Hamilton Council, Waikato Regional Council

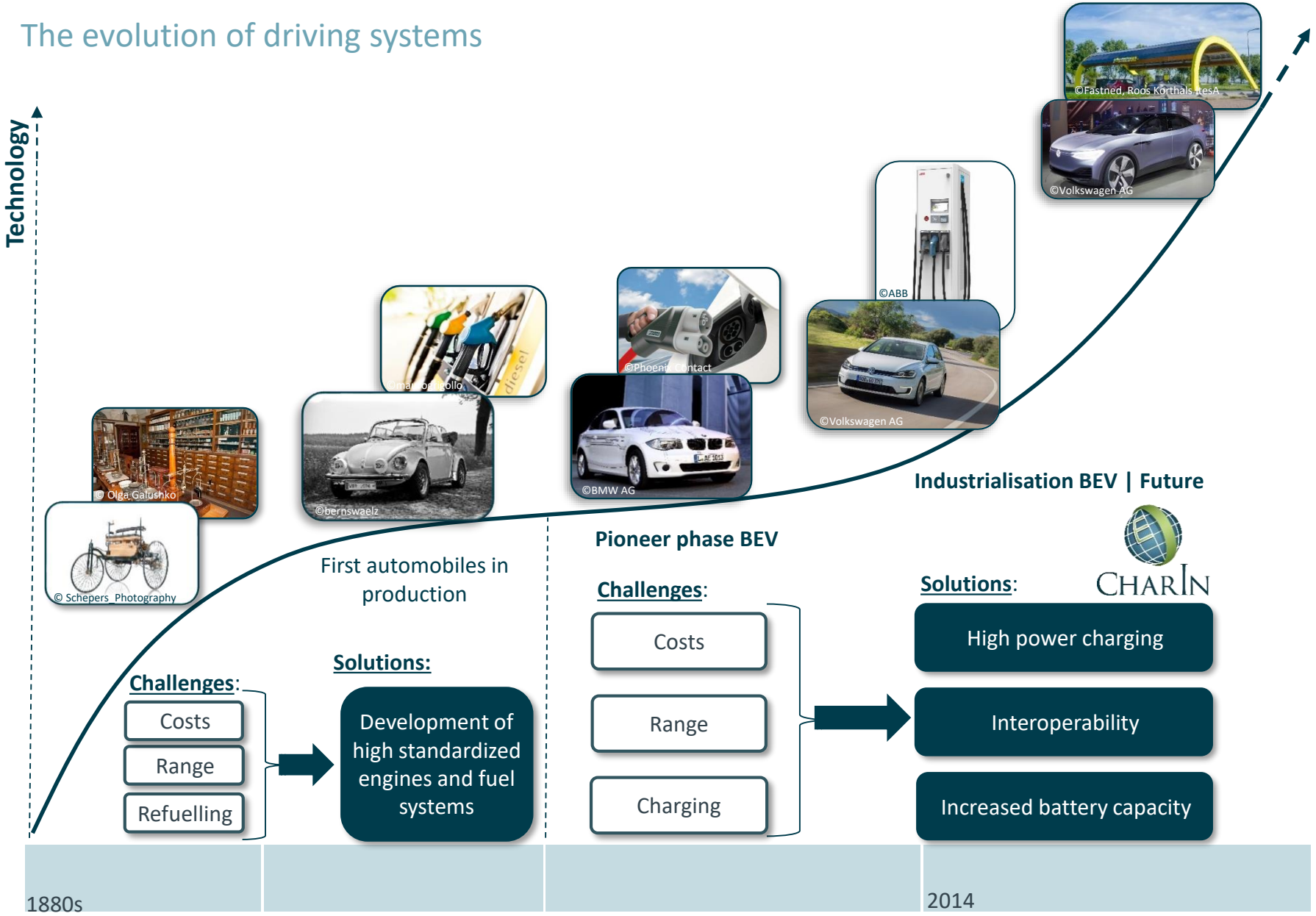
February 26 2020

ISO 15118 charging Standard

Interoperability by Connecting NZ Smart Cities, Smart Harbours

Where we are

The evolution of driving systems

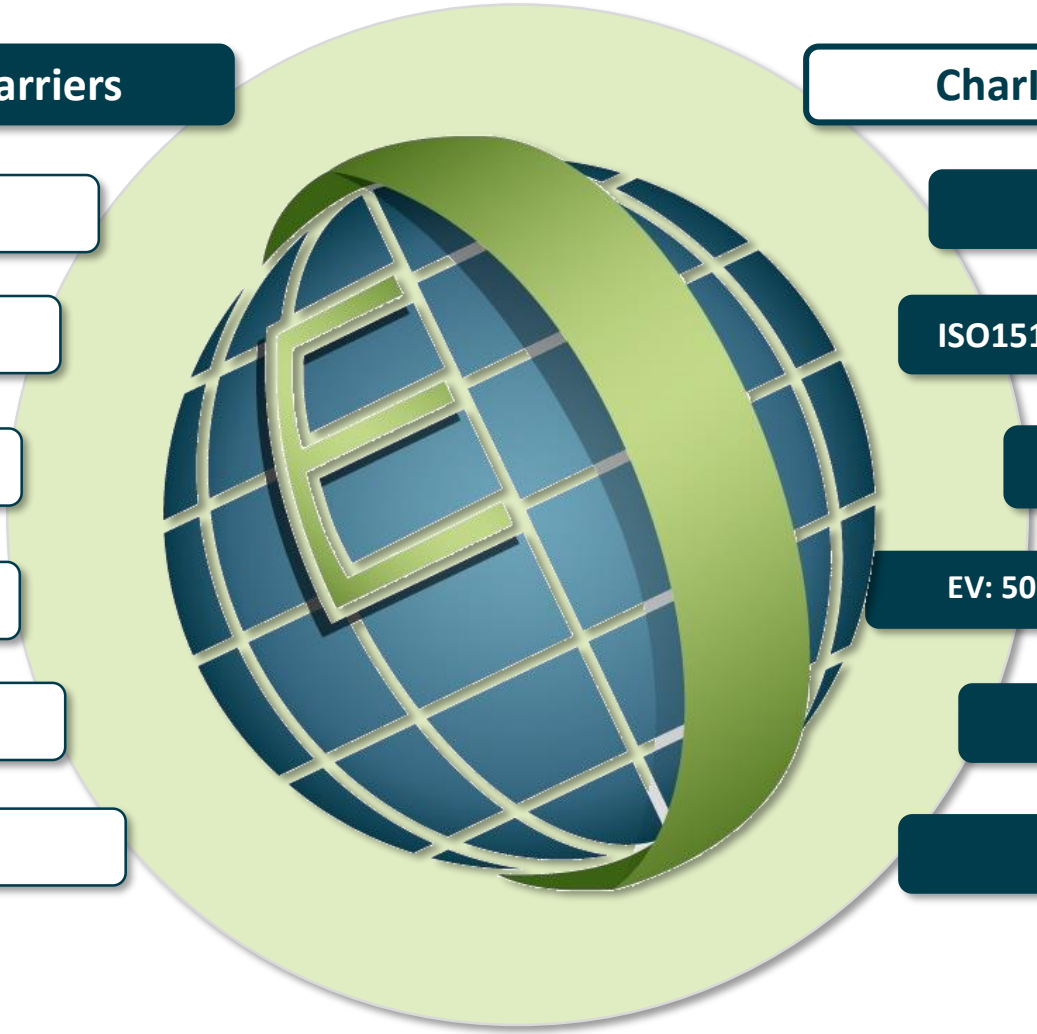


Vision

CharIN initiative solutions: CCSwith ISO 15118

Customers view | barriers

- Simplicity
- Safety
- Cost
- Reliability & Quality
- Power & Time
- Interoperability



