Charging Concepts

Different types of AC connectors for charging

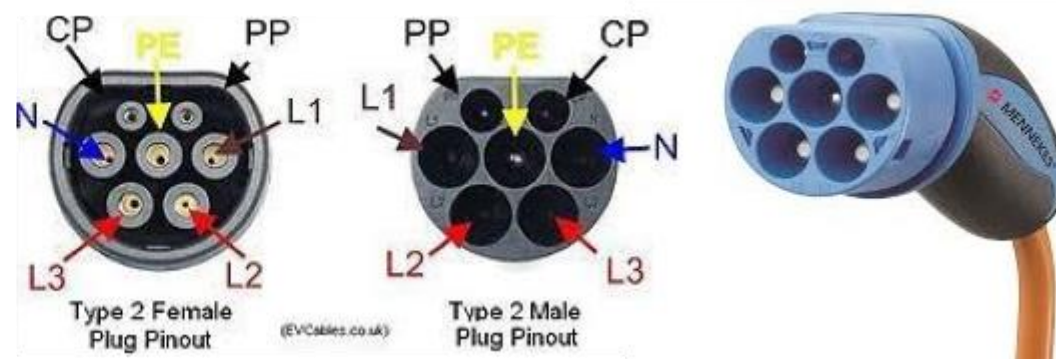
Type 1 SAE J1772-2009

- Japanese and American EVs (e.g. Nissan Leaf)
- 1-phase max. 7,2 kW (32A)



Type 2 connector

- European Standard (since 2013)
 - All EVs in Europe regardless of manufacturer
- 3-phase, max. 43 kW, 7-contacts

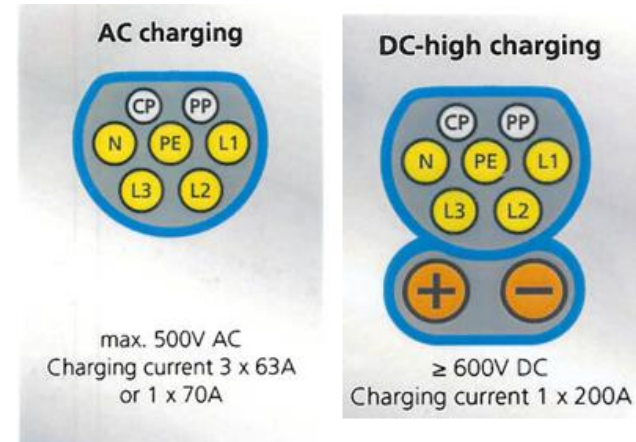


EV Charging Concepts

Different types of DC connectors for charging

Combined Charging System CCS

- Standard in Europe CCS2 and north America CCS1
 - Driven mainly by German OEMs (Audi, BMW, Daimler, Porsche, VW) in cooperation with American OEMs (GM, Ford)
 - A universal system which needs only one power interface in the car
- All means of charging possible:
 - One phase AC
 - Three - Phase AC
 - DC fast charging
- communication between the car and the charging station for DC charging



EV Charging Concepts

Different types of DC connectors for charging

ChaDeMo - DC fast charging

- Japanese standard since 2010
- Typical charging capacity is 50 kW
- special DC-interface fitted to the car
- Designed for bidirectional charging







ABB EV Infrastructure

Overview



Public and commercial car charging – use cases

Charging service should match charging application and demand

Public and commercial EV Charging			
AC destination	DC destination	DC Fast	DC High Power
3-22 kW	20-25 kW	50-150 kW	150 to 350 kW+
4-16 hours	1-3 hours	20-90 min	10-20 min
			
• Office, workplace • Multi family housing • Hotel and hospitality • Overnight fleet • Supplement at DC charging sites for PHEVs	• Office, workplace • Multi family housing • Hotel and hospitality • Parking structures • Dealerships • Urban fleets • Public or private campus • Sensitive grid applications	• Retail, grocery, mall, big box, restaurant • High turnover parking • Convenience fueling stations • Highway truck stops and travel plazas • OEM R&D	• Highway corridor travel • Metro ‘charge and go’ • Highway rest stops • Petrol station area’s • City ring service stations • OEM R&D



Terra AC wallbox

New product Overview



Terra AC wallbox

Portfolio

EU portfolio

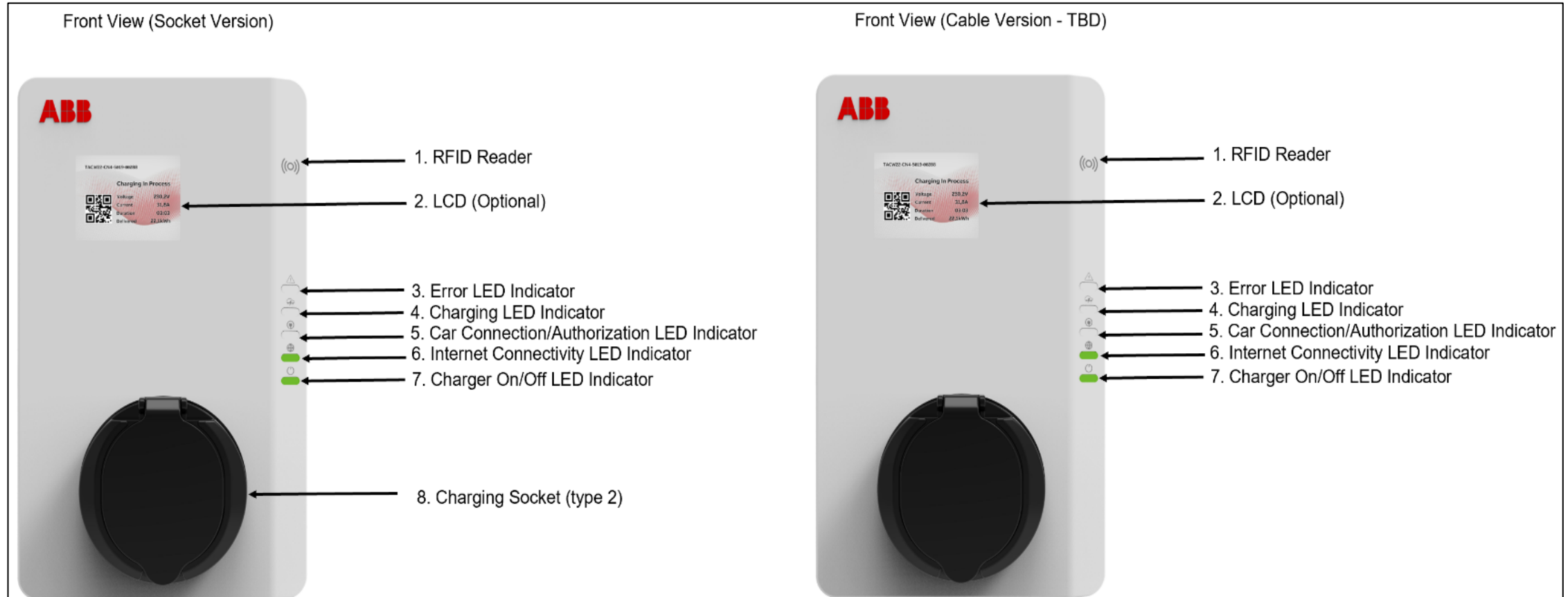
- Single phase
 - Up to 7.4 kW / 32 A
 - 110 ... 240 V AC
- Three phase
 - Up to 22 kW / 32 A
 - 380 ... 415 V AC, 50 / 60 Hz
- Type 2 socket with or without shutter
- Type 2 cable, 5 m
- Variants:
 - Display and MID certification
 - RFID
 - 4G

Dimension (HxWxD) = (320 x 195 x 110) mm



Terra AC wallbox

Front view



Terminologies

- Socket or cable:** Cable is more comfortable at home, users do not have to carry a charging cable in their car
Some countries require a socket in public spaces because of operability (pay attention to requirements different countries)
Pro: People can not drop the charging cable
- Shutter:** Cover on the socket, special requirement in France, (Italy and NL), other countries can use the standard socket.
- RFID:** Authorization – only a special group of people is allowed to use the charger
Authorization of payment through RFID card / tag
- MID:** Requirement in EU that the CPO is allowed to charge for charging session, check local laws and requirements
- 4G Modem:** Connect the charger to an OCPP-Backend, if local network should not be used

ABB Tera AC wallbox

Technical data for E

Power output

- Single Phase
- 3.7KW : 16A
 - 7.4KW : 32A
- Three phase
- 11KW : 16A
 - 22KW : 32A

Cable type or socket

- P : Type 1 cable
- G : Type 2 cable
- T : Type 2 socket
- S : Type 2 socket with shutter

Cable length

- No cable
 - 5 m
- Terra AC wall box charger cable accessories:
- Length: 7 m
 - Cables with 2 connectors of same or different types.
- Available as the following:
- Type 2 to type 1
 - Type 2 to type 2

Authorization

- RFID enabled
- No RFID

ABB Tera AC wallbox

Technical Data

Terra AC Wall Box				
Phase	Single Phase		Three Phase	
Rated Power (kW)	3.7 KW	7.4KW	11KW	22KW
Max. current (A)	16 A	32 A	16 A	32A
Socket outlet or connector type	Socket with shutter, type 2	Socket, type 2 or Cable 5 m, type 2	Cable 5 m, type 2	Socket, type 2 or Socket with shutter, type 2 or Cable 5 m, type 2
Authorization	-/RFID	-/RFID/4G	RFID	-/RFID/4G
Display and MID certification	-	Available with Socket, type 2 and with Cable 5m, type 2 (with RFID, 4G)	-	Available with Socket, type 2 or Socket with shutter, type 2 or Cable 5 m, type 2 and with RFID, 4G
Upstream overcurrent protection breaker	20A	40A	20A	40A
Wire size for the terminal block	Minimum cross-section 2.5 mm2	Minimum cross-section 6 mm2	Minimum cross-section 2.5 mm2	Minimum cross-section 6 mm2
Dimension	(HxWxD) = (320 x 195 x 110) mm			
Dedicated upstream protection device(s)	Options: RCD (Type A minimum) + MCB or RCBO (Type A minimum)			
Upstream residual-current device (RCD)	Minimum Type A, with a rated residual operation current of maximum (30 mA) Note: Internal to EVSE is DC fault current monitoring > 6mA			
Mounting	Wall or floor using a pedestal or Plastic adapter box			
Interface	Energy meter via Modbus RTU			
Interface through cloud	Cloud connectivity over: Ethernet RJ45, Wi-Fi, 4G			

Pedestals and accessories

Plastic adapter box

Plastic box on a standard 60 mm pole with ground plate

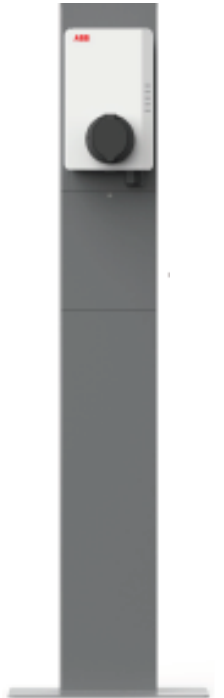
- Room for 5 x 4-slot DIN rail components
- IP54
- IK 10
- Sold with and without pole
- Can hold one or two chargers back to back
- Space saving cost efficient solution



Metal pedestal

Metal, free standing

- Room for 6 x 4-slot DIN rail components
- IP54
- IK 10
- Offers a big space for customized foiling
- Can hold one or two chargers back to back



Other accessories: extra RFID cards, spare cables and charge cables (T2-T2 and T2-T1)

Terra AC wallbox

Features

Load management

- Static load management with high accuracy revenue grade energy meter integrated
- Set up for external energy meter integration for dynamic load management
- Ready for integration with advanced smart building energy system for intelligent energy management



Load management case 1

Single charger

Single charger

Interfaces

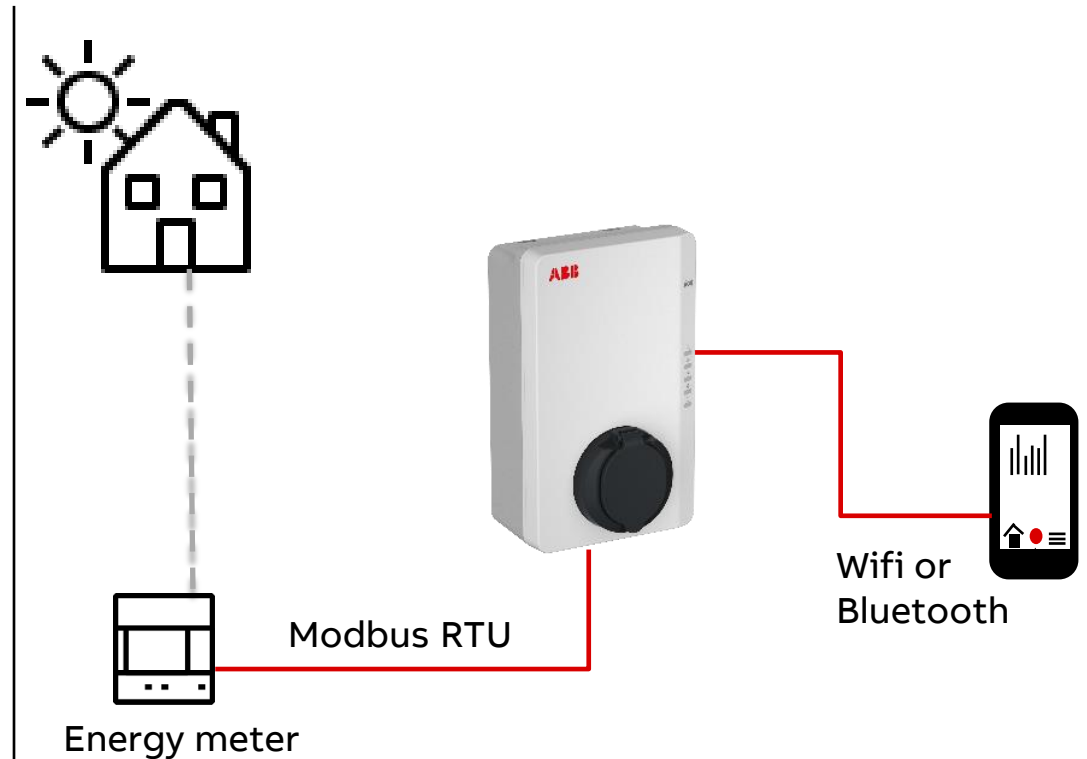
Energy meter:

- Modbus RTU

Benefits

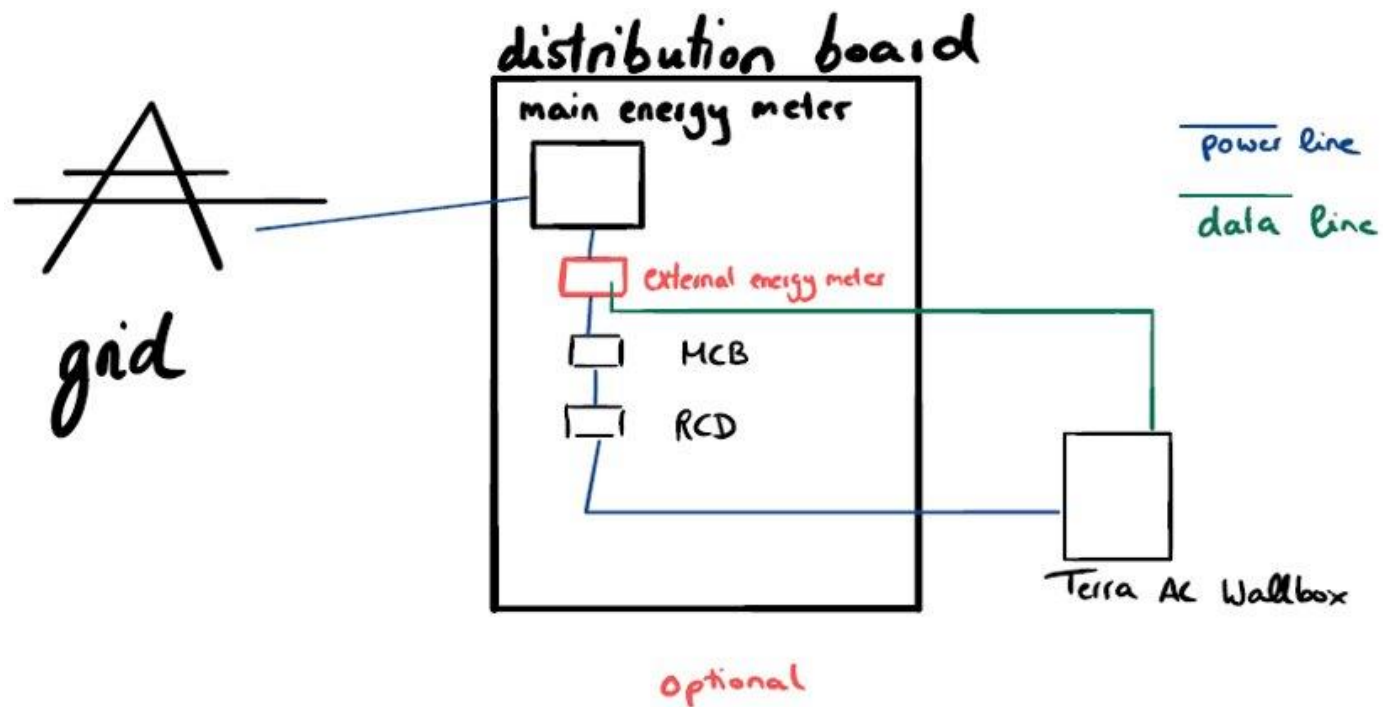
Adjusts the power to the power consumption of other devices in the home, and to solar.

No cloud connection needed.



Load management

Single charger (case 1)



Load management case 3

Multiple chargers with ABB AC cloud

Interfaces

Cloud connectivity over:

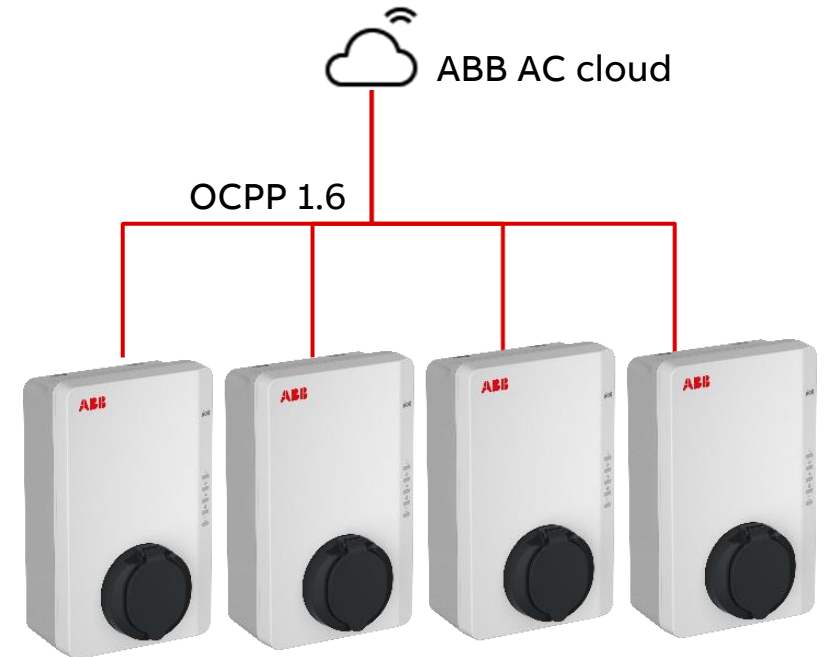
- Ethernet RJ45,
- Wi-Fi
- 4G

Benefits

Multiple chargers can be managed, the total installed power can be more than the grid connection can handle.