CharIN initiative solution

- Single System: AC/DC
- ISO15118 standard for all use cases
- Long term invest protection
- EV: 500 kW E-Bus/truck>3 MW
- Interoperability
- Grid Management

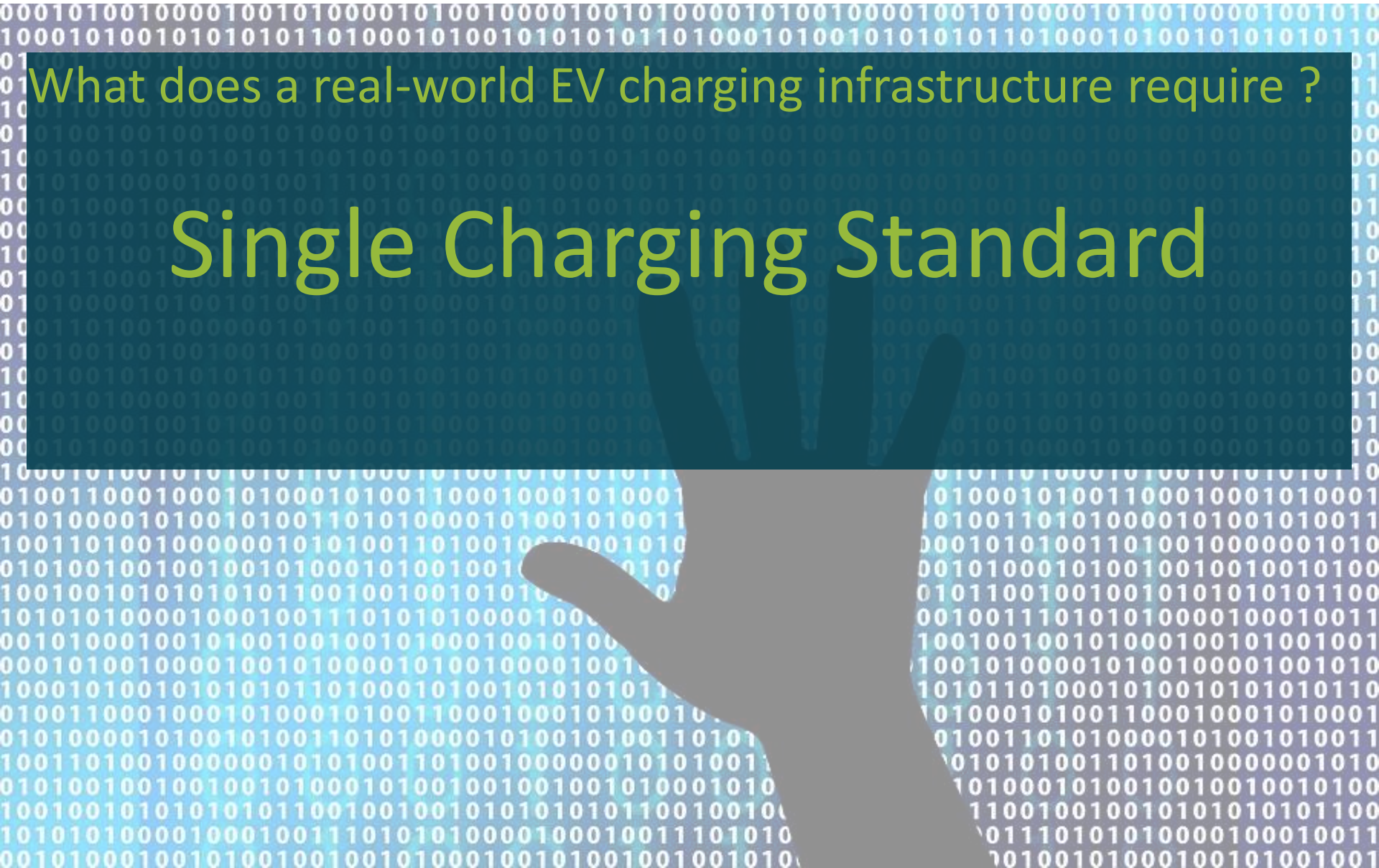
Customer perspective

CHARIN

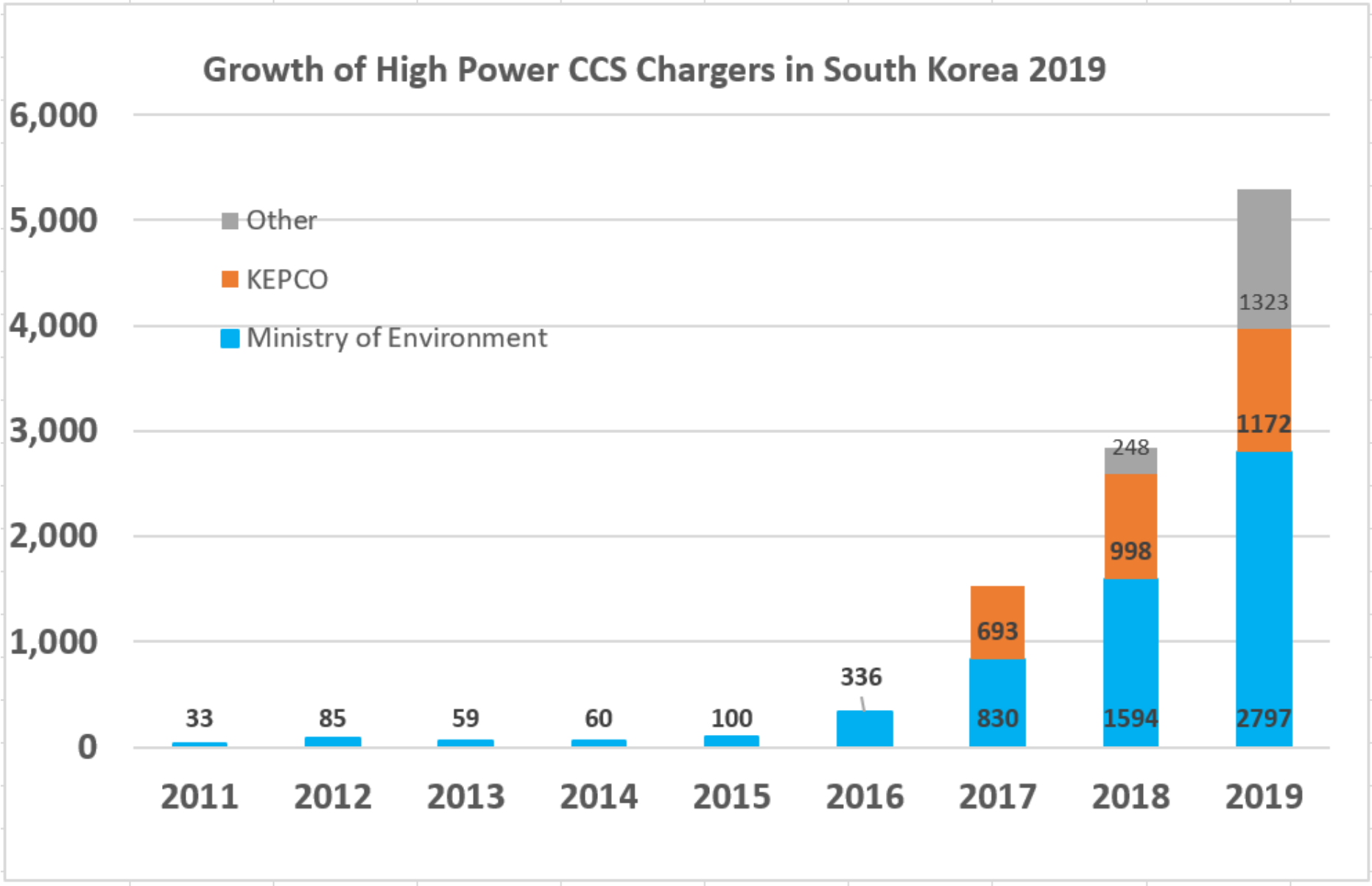
VISION
MISSION
ACTIVITIES

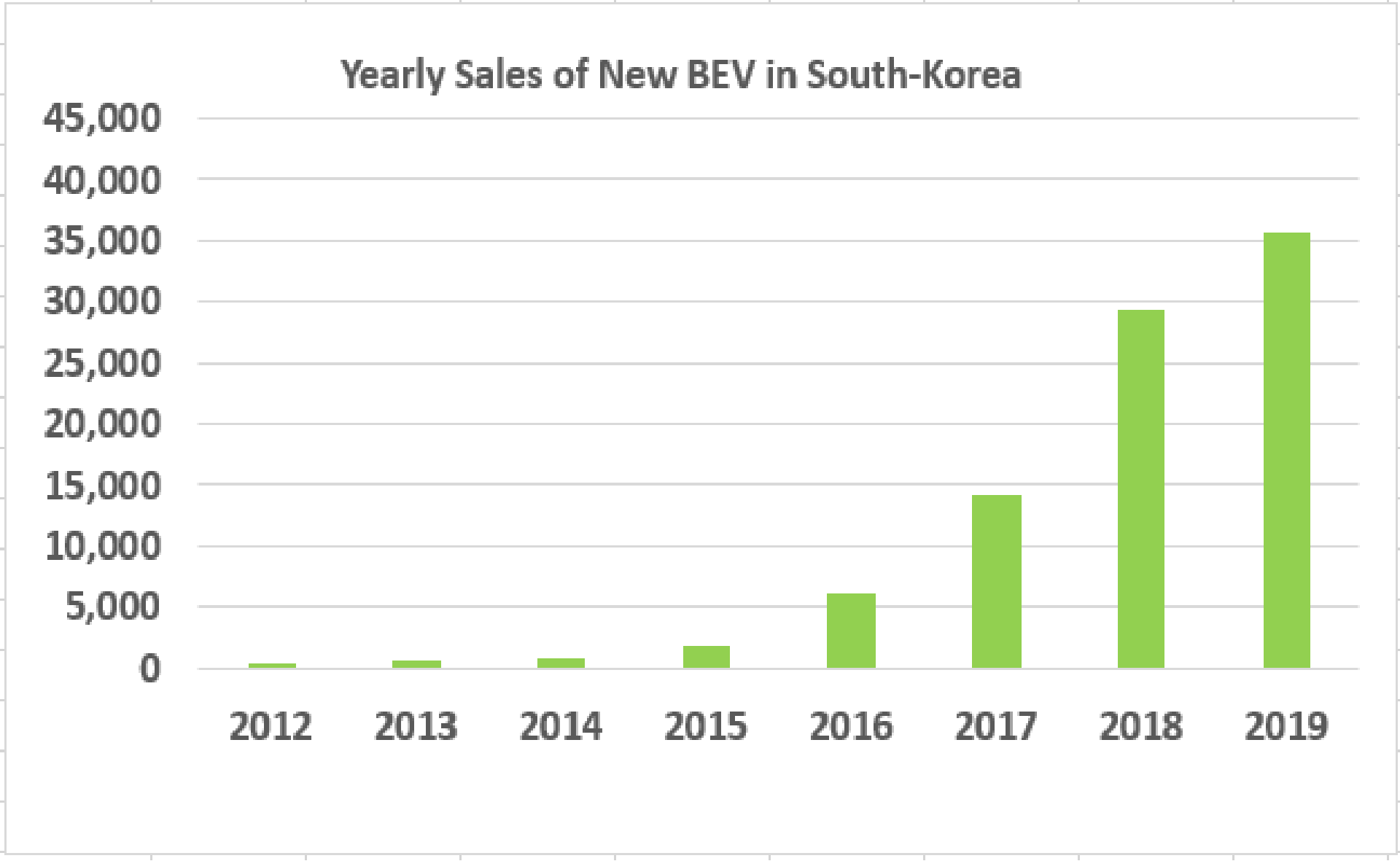
What does a real-world EV charging infrastructure require ?