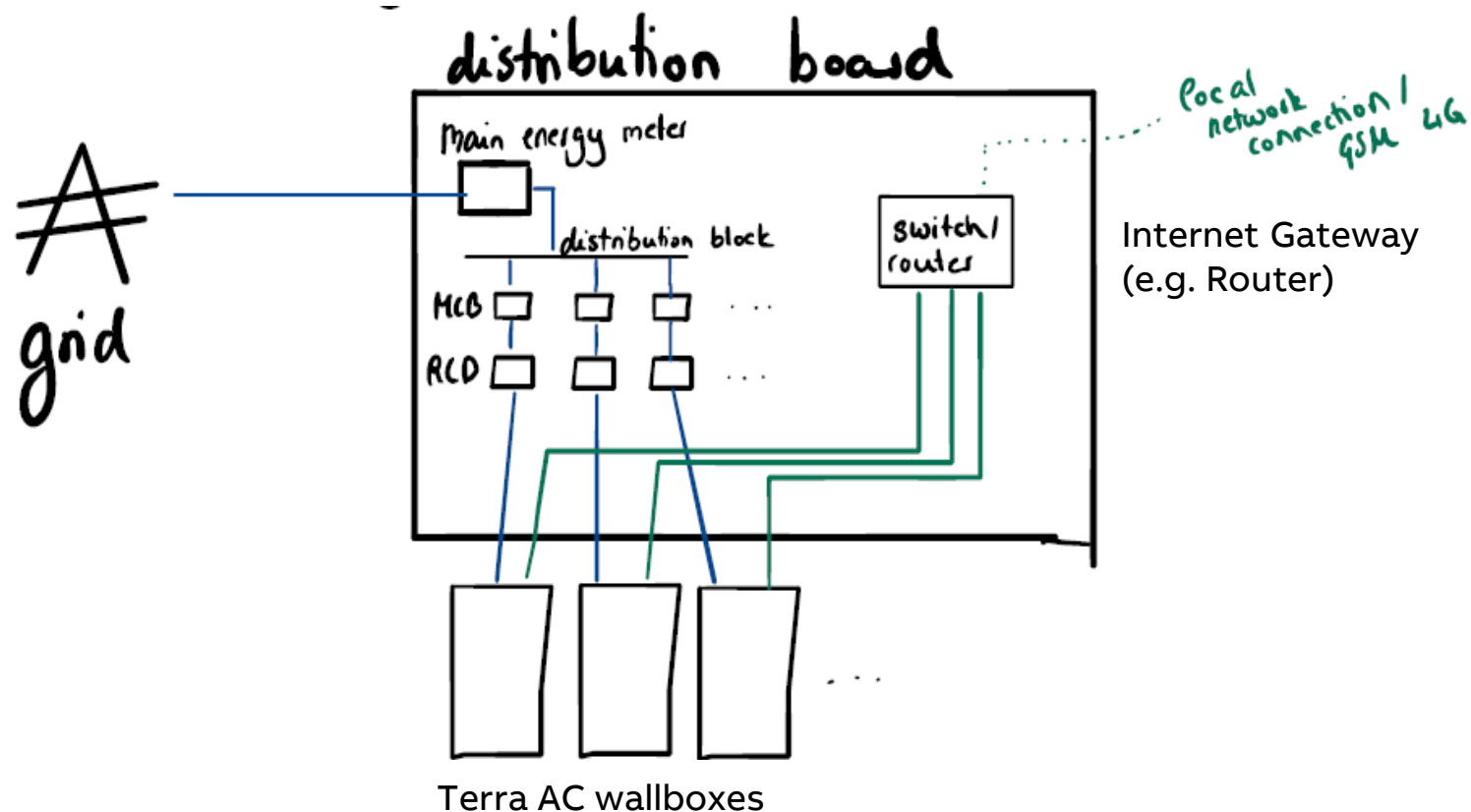
The *Hybrid load management* algorithm manages the queue.

Chargers do not need to be in the same LAN.



Load management – fixed limit

Static load management



Hybrid load management

Multiple chargers with ABB AC cloud

Benefits

Best of both worlds: both priority groups and share equal and first in first out.

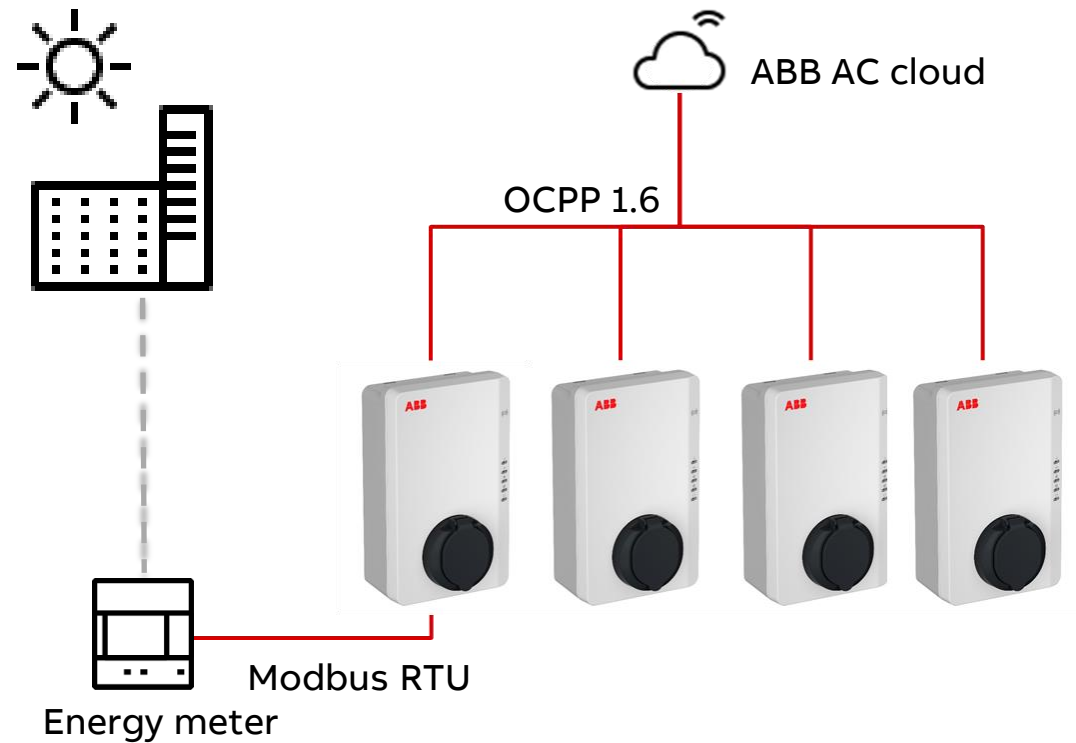
Behavior

- Higher priority chargers go first before lower priority chargers,

Benefits

Multiple chargers can be managed with one external meter.

The *Hybrid load management* algorithm manages the queue.



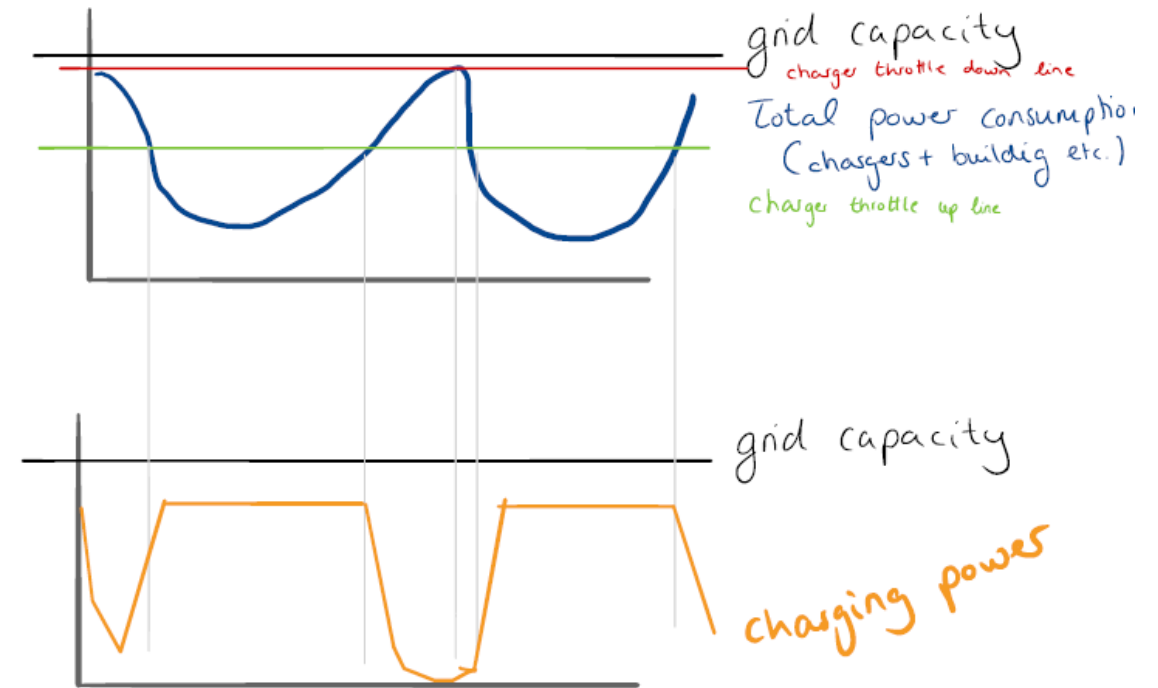
Load management with an external energy meter

Grid capacity: total available power from the grid

Charger throttle down line: if the total power consumption of all devices (detected/measures by the external energy meter) exceeds the value set for the throttle down line, the charger will decrease the charging power

Charger throttle up line: The chargers will increase the charging power when, the total power consumption of all devices drops below the set value for the throttle up line

Total power consumption: How much power is used by the building and the chargers



Terra AC wallbox

Product features

Built-in safety

Built-in safety doesn't prevent to use upstream protection devices (subject to local regulations)

- **Overcurrent**

The charger will switch off when it detects that the car takes more current than it is allowed to take

- **Overvoltage and undervoltage**

The charger will disconnect the car when it detects either a too low or too high input voltage

- **Ground fault**

The charger will disconnect the car when it detects an earth fault. When the charger detects an AC ground fault, or a DC ground fault of > 6 mA it disconnects the car from the mains connection.

- **Surge protection**

- **PE (protective earth) continuity monitoring**

Energy meter

- Built in high accuracy revenue grade energy meter (1% tolerance), class B, integrated in the electronic design
- Display variants are MID or NIST certified
- For static load management
- Combination with external energy meter or external controller is used for dynamic load management

- The ability to do power management is integral to the design. When connected to an energy meter this power budget can vary with the load seen by the meter.

Smarter mobility with smart capabilities

ABB's mobile App and web portal



For the user

- Lets you authenticate and control charging
- Shows charging status via the App



For the installer

- Allows configuration of the charger via the App
- Allows configuration of the charger's network via the ABB web portal

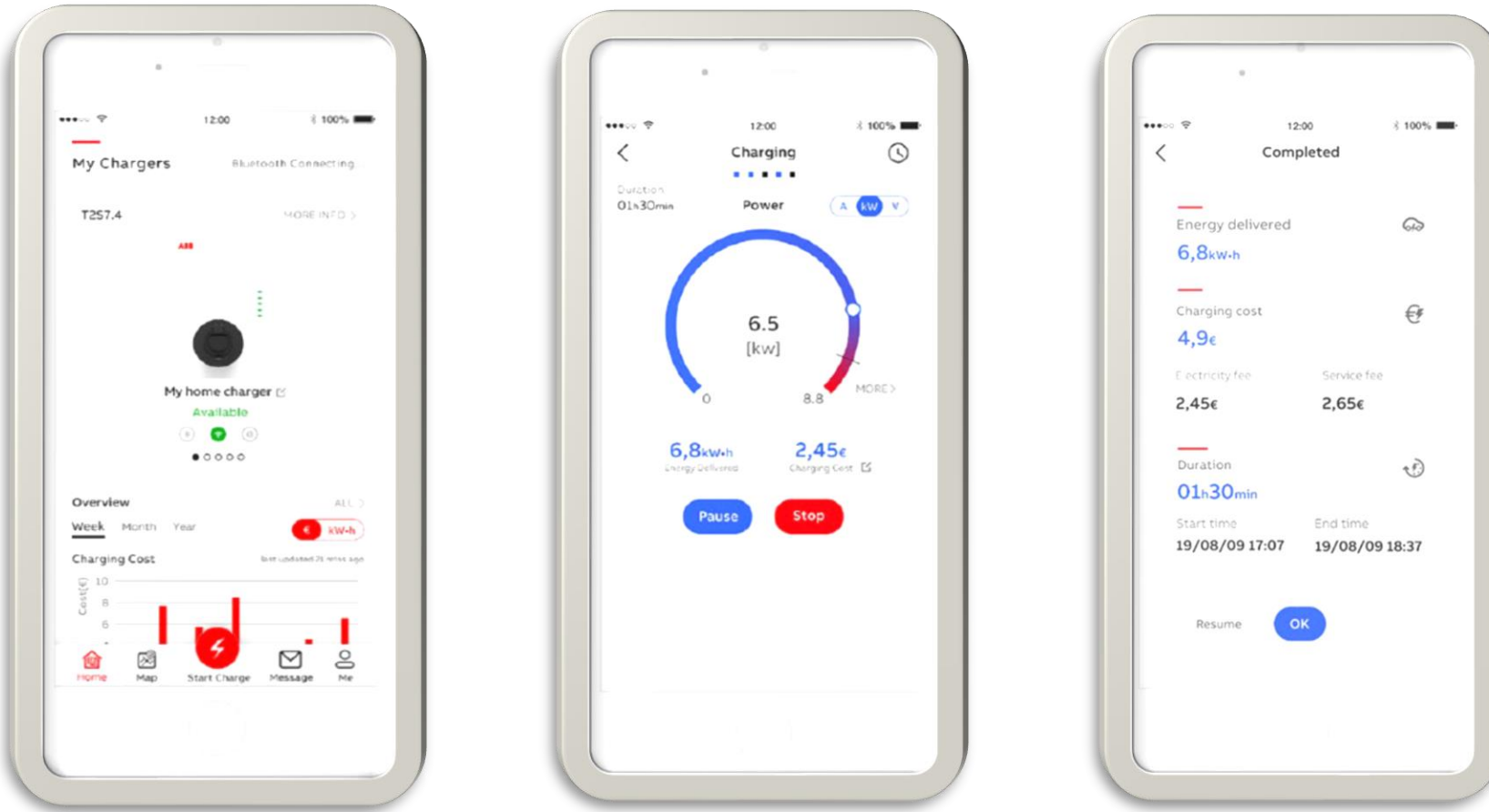


For the owner

- Lets you manage chargers and users via the ABB web portal
- Provides information about the status of chargers (availability, number of session, energy delivery)

Smarter mobility with smart capabilities

ABB's mobile App



Smarter mobility with smart capabilities

ABB's web portal

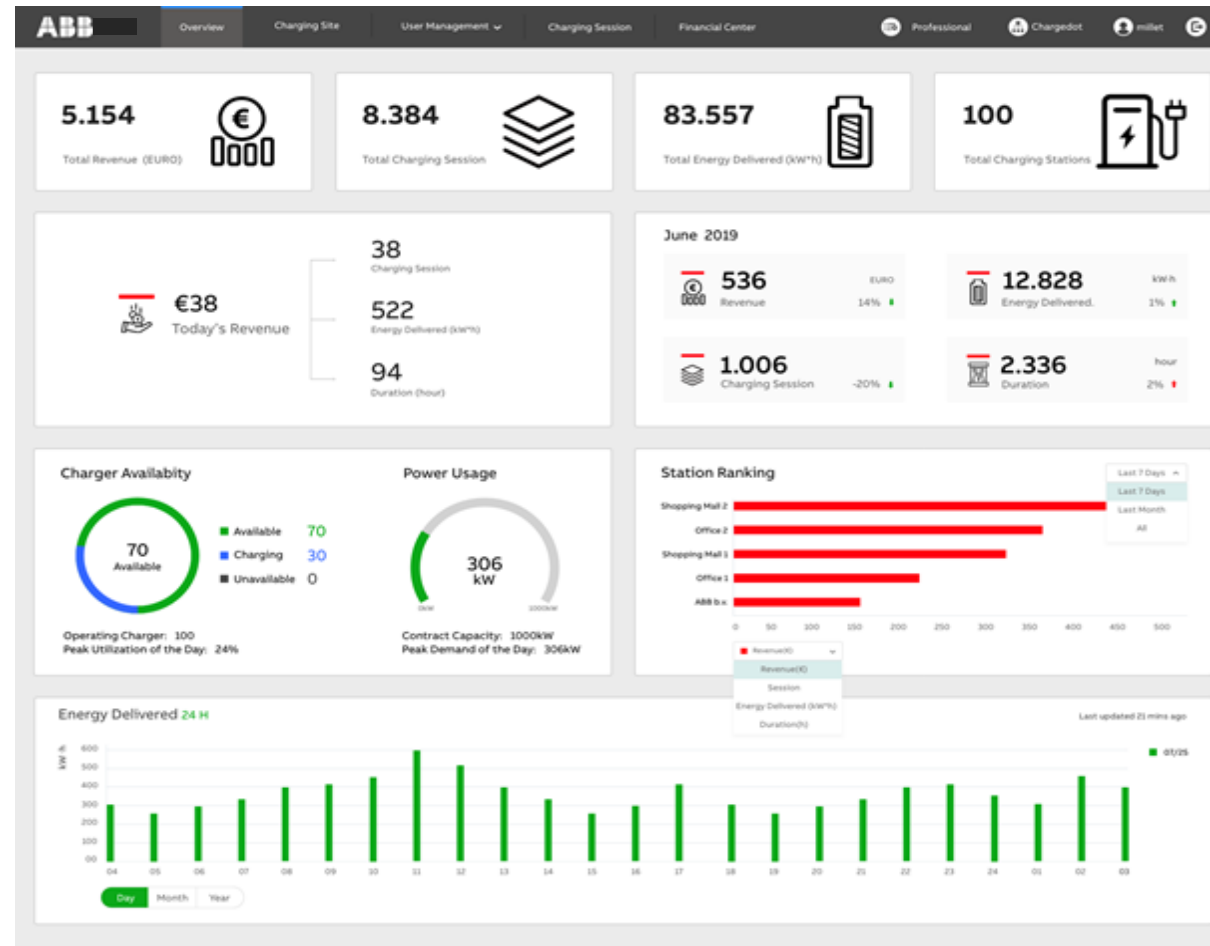




ABB Terra DC Wallbox

New product Overview



Public and commercial car charging – Use cases

Charging service should match charging application and demand

Public and commercial EV Charging			
AC destination	DC destination	DC Fast	DC High Power
3-22 kW	20-25 kW	50 kW	150 to 350 kW+
4-16 hours	1-3 hours	20-90 min	10-20 min
			

Terra DC Wallbox

Brought to you by ABB

Offering an **ultra-compact** DC fast charging solution,

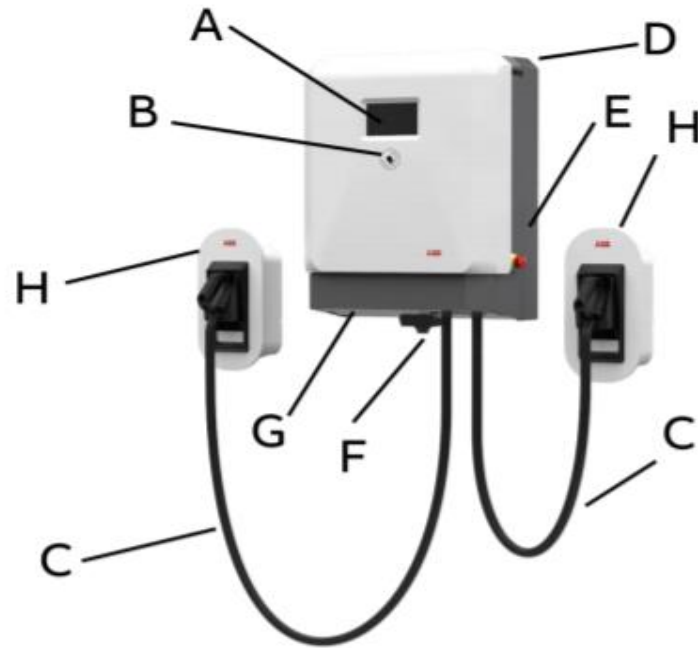
That is a **future proof** investment supporting current and future EVs with high voltage charging,

That is **safe and reliable**, for residential use too,

And that **maximizes revenue** opportunities for operators with built-in connection to the ABB ability platform.