Single Charging Standard



- Infrastructure build up: slow.
- Investment cost: high
- Maintenance cost: high
- EV sales: slow

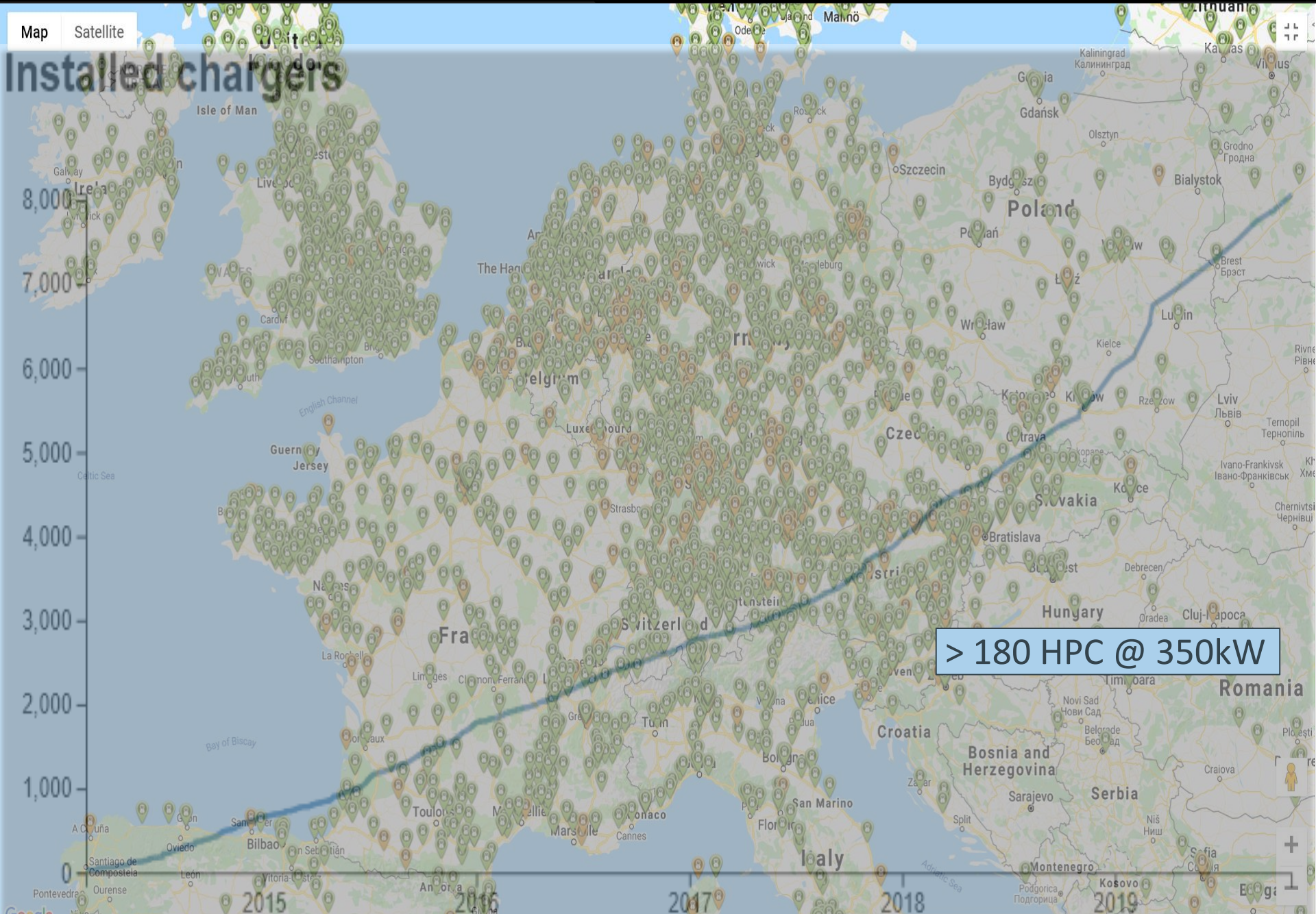

Growth of High Power CCS Chargers in South Korea 2019
6,000
5,000
4,000
3,000
2,000
1,000
0
Other
KEPCO
Ministry of Environment
33
85
59
60
100
336
693
830
248
998
1594
1323
1172
2797
2011
2012
2013
2014
2015
2016
2017
2018
2019


Yearly Sales of New BEV in South-Korea
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2012
2013
2014
2015
2016
2017
2018
2019

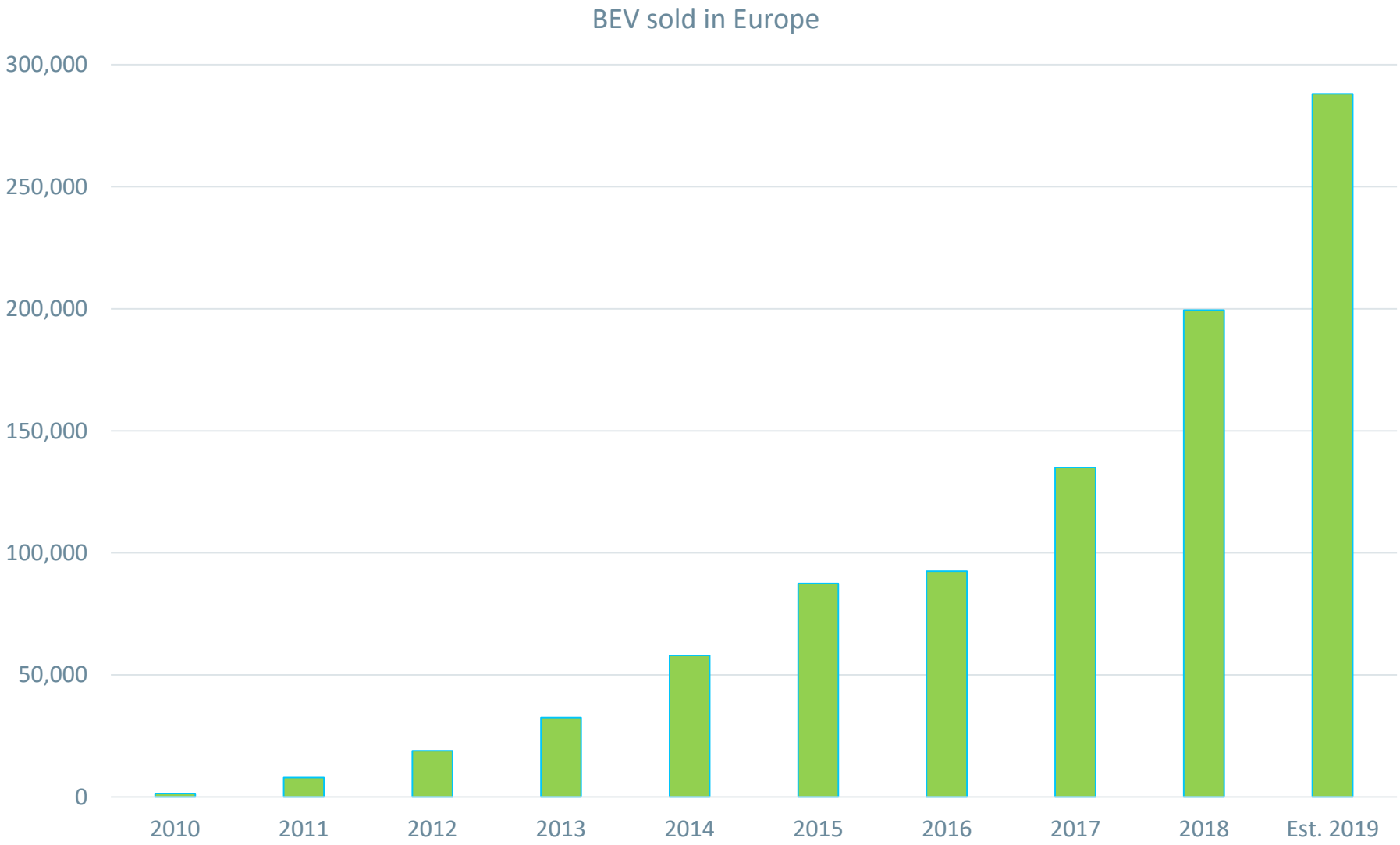
CCS Charge Map - Europe

DC Chargers 50 kW & above

8074



Evolution of yearly sales of new BEV in the EU



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