Product features



A	Display / HMI	E	Emergency button
B	RFID card reader	F	AC input cable
C	Charging outlets DC	G	Air inlet
D	Air outlet	H	Gunholder (optional)

Built in safety

- Output overcurrent,
- Input protection of overcurrent,
- Surge protection
- PE (protective earth) Insulation monitoring on the DC Output
- Leakage current monitor protection

Load Management

- Smart charging via OCPP
- Set up for external energy meter integration for dynamic load management

Connectivity

- 3G / 4G
- Ethernet
- RFID

Authentication

- RFID
- On-screen PIN code authentication
- 'Plug & charge (ISO 15118)

Size

- HxWxD 770 x 584 x 294 mm
- 60 kg excluding backplate (10kg) and cables

Terra DC wallbox use cases

High traffic areas where drivers are expected to be 1 – 3 hours



Residential

Multi-tenant homes,
residential communities



Office

Small and large
offices, business
parks and
complexes



Commercial

Hotels &
hospitality sports
institutions, shopping
centres, commercial
fleets, public or
private campus,
parking structures,
car dealerships, race
tracks



Public assets

Bus depots, utility
sensitive grid
applications

Terra DC wallbox

Portfolio

EU portfolio

Single phase & Three phase

- 0 ... 22.5 kW, 24 (peak) / 60 A
- CCS 150 ... 920 V DC
CHAdeMO 150 ... 500 V DC

Variants

- CCS2 and/or CHAdeMO
- EMC classification B
- Cable length 3.5 m & 7 m



Accessories

Pedestal

- 30 Kg
- Metallic structure
- Internal conduits available for cabling
- Supports up to 2 Gun Holders on each side



* Foundation not provided.



Terra DC wallbox

Connectivity

Digital integration of an ABB EV charger

ABB's solution

Highly redundant cloud platform

Extended protocol to the charger

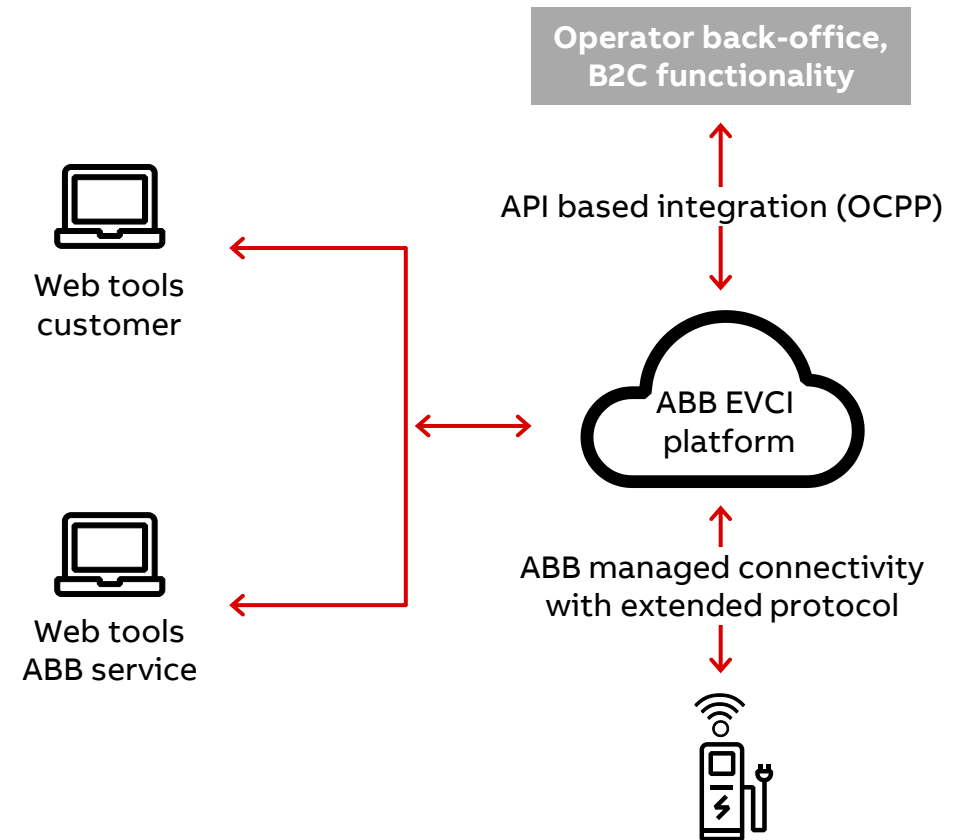
Over 8.500 chargers connected

24/7 network operation center, enforcement of SLA with GSM provider, outage mitigation & resolution

Software updates and car interoperability updates

Advanced remote service concept (by ABB or 3rd party)

APIs & web tools available based on a SaaS model



Digital integration of an ABB EV charger

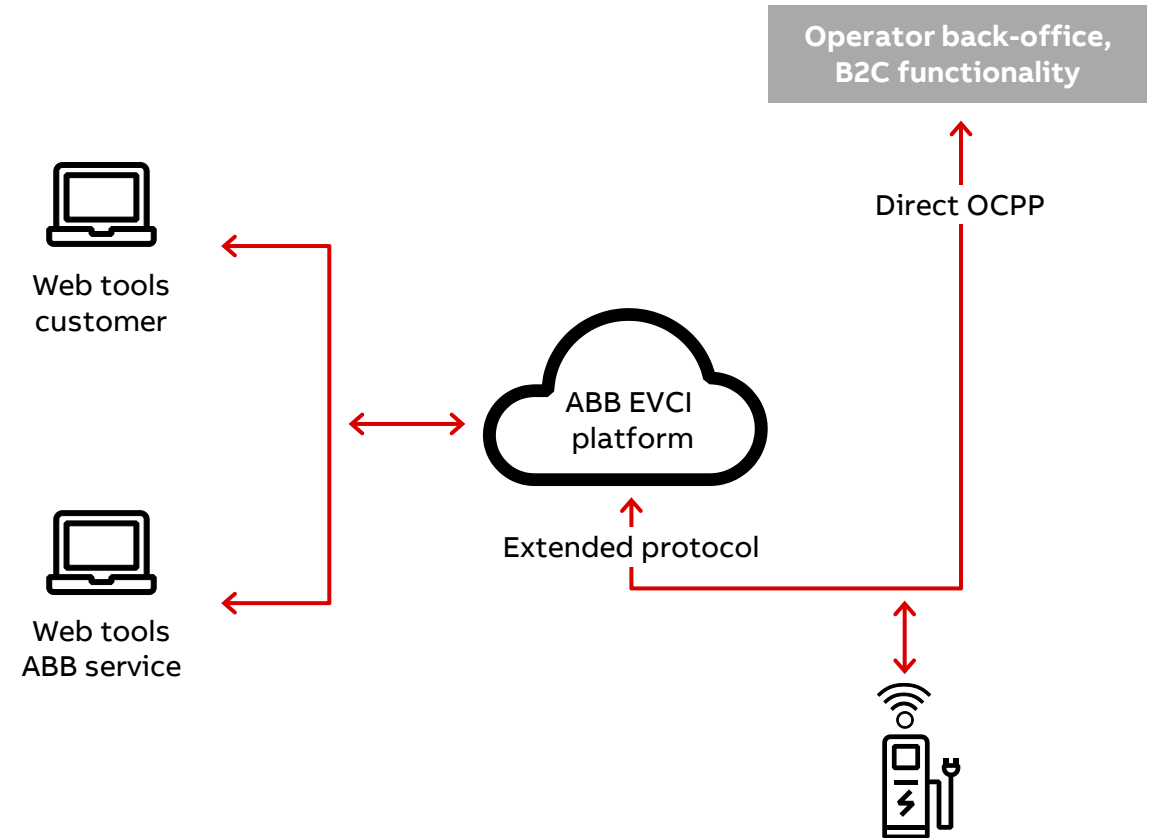
Dual Uplink Option – Combining direct OCPP with the benefits of the ABB EVCI platform

Details

Direct OCPP between EVSE and Central System

For OCPP 1.6 (using JSON via websockets)

Both communication channels use the same internet connection (either SIM or Ethernet) to send data to the two different end points





EV Fast Chargers

New product Overview



Uses cases for public and commercial charging

The state of the art until 2019..

Public and commercial EV Charging			
AC destination	DC destination	DC Fast	DC High Power
3-22 kW	20-25 kW	50 kW	150 to 350 kW+
4-16 hours	1-3 hours	20-90 min	10-20 min
			
– Office, workplace – Home – Multi family housing – Hotel and hospitality – Overnight fleet – Supplement at DC charging sites for PHEVs	– Office, workplace – Hotel and hospitality – Parking structures – Dealerships – Urban fleets – Public or private campus – Sensitive grid applications	– Retail, grocery, mall, big box, restaurant – High turnover parking – Convenience fueling stations – Highway truck stops and travel plazas – OEM R&D	– Highway corridor travel – Metro ‘charge and go’ – Highway rest stops – Petrol station area’s – City ring service stations – OEM R&D

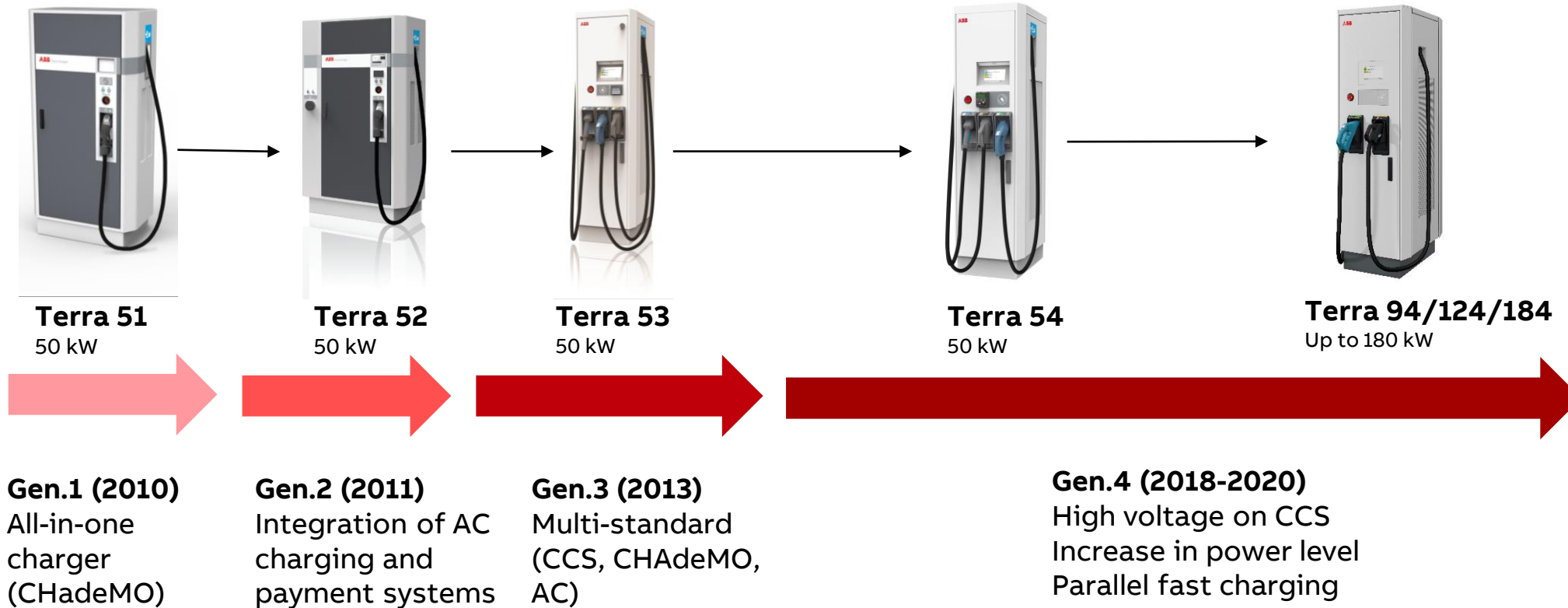
Uses cases for public and commercial charging

The state of the art today

Public and commercial EV Charging			
AC destination	DC destination	DC Fast ← → DC High Power	
3-22 kW	20-25 kW	50-150 kW	150 to 350 kW+
4-16 hours	1-3 hours	20-90 min	10-20 min
			
– Office, workplace – Home – Multi family housing – Hotel and hospitality – Overnight fleet – Supplement at DC charging sites for PHEVs	– Office, workplace – Hotel and hospitality – Parking structures – Dealerships – Urban fleets – Public or private campus – Sensitive grid applications	– Retail, grocery, mall, big box, restaurant – High turnover parking – Convenience fueling stations – Highway truck stops and travel plazas – OEM R&D	– Highway corridor travel – Metro ‘charge and go’ – Highway rest stops – Petrol station area’s – City ring service stations – OEM R&D

EV Fast Charging

Portfolio Evolution





EV Fast Chargers

New Terra models

Terra 94/124/184

- All-in-one charger, no need of separate power cabinets
- Modular design, allows progressive upgrade from 90 to 120 to 180 kW
- Terra 124 and Terra 184 can fast-charge two electric vehicles simultaneously
- Selection of cable options to satisfy different needs (current output and cable length). Cable management system available as factory or field upgrade.
- All models are future proof due to the high-voltage charging capability
- Part of the best-selling “Terra 54” product line, sharing features, components, accessories, configuration and administration tools
- AC socket available as option



Variant “C”
One CCS outlet



Variant “CC”
Two CCS outlets



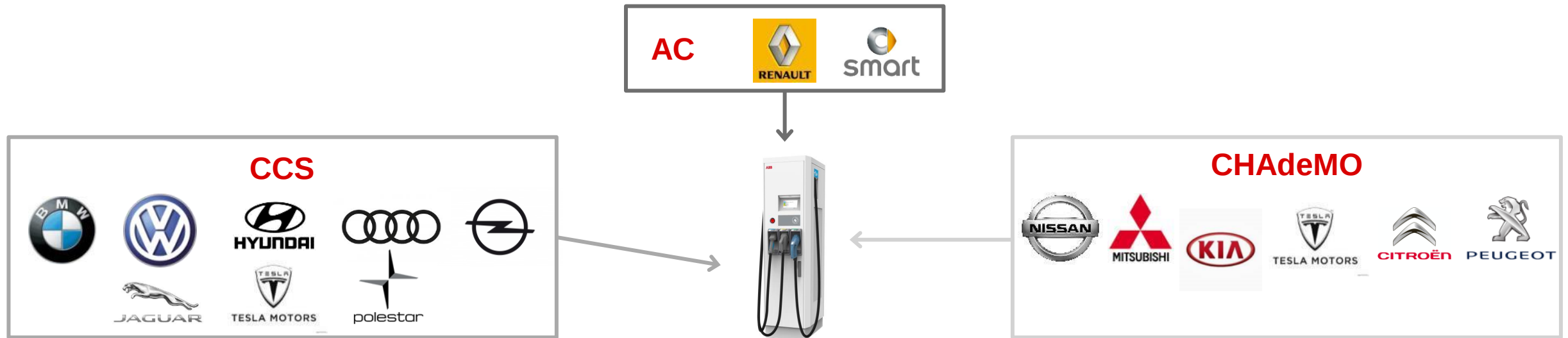
Variant “CJ”
One CCS outlet
and one
CHAdeMO outlet



Variant “JJ”
Two CHAdeMO outlets

Multi-standard charger solution Terra fast chargers

General explanation of naming convention



Terra 24	(20kW)	C - (Combo) = Combined Charging Systems (CCS)	- DC
Terra 54	(50kW)	J - (Japan) = CHAdeMO	- DC
Terra 94	(90kW)	Z - (China) = GB	- DC
Terra 124	(120kW)	T - (Socket) = Type 2 Socket	- AC
Terra 184	(180kW)	G - (Grid) = Cable + Type 2 Connector	- AC

HV = High Voltage

CCS: 200-920 V

CHAdeMO: 150-500 V

Highway segment

Terra 53 / Terra 54: Multi-standard chargers (50kW) – Input: 3x 400V

Available	Available	Available	Available	Available	Available
					
Terra 53/54 CT DC+AC Highway Charger	Terra 53/54 CG DC+AC Highway Charger	Terra 53/54 CJ DC Highway Charger	Terra 53/54 CJG DC + AC Highway Charger	Terra 53/54 CJG DC + AC Highway Charger	Terra 53/54 CJT DC+AC Highway Charger
50kW DC CCS-2 22kW AC	50kW DC CCS-2 43kW AC	50kW DC CCS-2 50kW DC CHAdeMO	50kW DC CCS-2 50kW DC CHAdeMO 43kW AC	50kW DC CCS-2 50kW DC CHAdeMO 22kW AC	50kW DC CCS-2 50kW DC CHAdeMO 22kW AC



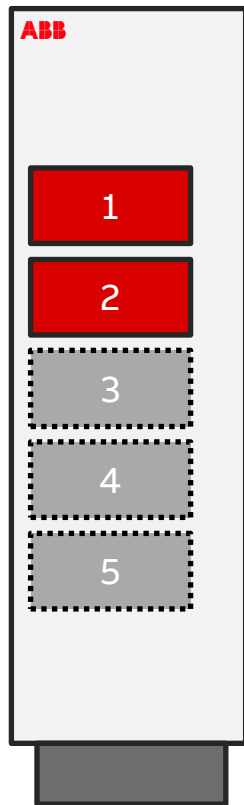
Terra EV Fast Chargers

Power modules and upgradability

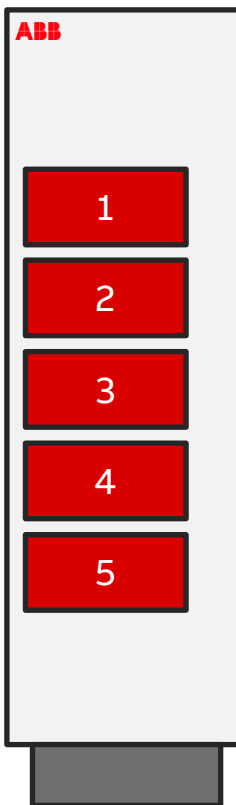
Installed power module

Slot available for upgrade

Terra 24

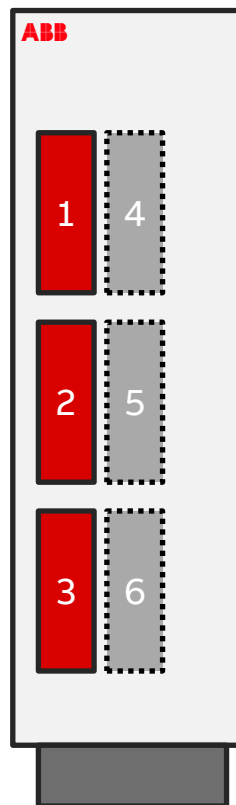


Terra 54

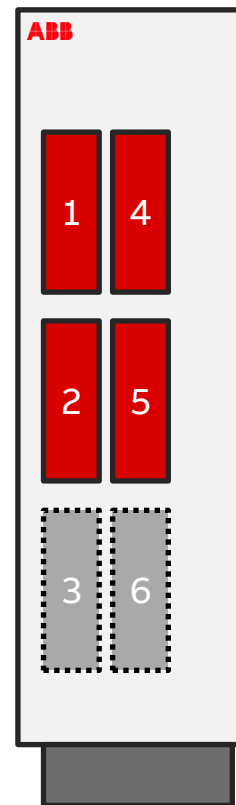


- Based on 2 (Terra 24) and 5 (Terra 54) 10 kw power modules
- Product line with 10.000 units installed worldwide
- Terra 24 is upgradable to Terra 54
- Terra 54 is available also in High Voltage variant (150-920 Vdc)

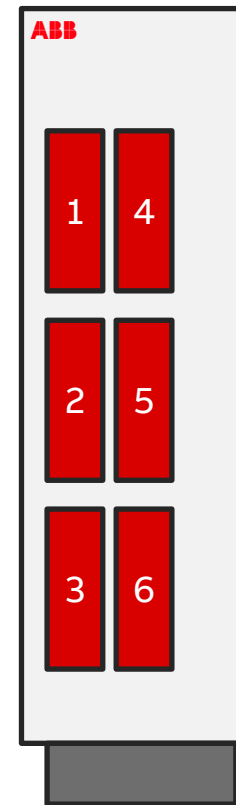
Terra 94



Terra 124



Terra 184

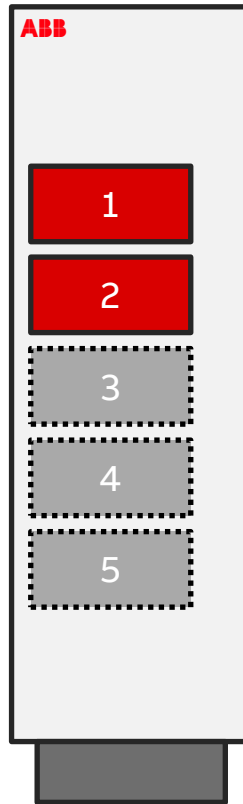


- Based on new 30 kw power modules
- Terra 94 and 124 upgradable to higher power rating, up to 180 kW
- Terra 54 cannot be upgraded to the new power modules due to different rating of the electrical components
- Terra 94-124-184 provide High Voltage capability (150-920 Vdc)

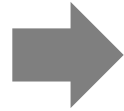
Terra EV Fast Chargers

Power modules and upgradability

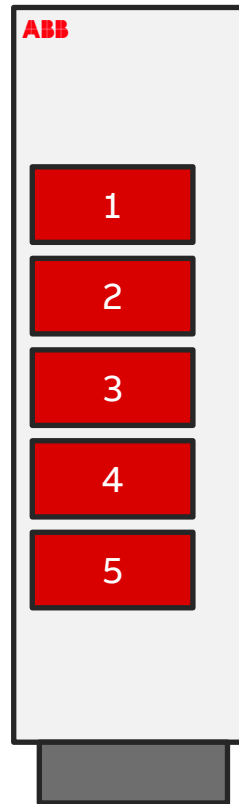
Terra 24



Upgrade
+ 30 kW



Terra 54



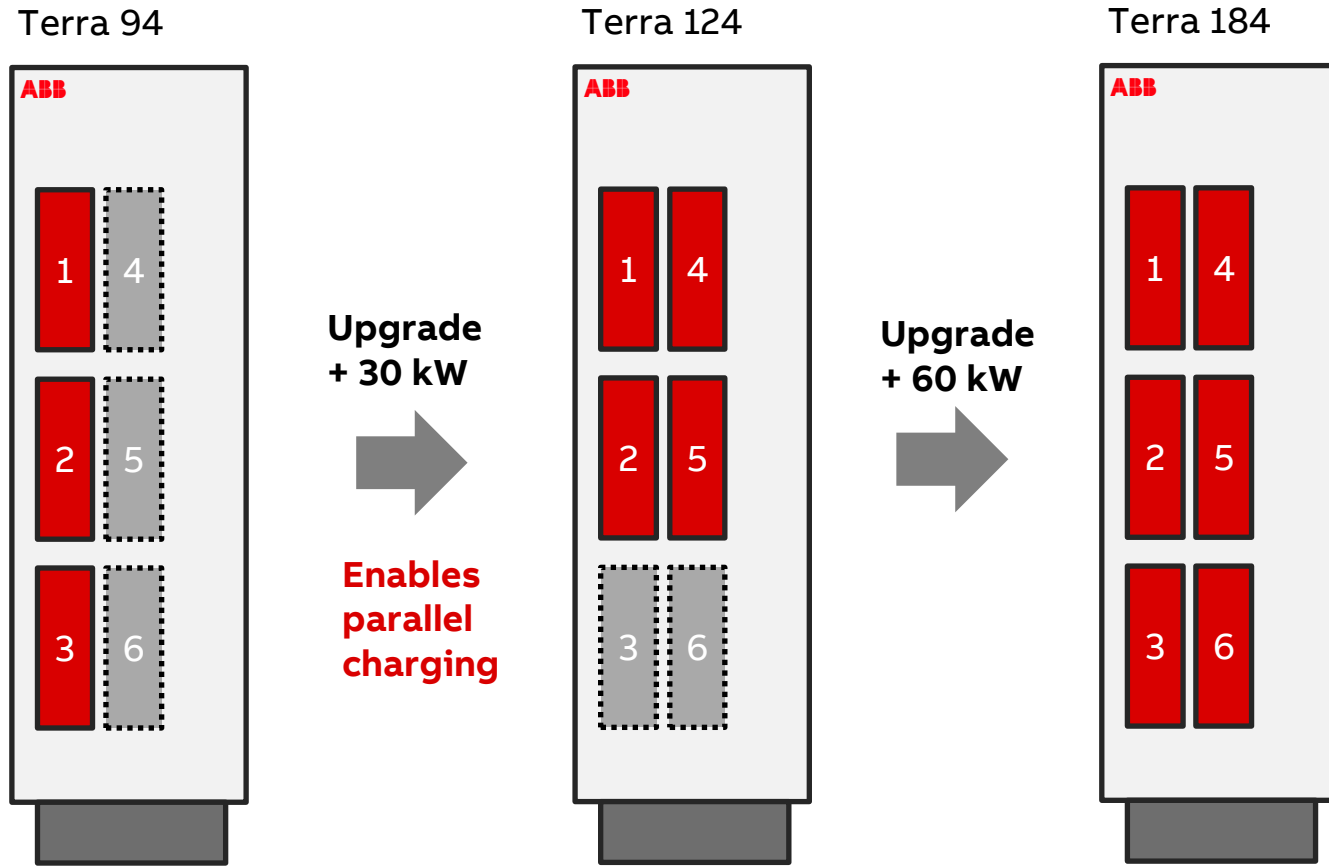
Installed power
module

Slot available for
upgrade

- Based on 2 (Terra 24) and 5 (Terra 54) 10 kW power modules
- Terra 24 is upgradable to Terra 54
- Terra 24 is a low voltage (500 Vdc) product and can be converted in Terra 54 low voltage (500 Vdc). Terra Wallbox is the alternative for 20 kW charging at high voltage.

Terra EV Fast Chargers

Power modules and upgradability



Installed power module

Slot available for upgrade

- Based on new 30 kW power modules
- All cabinets (Terra 94 and Terra 124) upgradable to higher power rating, up to 180 kW
- Terra 54 cannot be upgraded to the new 30 kW power modules due to different rating of the electrical components
- Terra 94-124-184 provide high voltage capability as standard (920 Vdc)

Terra EV Fast Chargers

A cleaner, improved design, made for serviceability

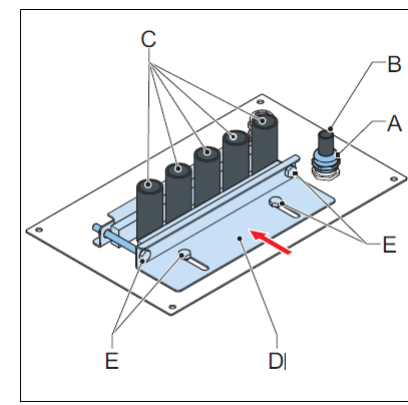
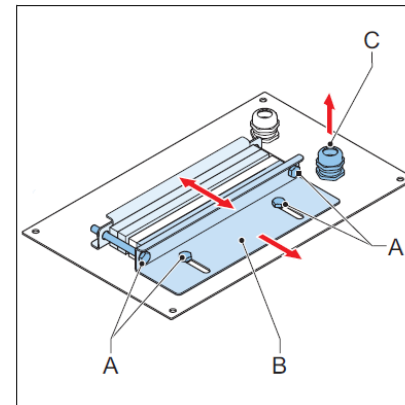


Terra EV Fast Chargers

Improvements

Installation

- Improved AC cable entry to speed up the commissioning
- No more long commissioning due to stiff or enlarged cables that do not pass through the glands!



Terra EV Fast Chargers

Improvements

Foundation

- Same foundation as Terra 53 and Terra 54!
- Pre-casted foundation available in the price book
- Drawing for site casted foundations available

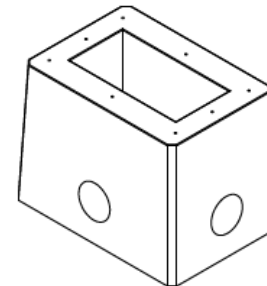
**Terra
23/53**



**Terra
24/54/54
HV**



**Terra
94/124/184**



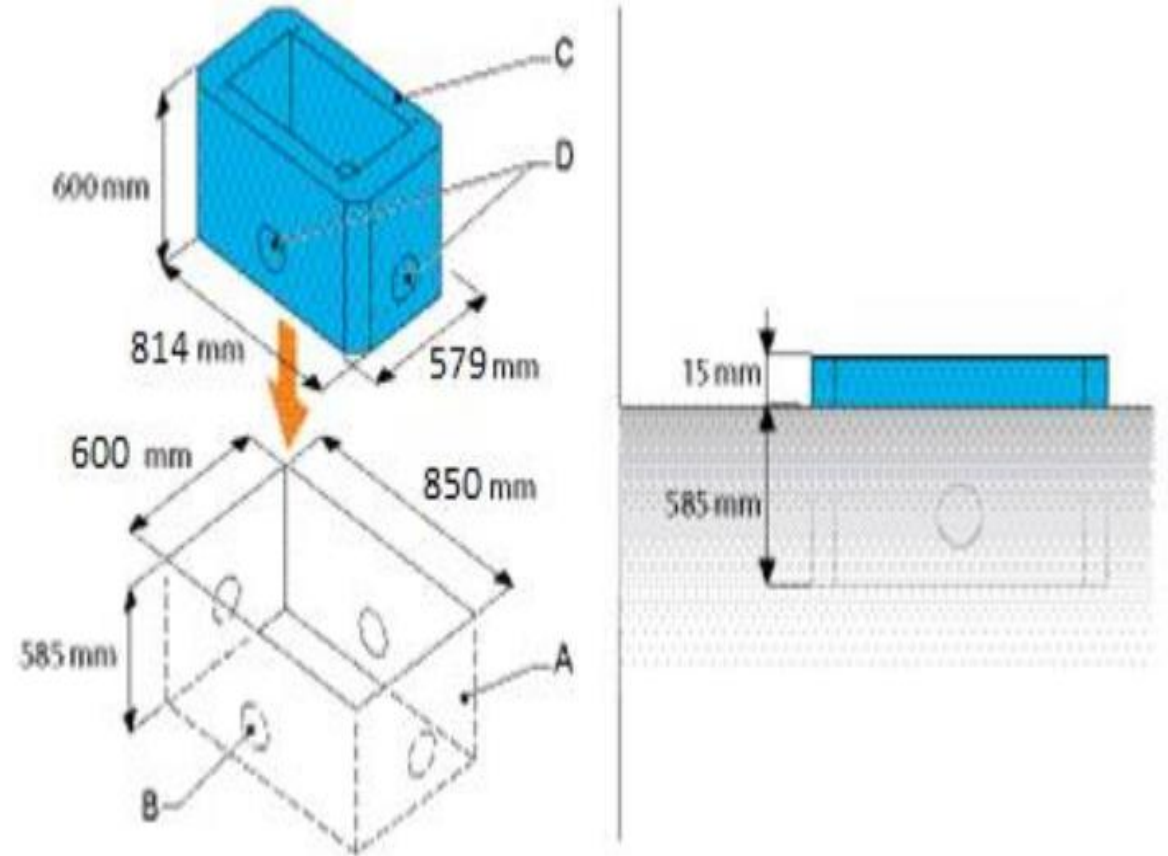
Same foundation!

EV Charger installation

overview

Site construction

1. Make a hole in the ground (A) with a minimum of the dimensions shown.
2. Make sure the cable duct(s) are routed to one of the indicated positions (B).
3. Lower the foundation (C) into the hole.
4. Route the cables through one of the holes (D).
5. Make sure the top surface of the foundation is at least 15 mm above ground level to prevent water from entering into the charger foundation.
6. Make sure a cable length of one meter is available above the foundation for internal routing in the cabinet.
7. Fill the foundation with gravel or shingles to prevent rodents from entering the equipment.
8. The maximum conductor surface is 95 mm².
9. Recommended power cable: 4 x 70 + 70 mm².



Terra EV Fast Chargers

Accessories

Cable Management System

- System designed to retract the charging cables and avoid contact with the ground
- Suitable for all Terra models (Terra 23/53, Terra 24/54/54HV, Terra 94/124/184)
- Available factory mounted option or field-upgrade
 - Field installation does not require modification of the cabinet and can be completed in few minutes
- Resistant design
- Suitable for different cable lengths
- Terra (24, 54, 94, 124, 184) are available with 3.9-meter cable and optional available with 6m / 8m



Terra EV Fast Chargers

Power sharing

Mode 1 – Single charging session

Number of charging session

One at the time

Maximum power output

100% of charger capacity

Second outlet available while the first is charging

No

Mode 2 – Two sessions all the time

Number of charging session

Two at the same time

Maximum power output

50% of charger capacity

Second outlet available while the first is charging

Yes

Mode3– Max Speed

Number of charging session

Up to two at the same time

Maximum power output

Depends on EV charging speed:

- High performance EVs -> 100% charger capacity
- Regular EVs -> 50% charger capacity

Second outlet available while the first is charging

If a high-performance EV is charging, the second outlet is not available until certain conditions are met (power demand)

Mode 4 – Max Availability

Number of charging session

Up to two at the same time

Maximum power output

Depends on EV charging speed:

- High performance EVs -> 100% charger capacity
- Regular EVs -> 50% charger capacity

Second outlet available while the first is charging

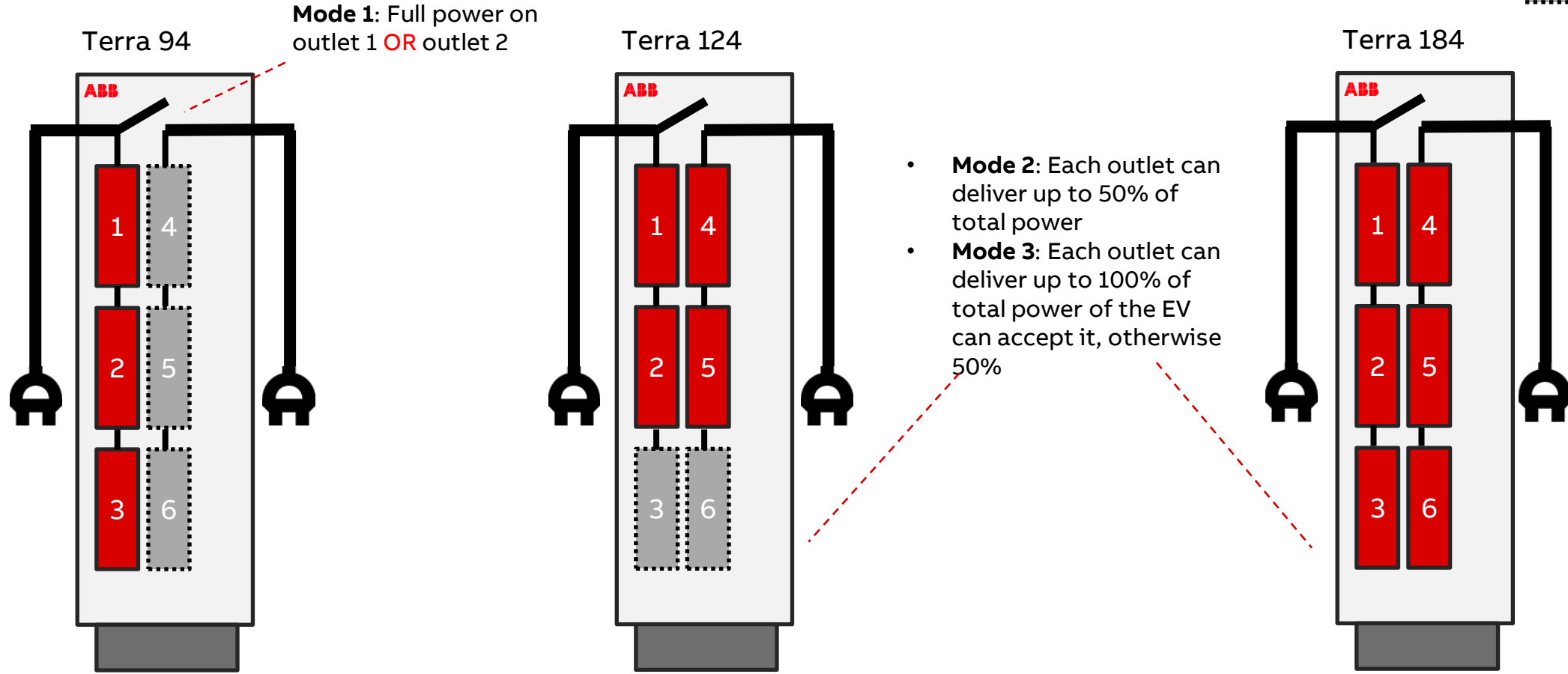
Yes

Terra 24/54 - Terra 94

Terra 124/184

Terra EV Fast Chargers

Power modules layout



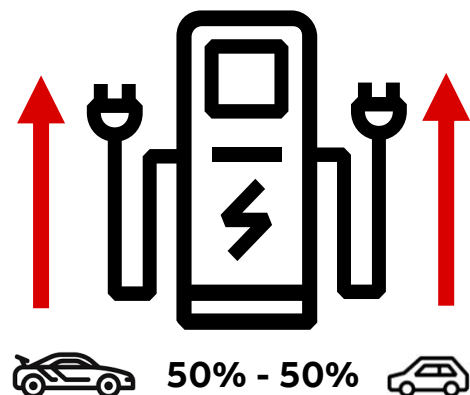
Terra EV Fast Chargers

Power sharing (T124 / T184)

EV that can charge @ 100+ kW 

EV that can charge @ 50 kW 

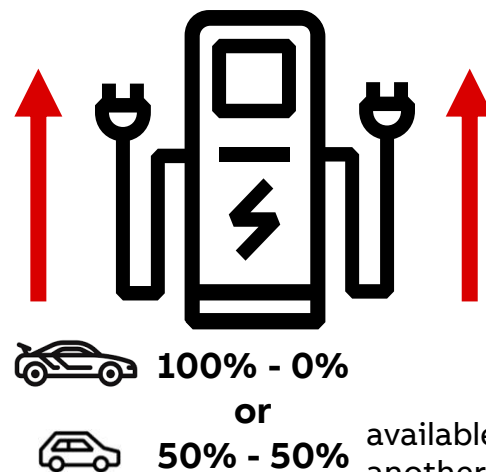
Mode 2 – Two sessions all the time



Each gun can supply up to 50% of the power capacity all the time.