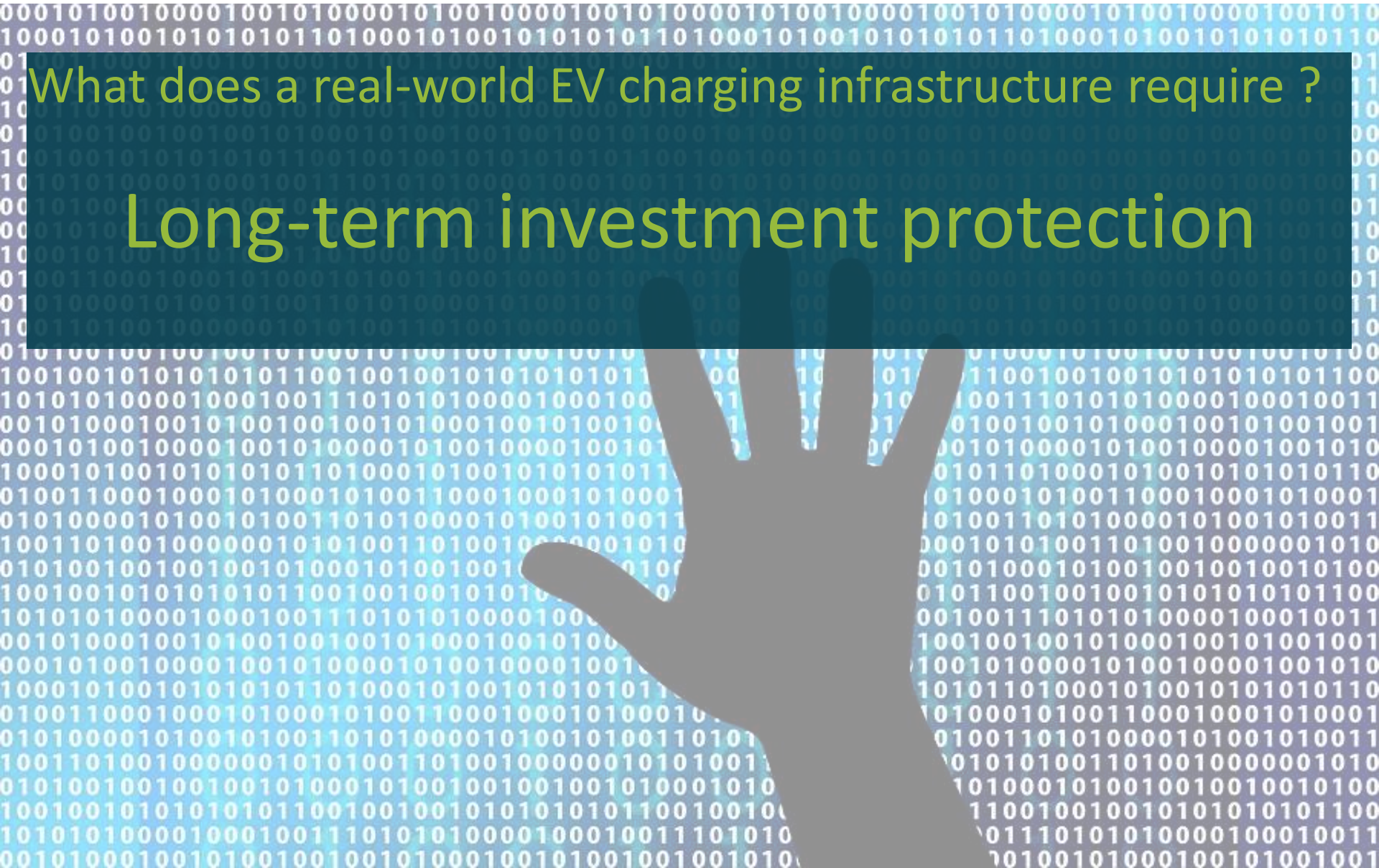
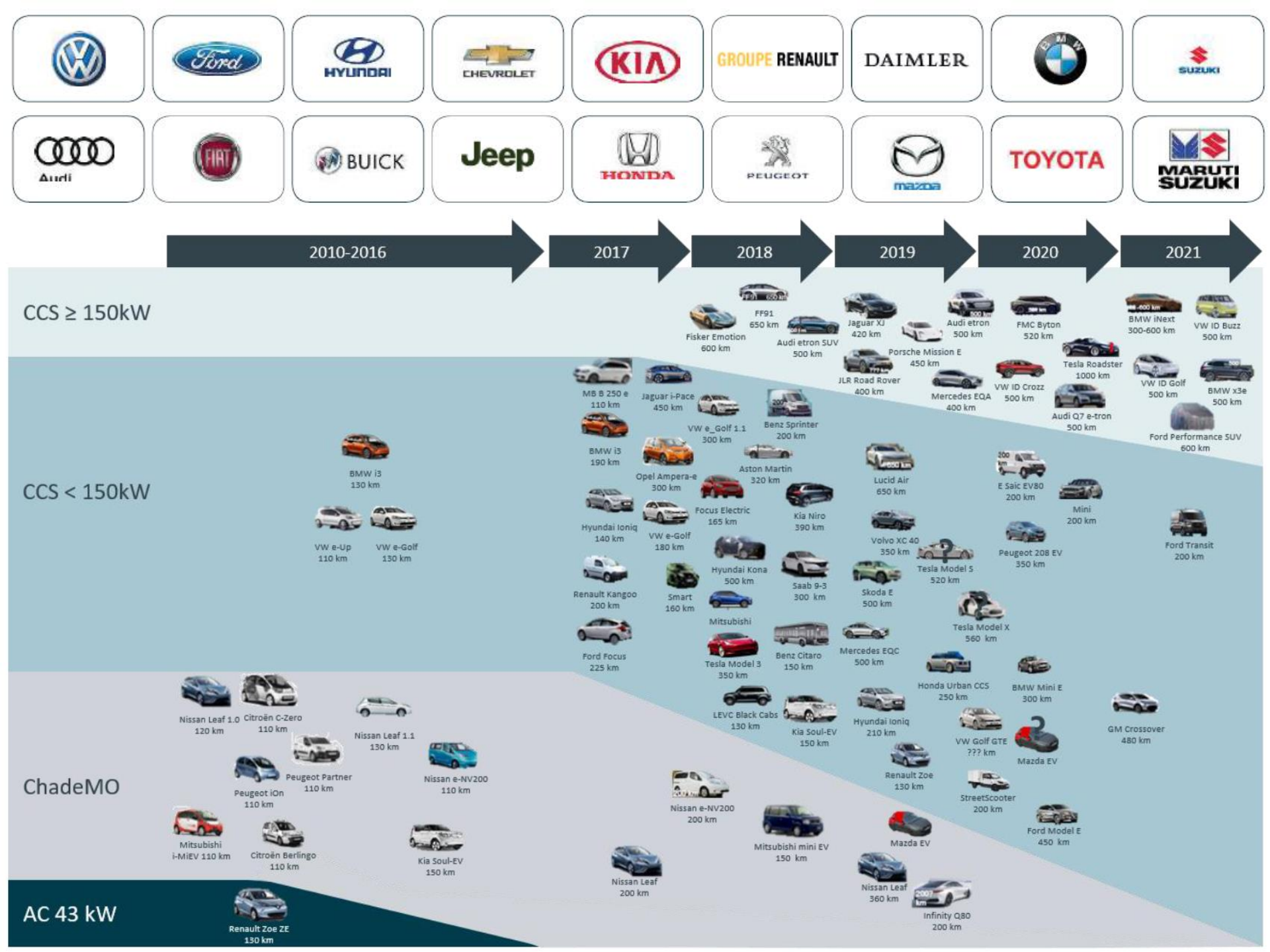
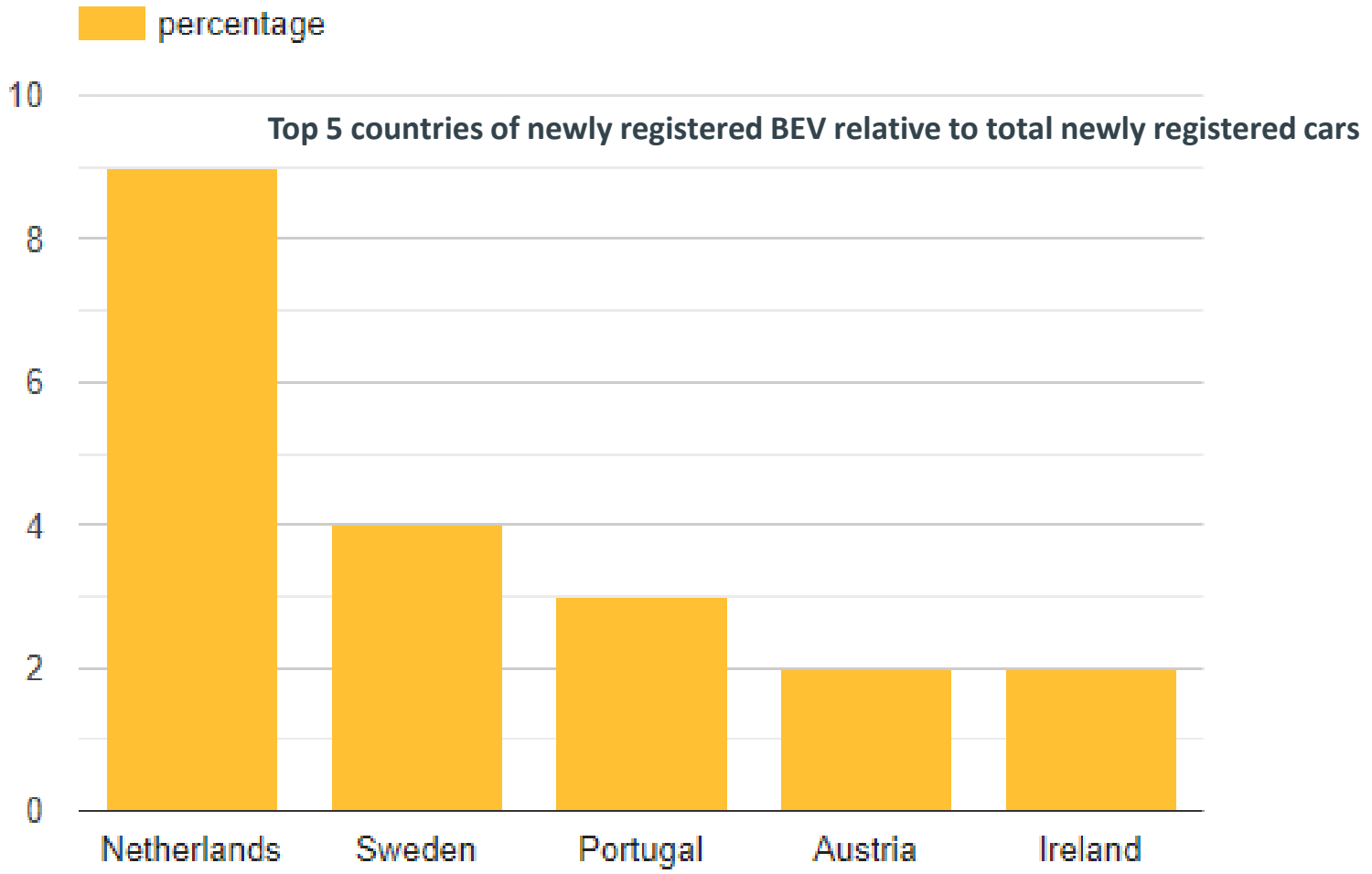
What does a real-world EV charging infrastructure require ?

Long-term investment protection




2010-2016
2017
2018
2019
2020
2021
CCS ≥ 150kW
CCS < 150kW
ChadeMO
AC 43 kW
FF91 650 km
Fisker Emotion 600 km
Audi etron SUV 500 km
Jaguar XJ 420 km
Audi etron 500 km
FMC Byton 520 km
BMW iNext 300-600 km
VW ID Buzz 500 km
Porsche Mission E 450 km
Tesla Roadster 1000 km
JLR Road Rover 400 km
Mercedes EQA 400 km
VW ID Crozz 500 km
VW ID Golf 500 km
BMW x3e 500 km
Audi Q7 e-tron 500 km
Ford Performance SUV 600 km
MB B 250 e 110 km
Jaguar i-Pace 450 km
VW e_Golf 1.1 300 km
Benz Sprinter 200 km
BMW i3 190 km
Opel Ampera-e 300 km
Aston Martin 320 km
Lucid Air 650 km
E Saic EV80 200 km
Mini 200 km
Hyundai Ioniq 140 km
VW e-Golf 180 km
Focus Electric 165 km
Kia Niro 390 km
Volvo XC 40 350 km
Peugeot 208 EV 350 km
Ford Transit 200 km
Hyundai Kona 500 km
Tesla Model S 520 km
Renault Kangoo 200 km
Smart 160 km
Saab 9-3 300 km
Skoda E 500 km
Mitsubishi
Tesla Model X 560 km
Ford Focus 225 km
Tesla Model 3 350 km
Benz Citaro 150 km
Mercedes EQC 500 km
Honda Urban CCS 250 km
BMW Mini E 300 km
LEVC Black Cabs 130 km
Kia Soul-EV 150 km
Hyundai Ioniq 210 km
GM Crossover 480 km
VW Golf GTE ??? km
Mazda EV
Renault Zoe 130 km
StreetScooter 200 km
Ford Model E 450 km
Nissan e-NV200 200 km
Mitsubishi mini EV 150 km
Mazda EV
Nissan Leaf 200 km
Nissan Leaf 360 km
Infinity Q80 200 km
BMW i3 130 km
VW e-Up 110 km
VW e-Golf 130 km
Nissan Leaf 1.0 120 km
Citroën C-Zero 110 km
Nissan Leaf 1.1 130 km
Peugeot Partner 110 km
Peugeot iOn 110 km
Nissan e-NV200 110 km
Mitsubishi i-MiEV 110 km
Citroën Berlingo 110 km
Kia Soul-EV 150 km
Renault Zoe ZE 130 km