Two charge sessions at the time

Mode 3 – Maximum speed

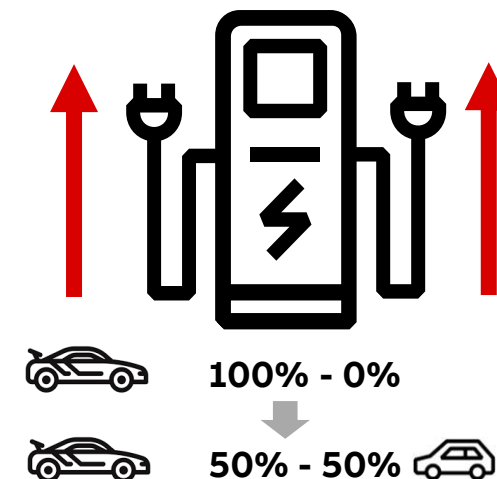


Each gun can supply up to the maximum speed accepted by the EV.

High capacity EVs take 100% of the available power.

Low capacity EVs take 50% of the available power, second outlet still available to charge another EV.

Mode 4 – Max availability



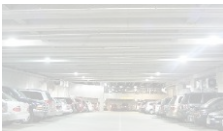
Each gun can supply up to the maximum speed accepted by the EV.

High capacity EVs take up to 100% of the available power.

If a second EV is plugged, the power is split equally between the two vehicles

Public and commercial car charging – use cases

Charging service should match charging application and demand

Public and commercial EV Charging			
AC destination	DC destination	DC Fast	DC High Power
3-22 kW	20-25 kW	50 kW	150 to 350 kW+
4-16 hours	1-3 hours	20-90 min	10-20 min
			
• Office, workplace • Multi family housing • Hotel and hospitality • Overnight fleet • Supplement at DC charging sites for PHEVs	• Office, workplace • Multi family housing • Hotel and hospitality • Parking structures • Dealerships • Urban fleets • Public or private campus • Sensitive grid applications	• Retail, grocery, mall, big box, restaurant • High turnover parking • Convenience fueling stations • Highway truck stops and travel plazas • OEM R&D	• Highway corridor travel • Metro ‘charge and go’ • Highway rest stops • Petrol station area’s • City ring service stations • OEM R&D

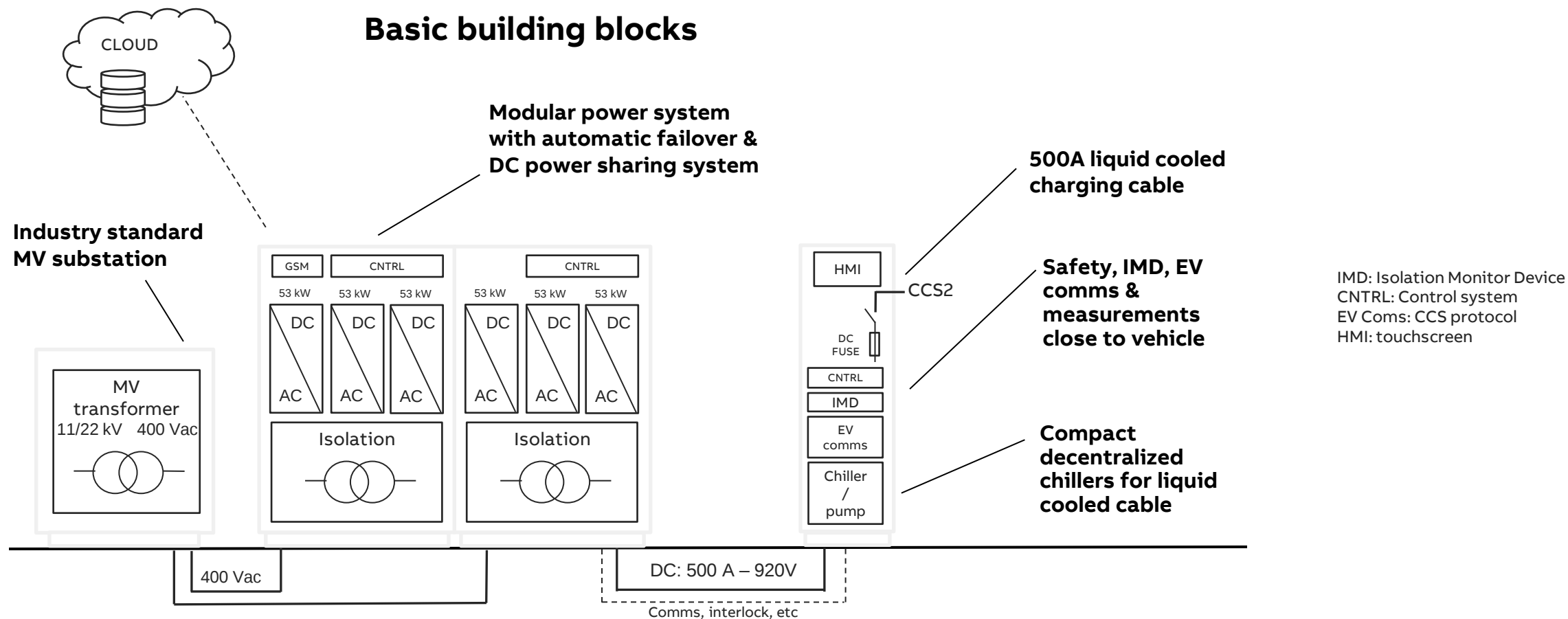
Terra HP Series: Static and *Dynamic DC* configurations

Single output or 350 kW dual output with ABB's unique *Dynamic DC* feature

175 or 350 kW Single Output Terra HP Static		350 kW Dual Output Terra HP <i>Dynamic DC</i> power allocation	
150-920 V _{DC}			
			
175 kW 350 A		350 kW 500 A 350 kW 500 A	
		<i>Dynamic DC</i>	
		Power expansion	
		1 cabinet expansion	
			
		2 cabinet expansion	
			

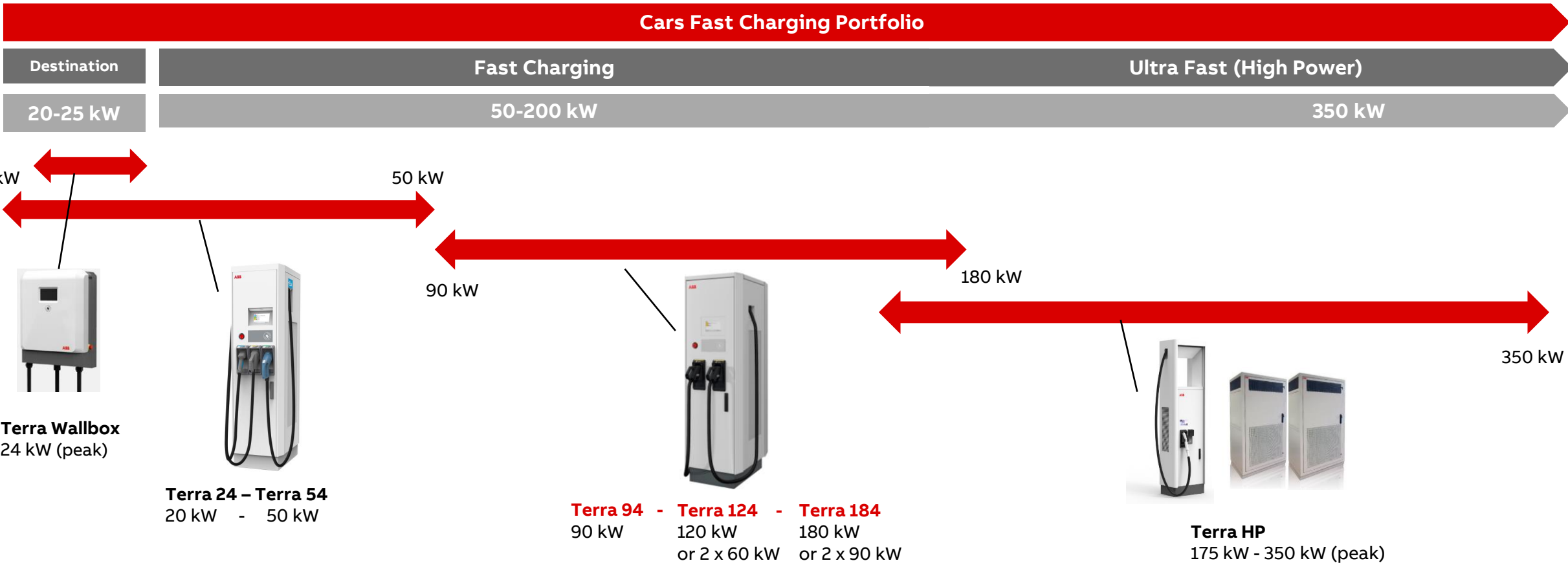
Terra HP modular: system architecture

Each power cabinet 160kW continuous, and 175kW peak power; 1x cabinet: 160kW / 2x cabinet: 320kW



EV Fast Chargers

New DC charging portfolio



From source to street

Leverage ABB's expertise for solutions that expand across the full EV infrastructure network