Top 5 EU countries of newly registered BEV relative to total of newly registered cars in 2019



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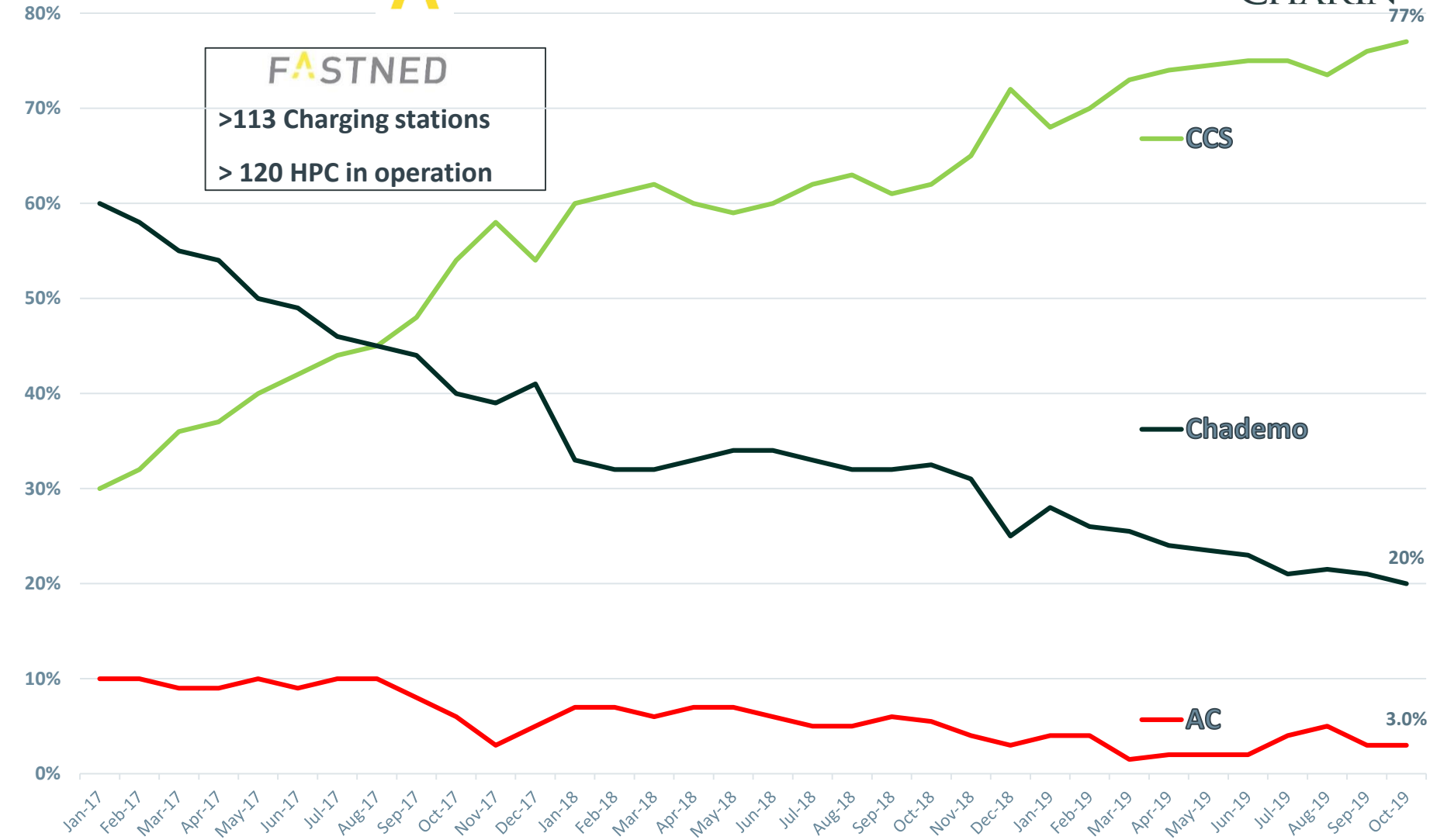
Multi-standard charger usage data over time




DC 콤보
DC 콤보
환경부
CHAEVI

E-busses

Public Transport: Battery size will define range & charging time

Importance in choice of the e-bus battery	
·How many passengers/ bus ?	Medium
·What is the distance of the route?	High
·How much time do we have to charge?	High
·How many buses?	Low
·What is the geography of the route?	High
·How many stops?	Medium
What is frequency of charging?	High
……	