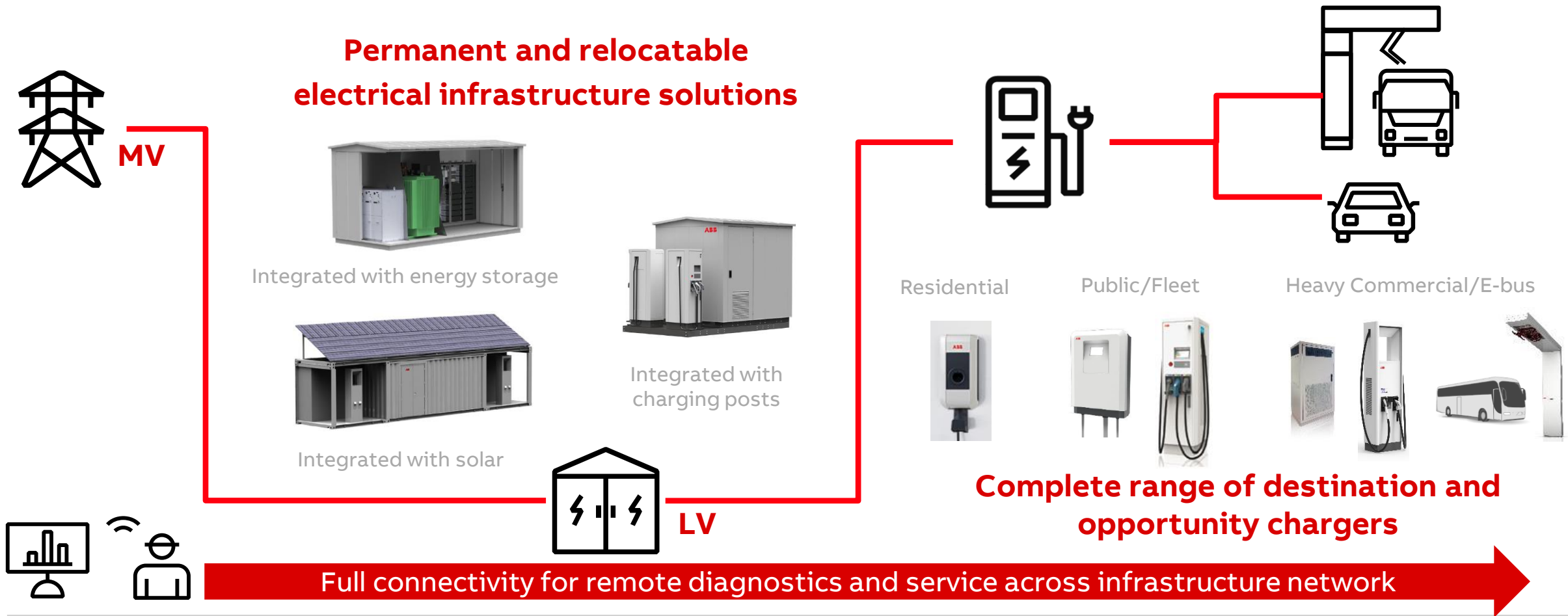




ABB EV Infrastructure

eBus charging solutions



Product portfolio EV Charging

Overnight and opportunity charging

Overnight chargers

HVC 50C



HVC 100C



HVC 150C



P: Pantograph

C: Cable

Opportunity chargers

HVC 150P



HVC 300P



HVC 450P

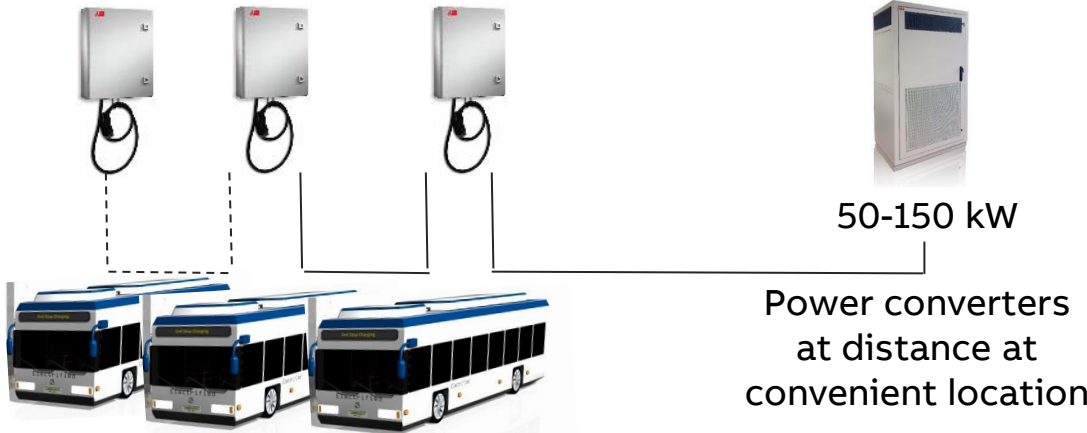


HVC 600P

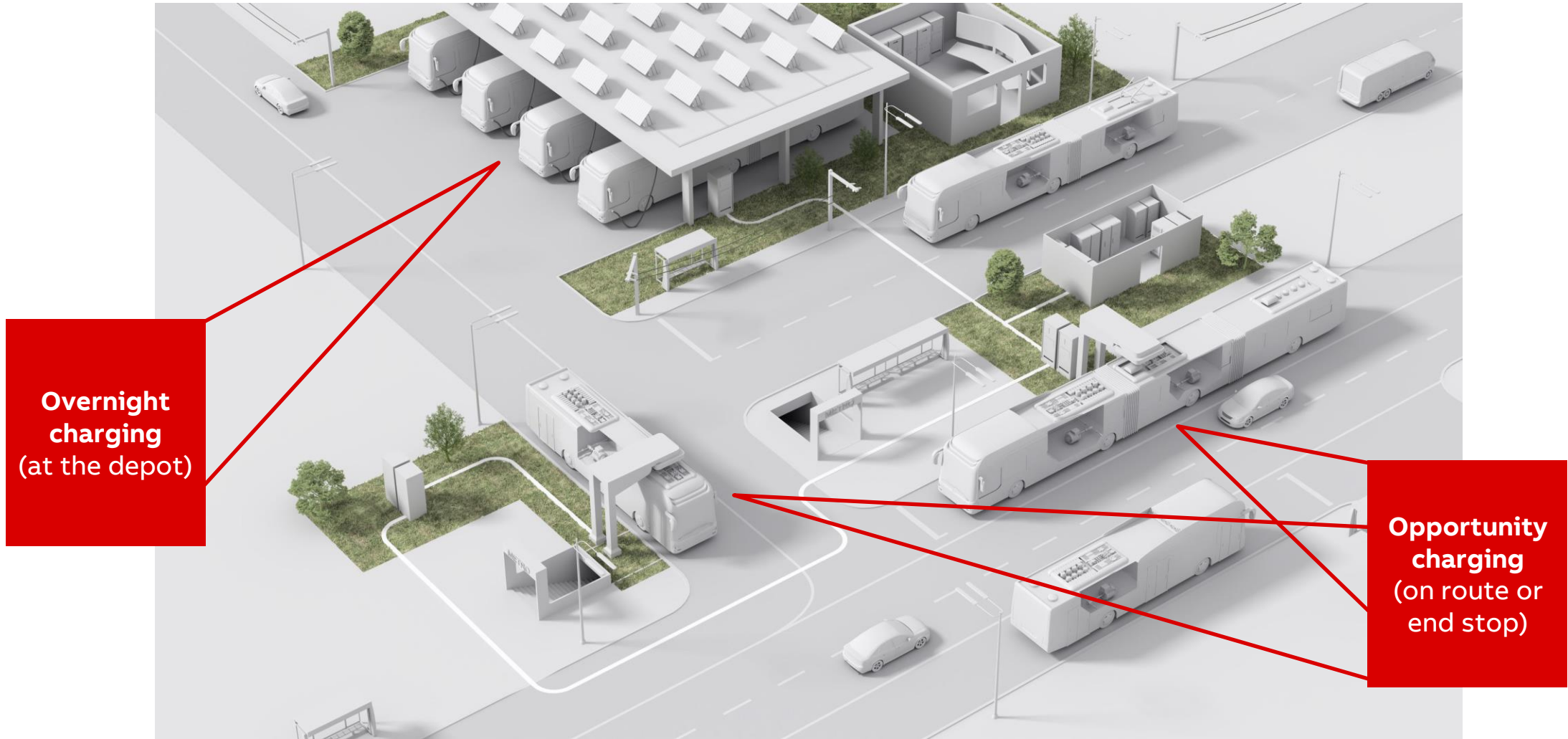


eBus and heavy vehicle charging: 50 kW – 450 kW

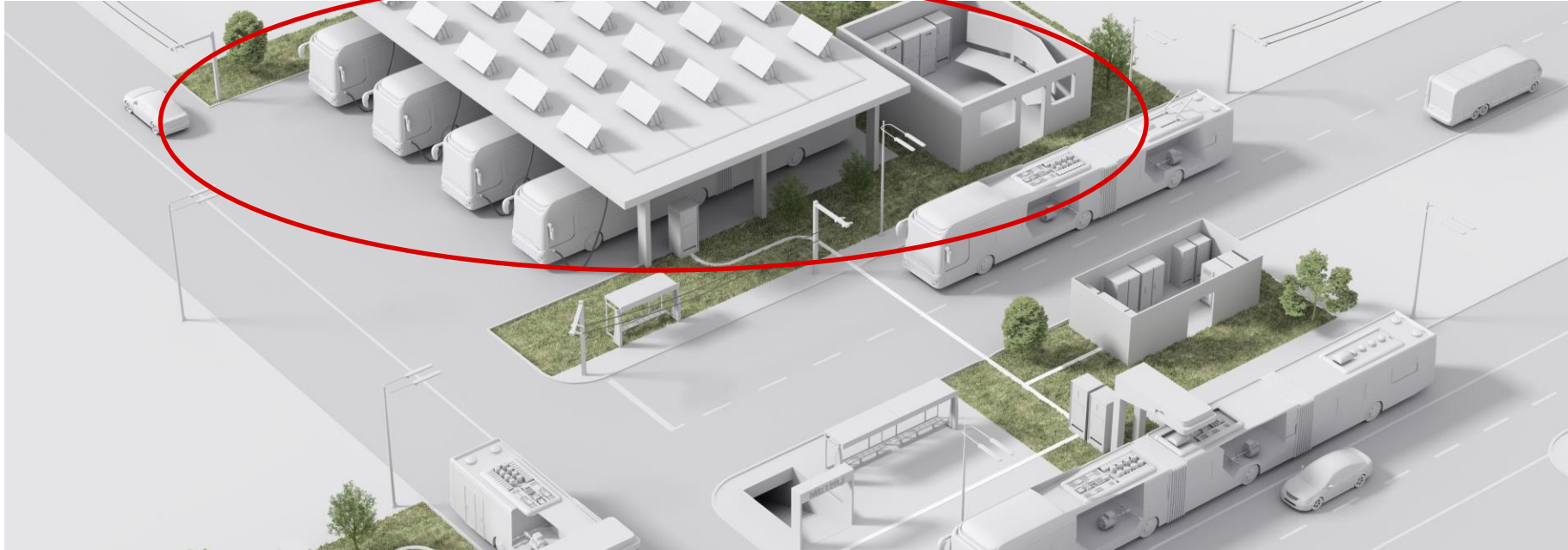
Opportunity and Depot charging

Opportunity charging On street		Overnight charging Depot charging	
Overhead charging with pantograph		Cable connector charging	
Charging standard: OppCharge 		Charging standard: CCS  	
Quickest charge, on-demand, longer routes		Off-peak, load-friendly, wake-up/warm up	
 150 kW: HVC 150P  300kW: HVC 300P  450kW: HVC 450P 		 50-150 kW Power converters at distance at convenient location Compact charge box with cable close to bus parking area	
← Connected Services → Online 24/7/365, remote NOC monitoring, software upgrades; statistics, remote diagnostics and 1st line support			

Electric bus charging landscape



Electric bus charging landscape

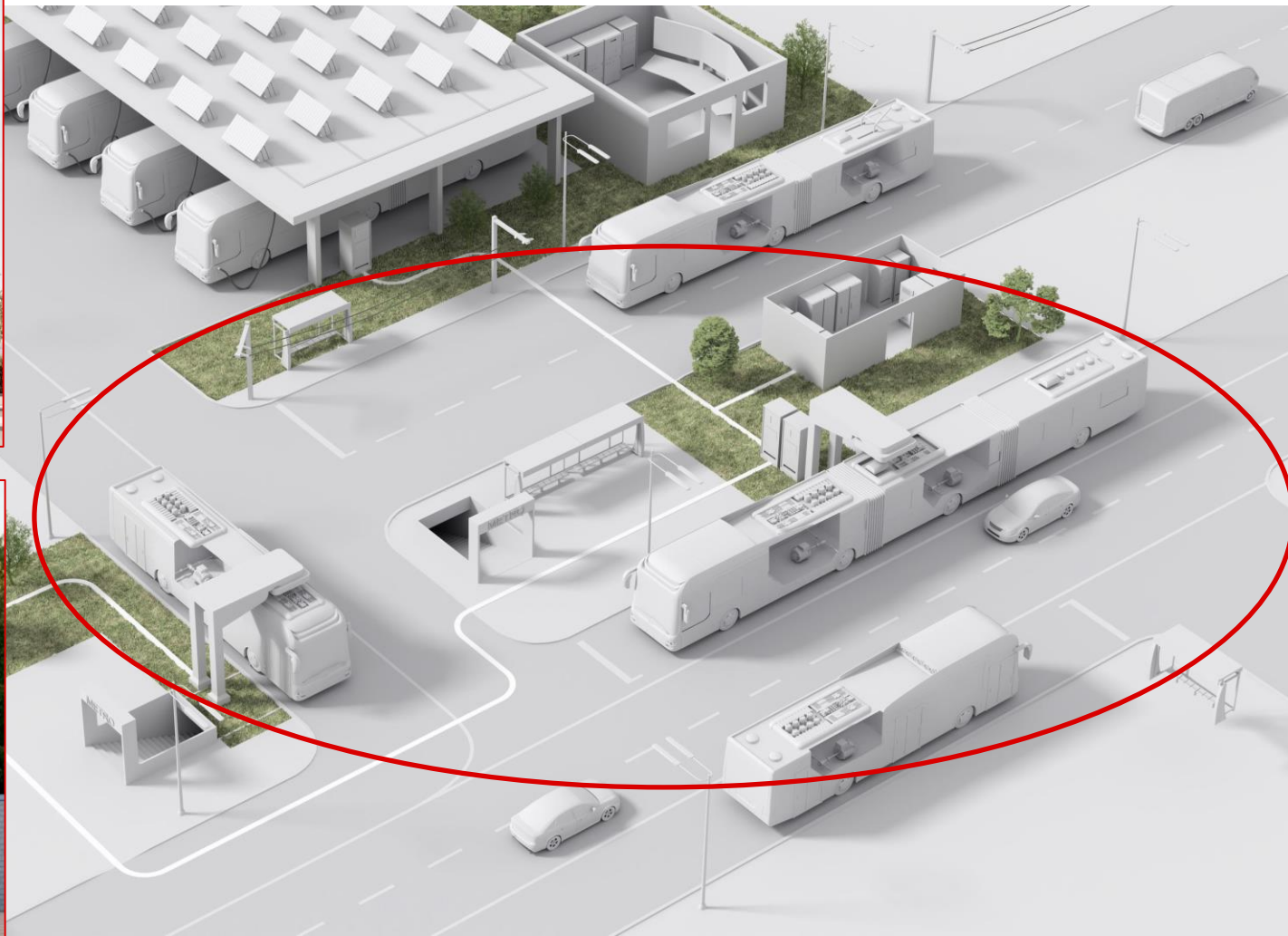


Electric bus charging landscape

Pantograph Down



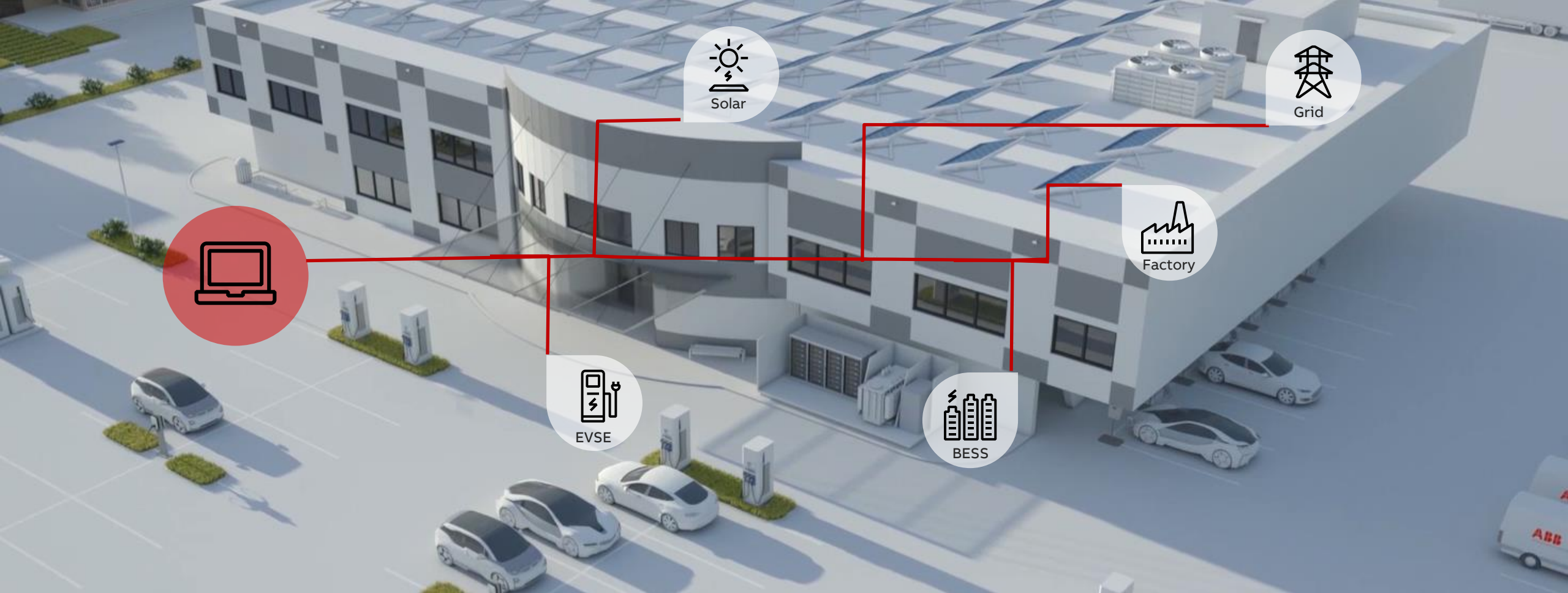
Pantograph Up



Electric bus charging solutions

A full portfolio to support the unique requirements of each commercial and industrial fleet

Depot/overnight charging systems		(Depot/overnight and) En-route opportunity charging systems	
Connector	Pantograph-Up	Pantograph-Down	
25 - 150 kW	150 - 600 kW	150 – 600 kW	
2 – 10 h charging time		0,5 – 2 h charging time	
5 – 20 min charging time			
 Optionally sequential			
			



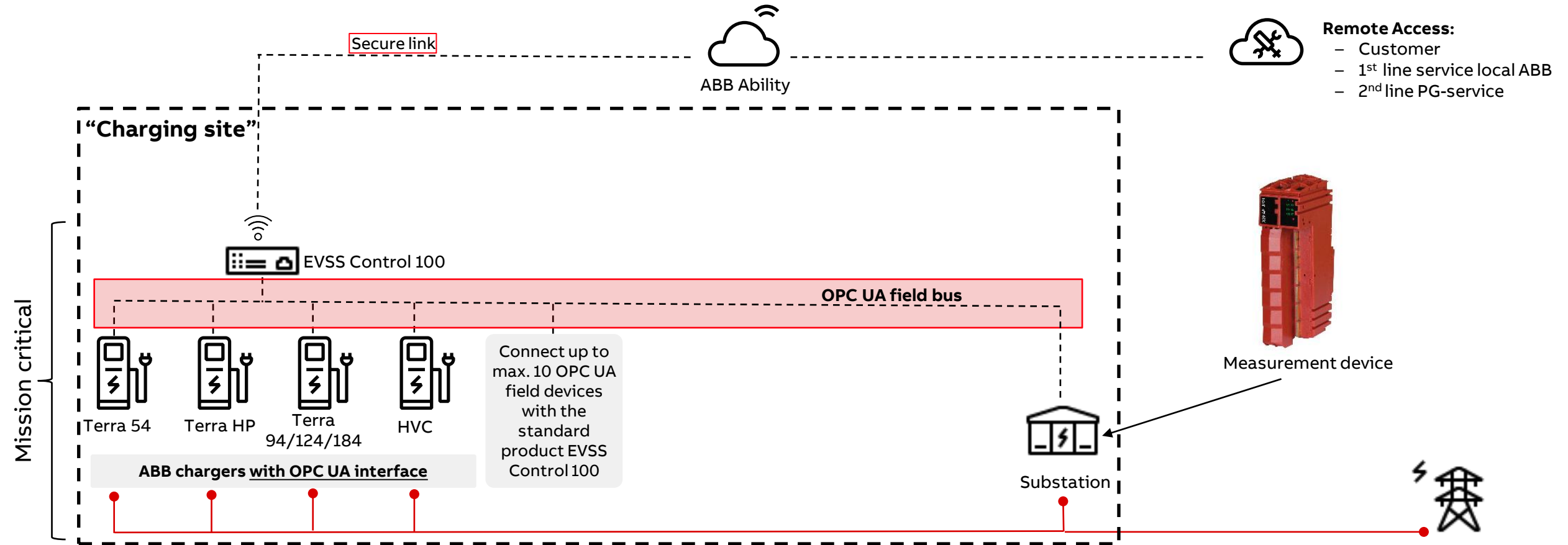
EVSS Control and energy management services

EV Site Solutions



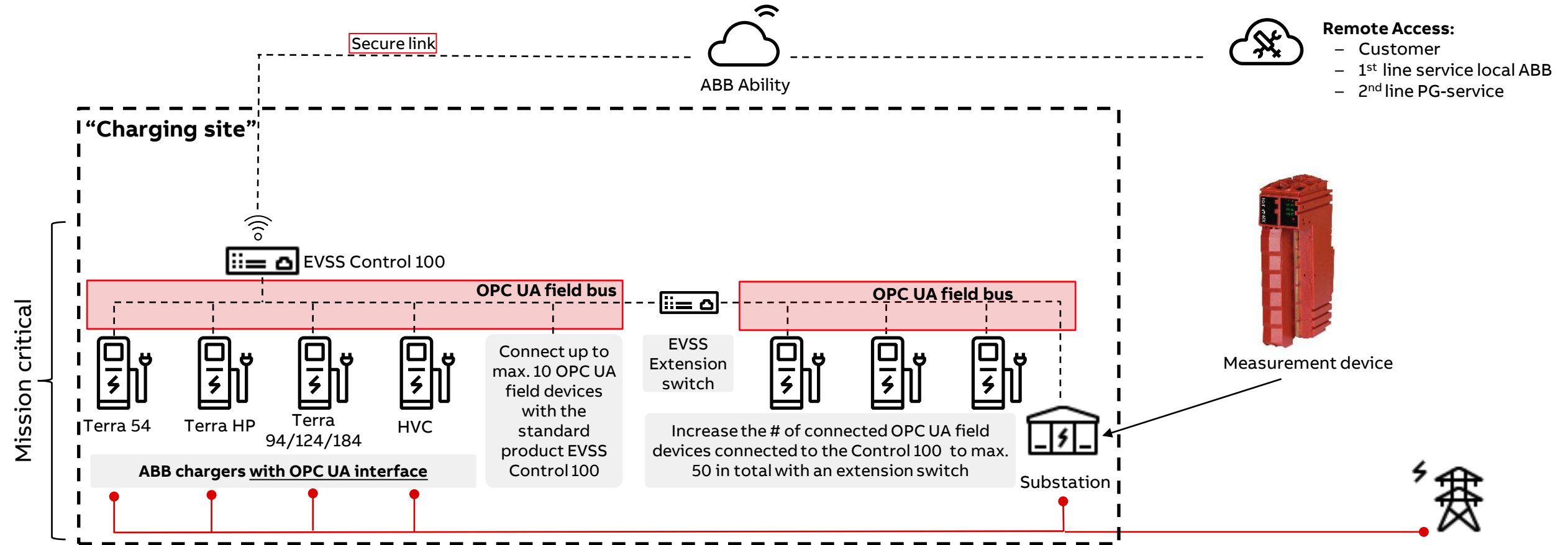
Onsite load management

EVSS Control 100



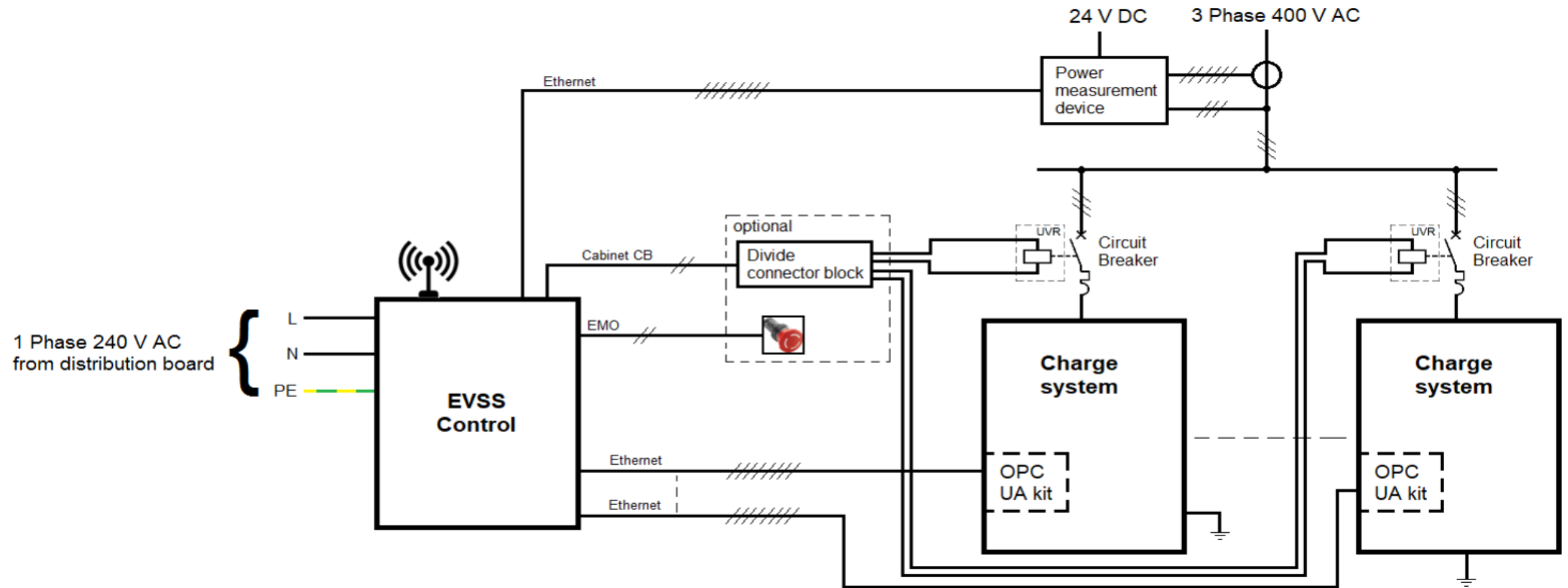
Onsite load management

EVSS Control 100



Onsite load management

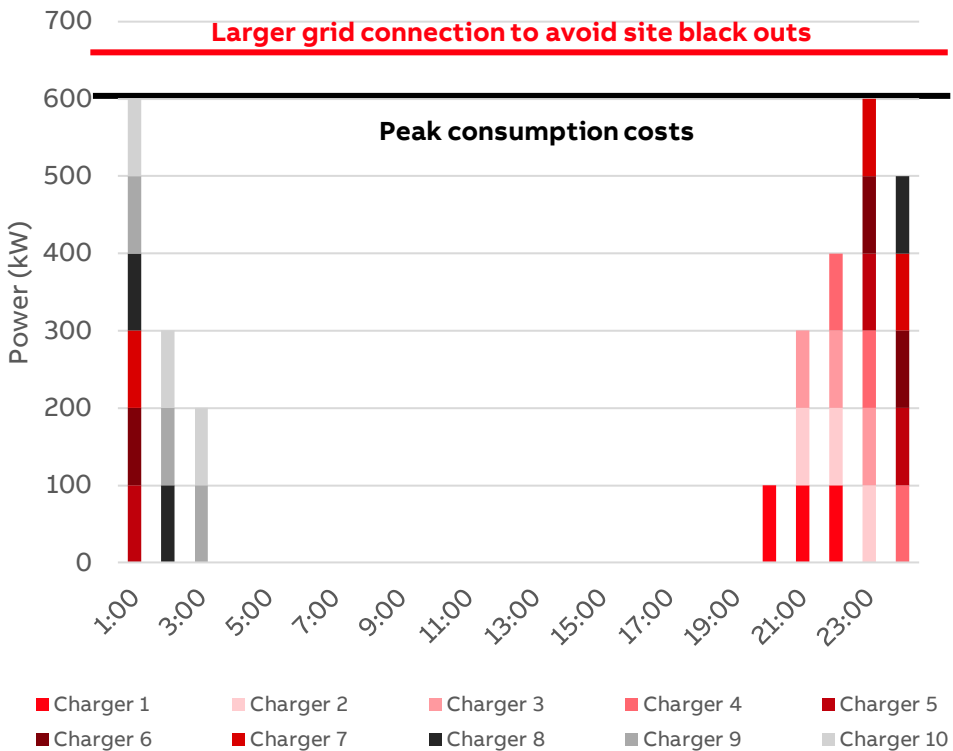
EVSS Control 100



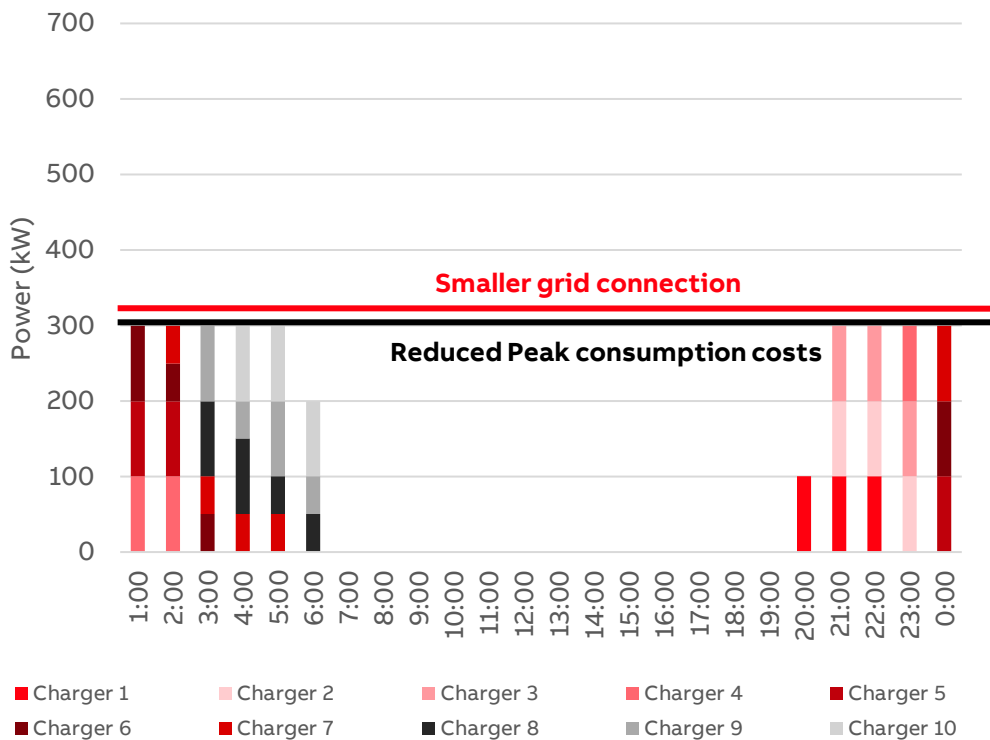
Why energy management is important?

Business case example: 10 Buses, 300kWh Battery each, max 100kW Charging, 10 Chargers

Without EVSS Control 100



With EVSS Control 100



Cost reductions
CAPEX + OPEX

Increased uptime

Faster project implementation

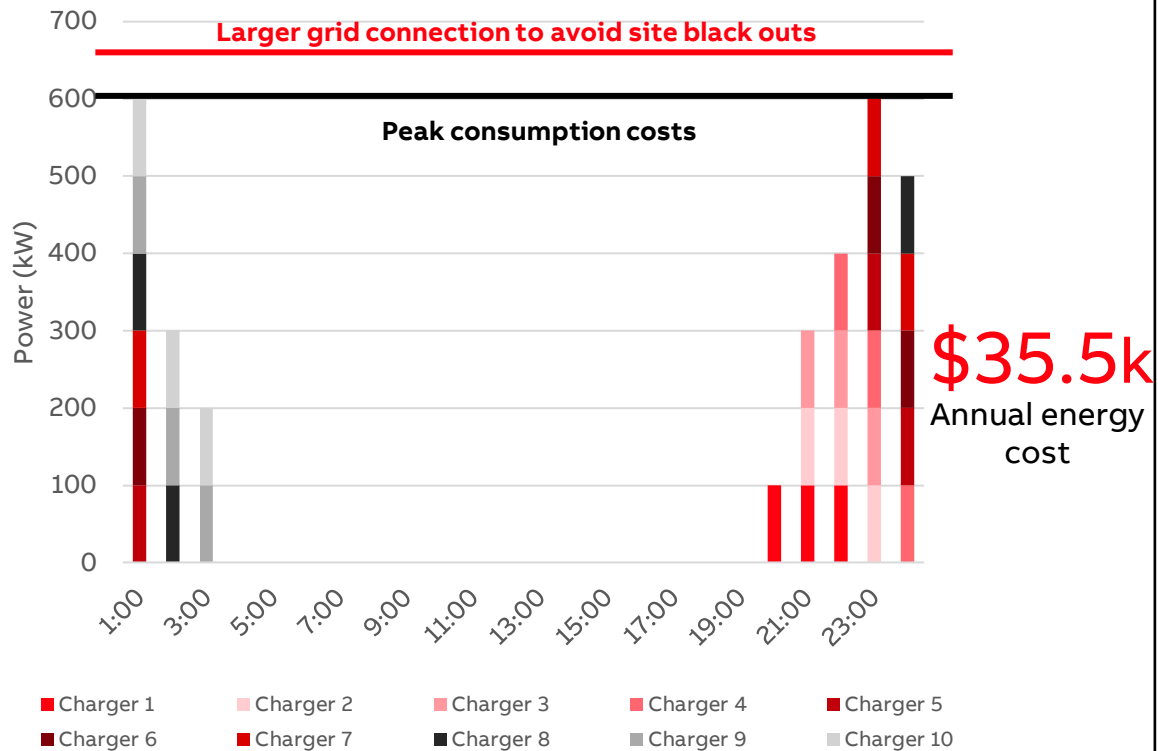
* Peak demand rates incurred when exceeded
** Overload of the system, protection devices will trip



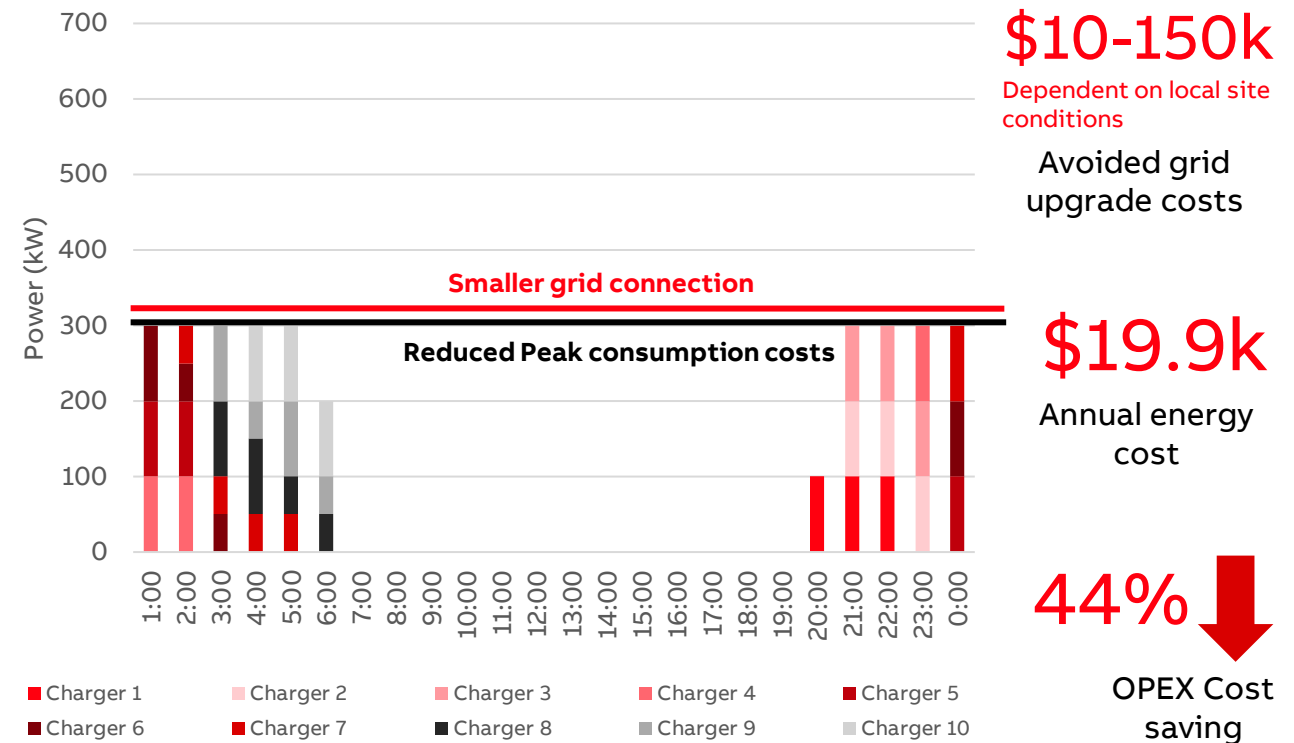
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Without EVSS Control 100



With EVSS Control 100

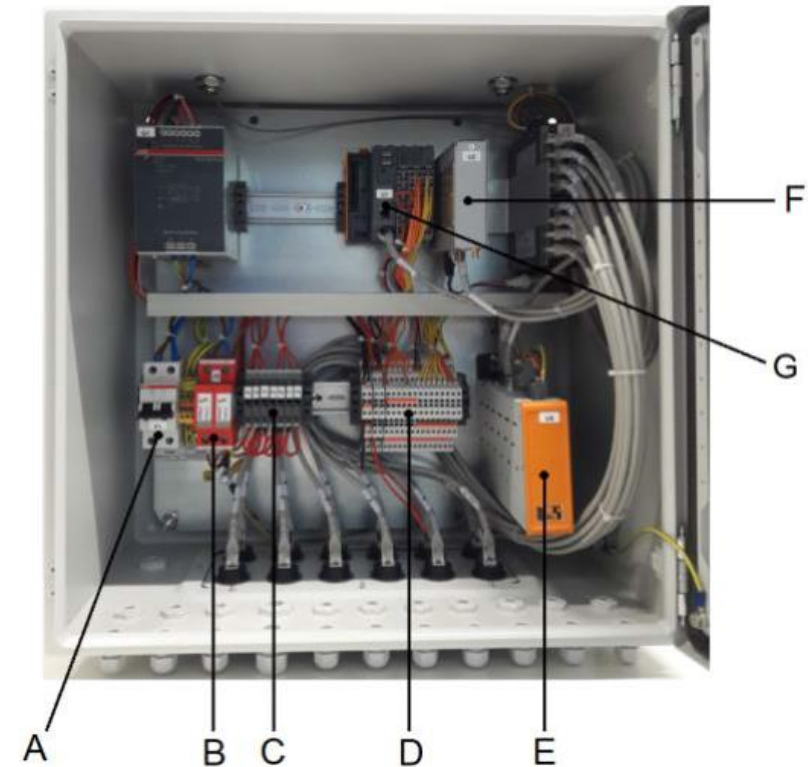


EVSS Control 100

Inside view of the EVSS Control

EVSS components

- A: 240 V AC Power connection
- B: Over Voltage Protection (OVP)
- C: Fuse holders (including fuse)
- D: Connector terminals
- E: Industrial PC
- F: 4G Modem
- G: Master controller (PLC)



EVSS Control 100 – Algorithms explained

EVSS Control 100 - Load Management Algorithms

Load Management Algorithms

Equal Share

1. First EV to have an active charge session will have full power until another EV starts charging.
2. When a second EV starts charging the site capacity is equally shared between the active chargers. Example:
 1. 2 chargers: both receive 50% of available power;
 2. 3 chargers: both receive 33% of available power;
 3. 4 chargers: both receive 25% of available power;
 4. Etc.

Default budget: used when communication is lost between charger and EVSS Control.

First In First Out

1. Every charger has a minimum default budget to always allow a minimum budget for charging. The remaining capacity is then assigned as per FIFO logic.
2. First EV to have an active charge session will have full power until charging is stopped by user/vehicle.
3. Second EV to start charging will get a reduced charging budget, which will increase as soon as the first EV has finished charging.

Minimum budget: configuration for every outlet of a charger.

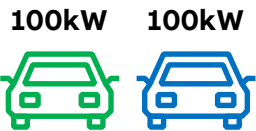
Main Guideline: total site charging power does not exceed available site power

How can EV chargers be prioritized?

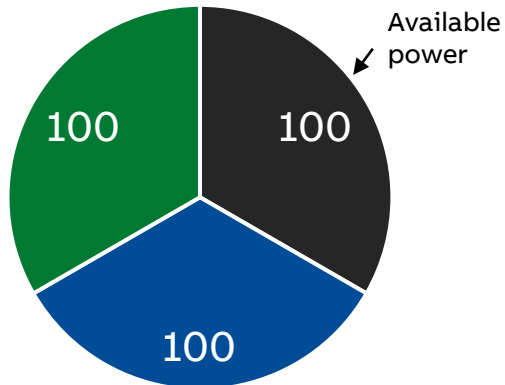
Equal share

7:00

Charging power needs:

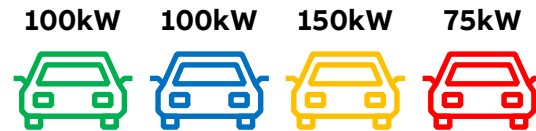


Charging power delivered:

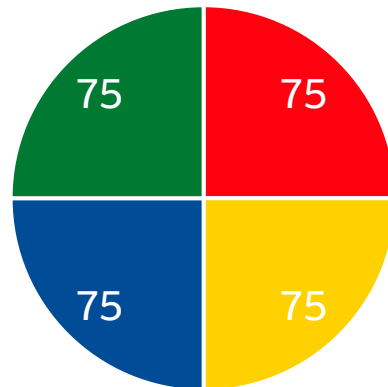


7:05

Charging power needs:

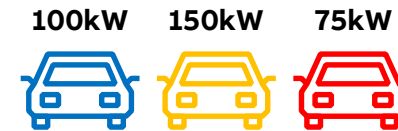


Charging power delivered:

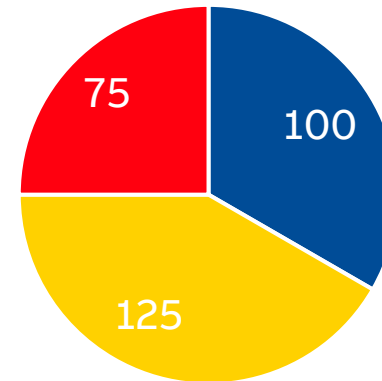


7:10

Charging power needs:

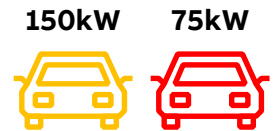


Charging power delivered:

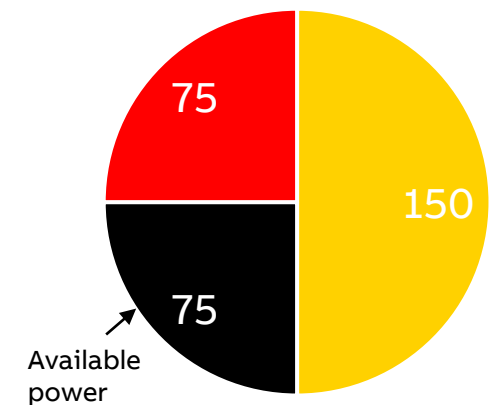


7:15

Charging power needs:



Charging power delivered:

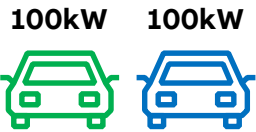


How can EV chargers be prioritized?

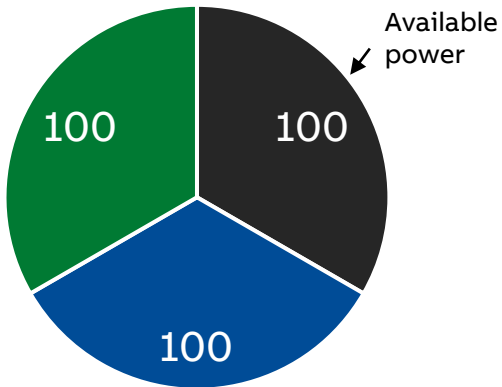
First in, first out (FIFO)

7:00

Charging power needs:

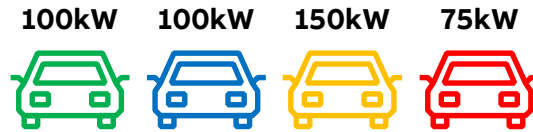


Charging power delivered:

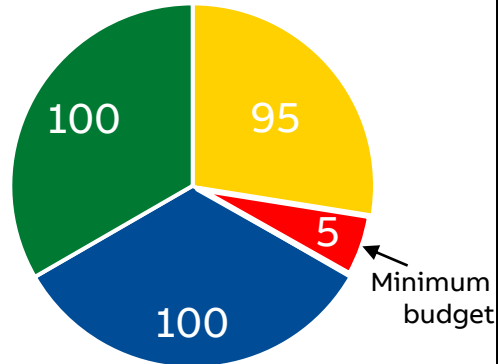


7:05

Charging power needs:

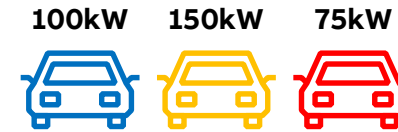


Charging power delivered:

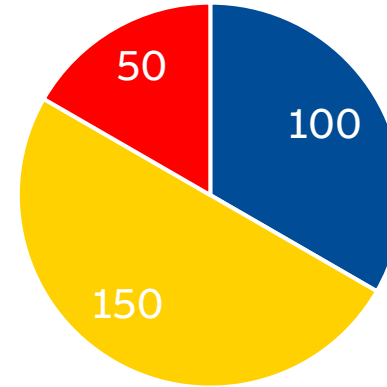


7:10

Charging power needs:

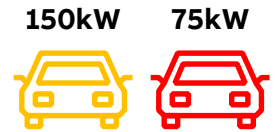


Charging power delivered:



7:15

Charging power needs:



Charging power delivered:

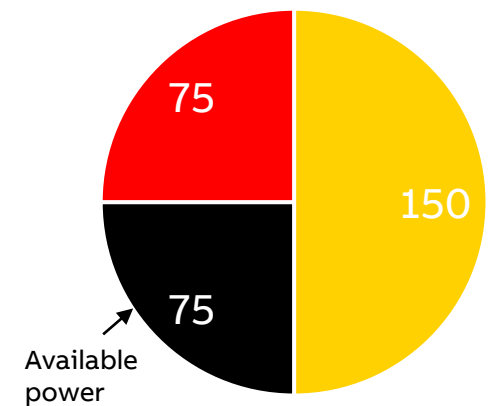


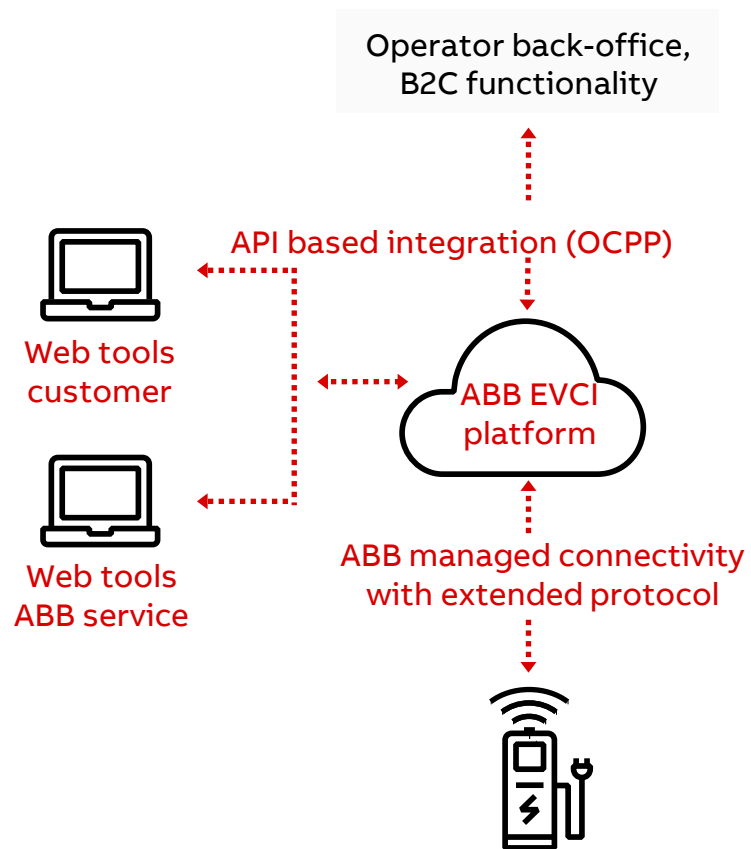


ABB EV Infrastructure

Cloud connectivity of EV chargers



ABB Ability™ Connected Services



Reliable 24/7/365 connectivity is fundamental for a commercial operation of a network of chargers



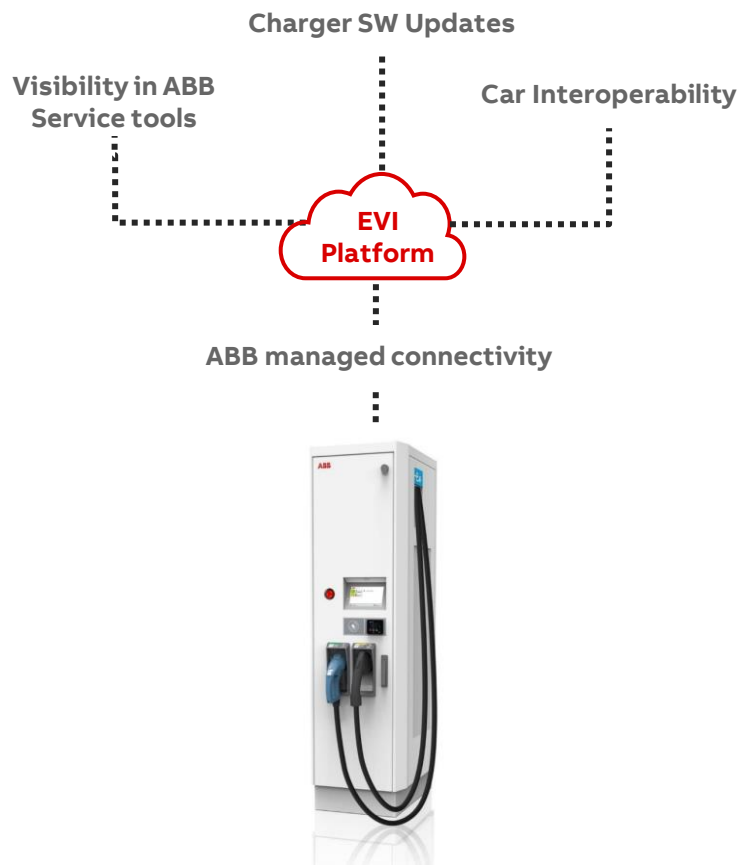
Online 24/7/365, remote NOC monitoring, software upgrades

Web Tools: access control via RFID/PIN, payment enablement via RFID/apps, statistics, remote diagnostics and 1st line support

Custom APIs, OCPP Integrations, D/R API, payment terminal interface

ABB Ability™ Connected Services

Reliable 24/7 connectivity is fundamental for a commercial operation of a network of chargers!



Benefits

- Future proof infrastructure with maximum **interoperability** with latest EV models
- Optimized **diagnostic** process, reducing time to repair and minimizing need for site visits
- Reliable & cost effective way to **connect** charger to the internet

Main features

- Internet connection via GSM including SIM card and data transfer
- Enables all connected services such as web tools and APIs
- Remote charging protocol updates
- Remote charger SW update
- Visibility in ABB remote service tools giving real time data to local and global service teams
- 24/7 connectivity monitoring by ABBs global Network Operation Center

Note

- Charger Connect is the foundation for all service level agreements

ABB Ability™ Connected Services

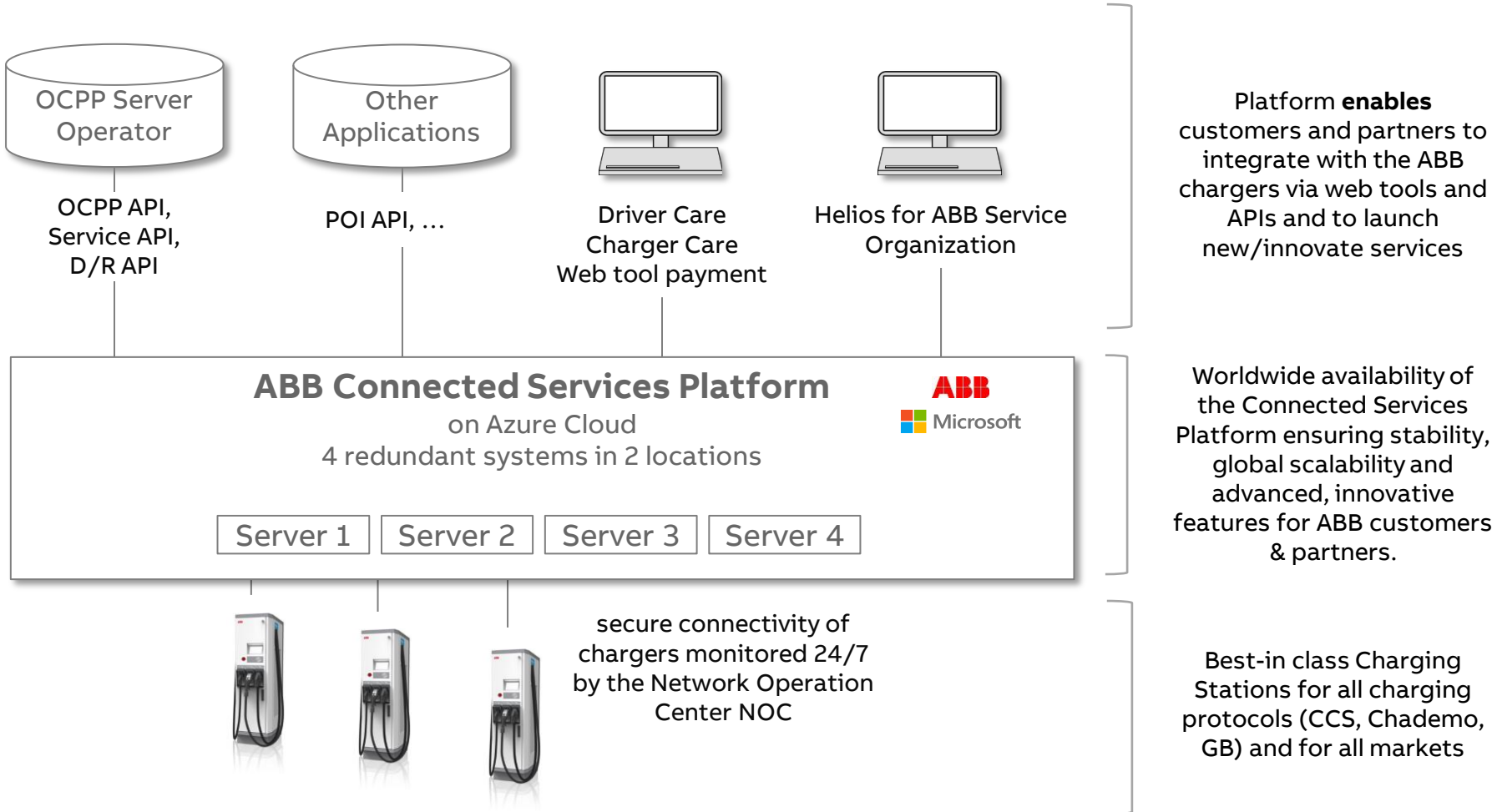




ABB V2G – Vehicle to Grid

The next revolution in energy trading





ABB EV Chargers

V2G – Vehicle to Grid

Benefits of Vehicle-to-Grid

Utilities:

V2G supports in balancing the grid and enables utilities to become less dependent from fossil fuel power plants.

EV driver:

V2G have a clear incentive to encourage consumers to take part. Consumers will be rewarded if they make their battery available to the utility to be used for V2G.

EV fleet operators:

Fleet owners can make money with their fleet by putting power back to the grid. While the stored energy can be used in case of a power outage, continuous operation is guaranteed.

Commercial buildings/homes:

Electricity consumption spikes in the building can be balanced with the help of electric cars and no extra energy needs to be consumed from the grid.



ABB EV Chargers make the world great again

ABB ranked #8 in Fortune Magazine

Fortune Magazine recently ranked ABB #8

ABB has been named #8 in Fortune magazine's "Change the World" rankings for the company's efforts to speed up adoption of clean-energy electric transportation for the advances it has made in e-mobility and electric vehicle (EV) charging.





ABB EV Infrastructure

ABB EV Charger in Egypt



ABB EV Chargers now installed in Egypt

ABB and REVOLTA Egypt cooperation

ABB the first company to offer DC fast chargers in Egypt

ABB signs a new contract to deliver DC fast chargers for electric vehicles (EV) in Egypt to help protect the environment and increase EV adoption.

ABB and REVOLTA secured a deal to supply a number of Terra 53 multi-standard DC fast chargers for use across the country at Wataneya stations and NPCO (National Petroleum Company).

ABB entered the EV-charging market back in 2010, and today has a fast growing global installed base of 8,000 ABB DC chargers, including high power chargers up to 350 kW, installed across 68 countries, more chargers than any other manufacturer.



ABB EV Chargers projects

ABB the first company to offer DC fast chargers in Egypt with REVOLTA Egypt

In Ain Sokhna.



In Alexandria-Cairo Desert road



In Cairo-Alexandria Desert road



In Hurghada



In Katamya-Ras Galala Highway



In Suez



ABB EV Chargers projects

ABB the first company to offer DC fast chargers in Egypt with REVOLTA Egypt

In Al-Tour South of Sinai



In Mansoura



In North coast (Marina 7)



In Ras Ghareb



In Ras Sedr



In Sahl Hasheesh



ABB EV Chargers projects

ABB the first company to offer DC fast chargers in Egypt with REVOLTA Egypt

In Sheraton Heliopolis



In Zafarana House



ABB EV Chargers projects

ABB the first company to offer DC fast chargers in Egypt

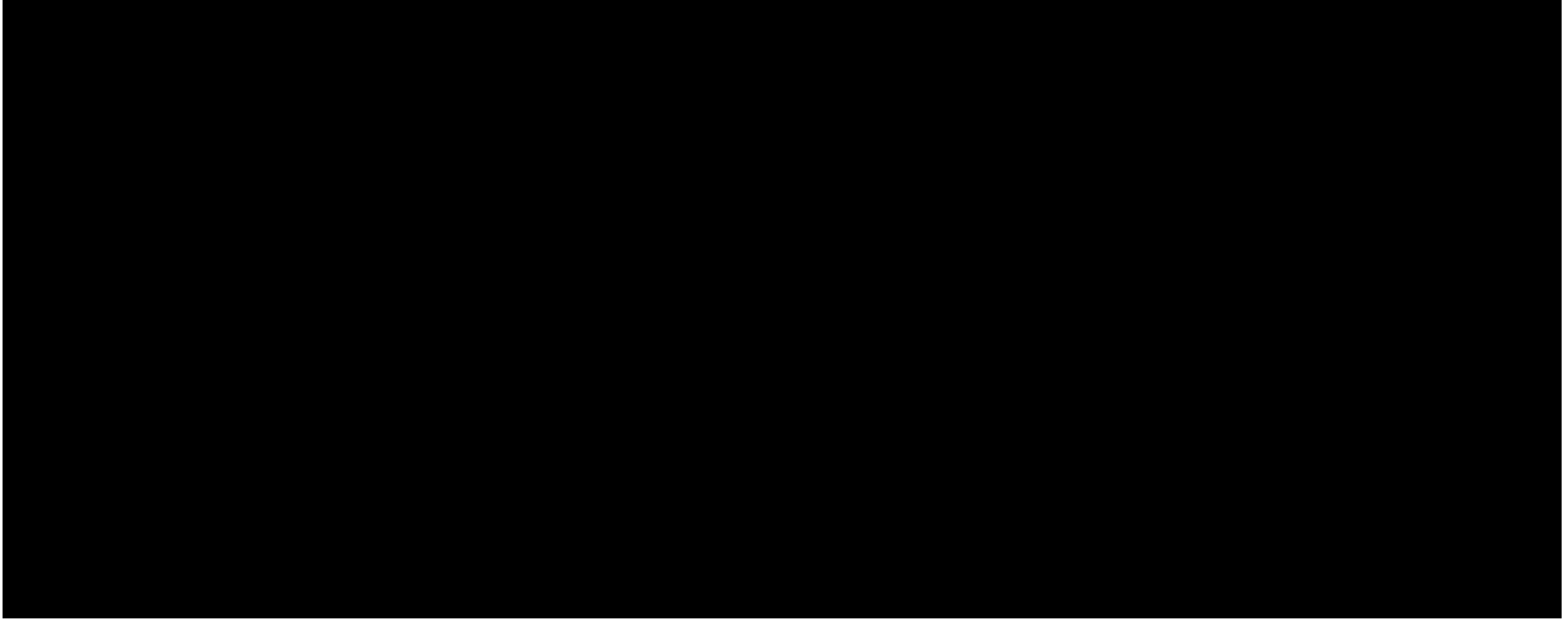


ABB EV Chargers projects

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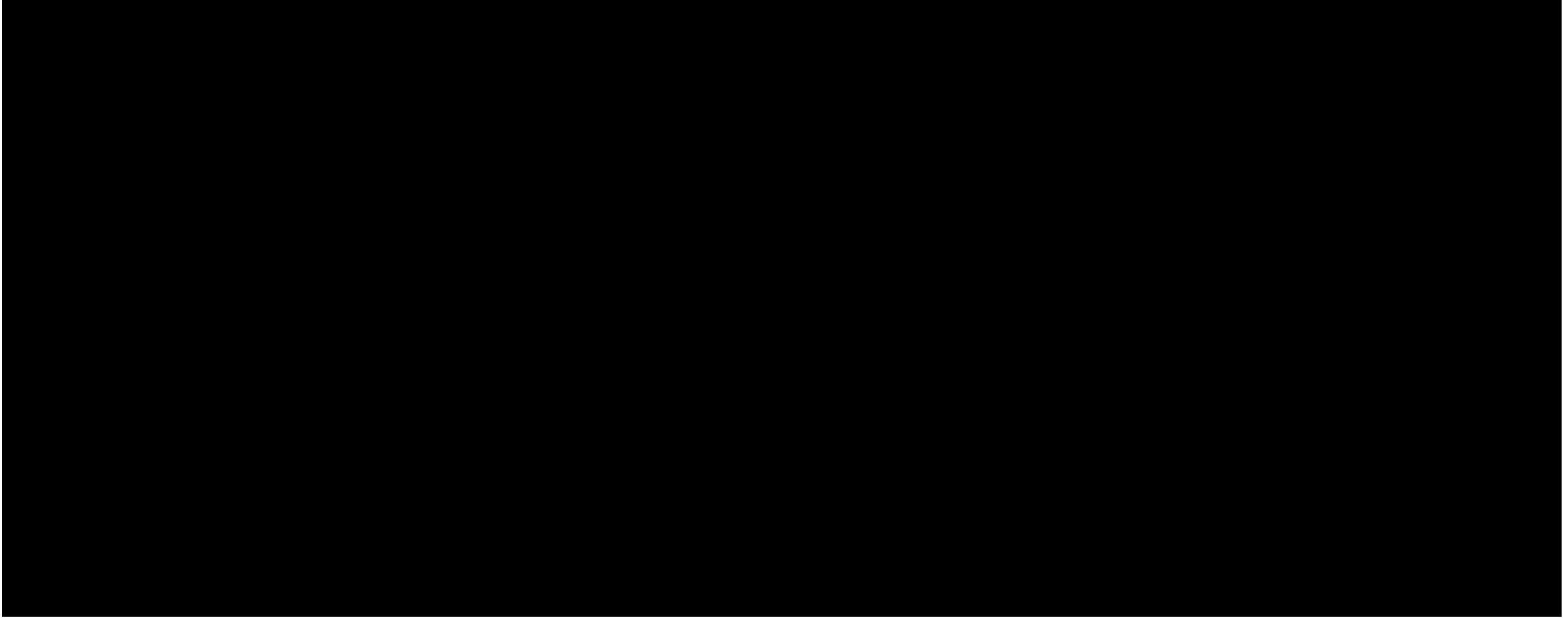


ABB EV online Tool

EV charger selector

EV charger selector

[EV Charger selector](#) is a quick tool for selecting the optimum EV Charger that best fits your application based on

- Location type
- Parking Time

Browse more on [ABB Electric vehicle charging infrastructure Solutions](#)

Product	Solution	Parking Time	Installation	Cost
Terra AC Wallbox 	Retail 	8 hours 	 Simple	\$
Terra DC Wallbox 	Retail 	< 2 hours 	 Moderate	\$ \$ \$
Terra 54 	Retail 	< 1 hour 	 Advanced	\$ \$ \$ \$



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