Electric consumption of a bus can define size of battery

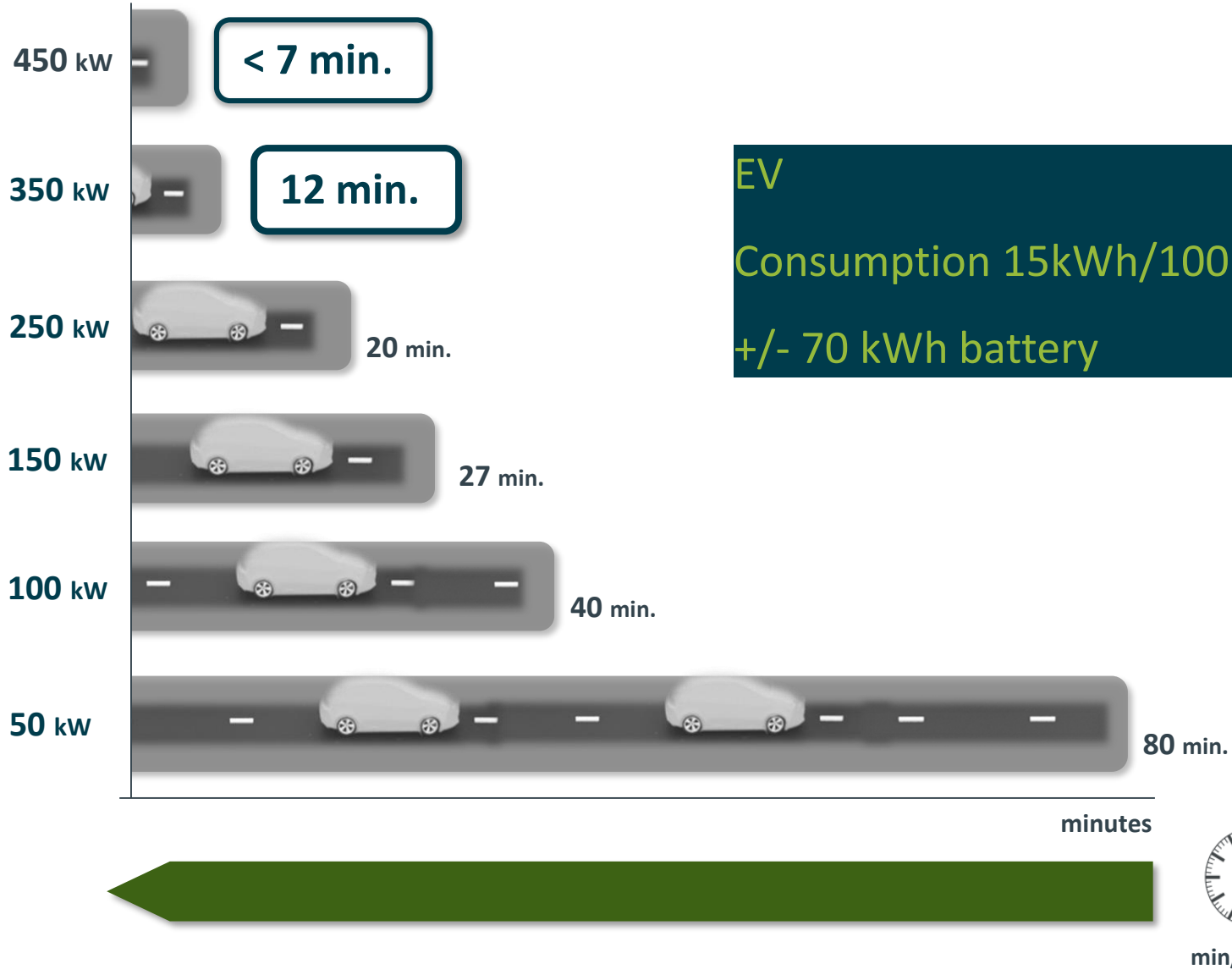
BUT: COST & Physical Size of battery puts limitation

CHARIN

Type of vehicle	kWh/100 km	Battery (kWh) for Range of 400km (20% safety margin)
Electric Car (EV)	15	72
12m e-bus	80	384
18m e-bus	100	480
24m e-bus	130	624

Standardization – perspectives for CSS

Charging times for about 400 km range



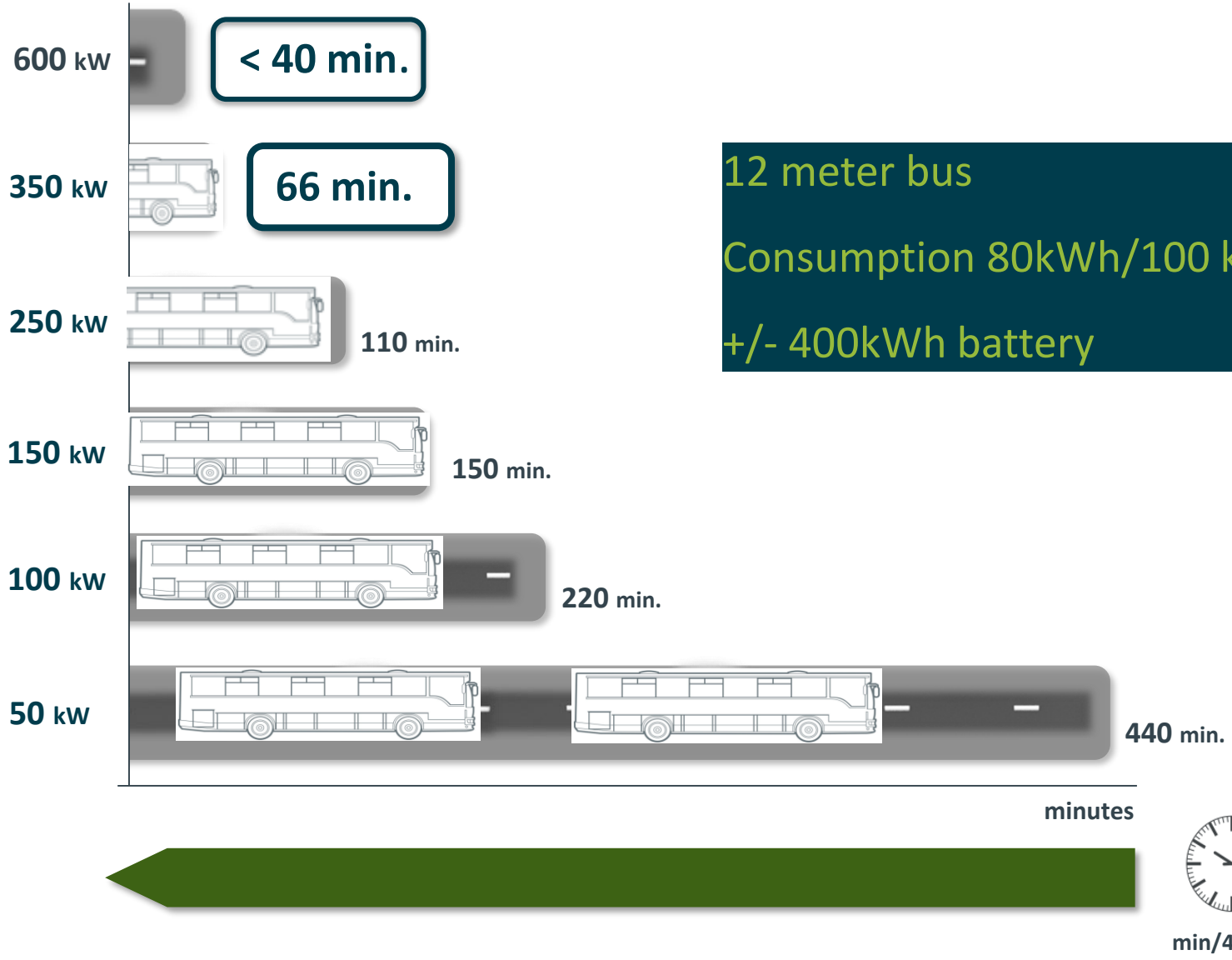
EV

Consumption 15kWh/100 km

+/- 70 kWh battery

Standardization – perspectives for CSS

Charging times for about 400 km range for 12 meter bus

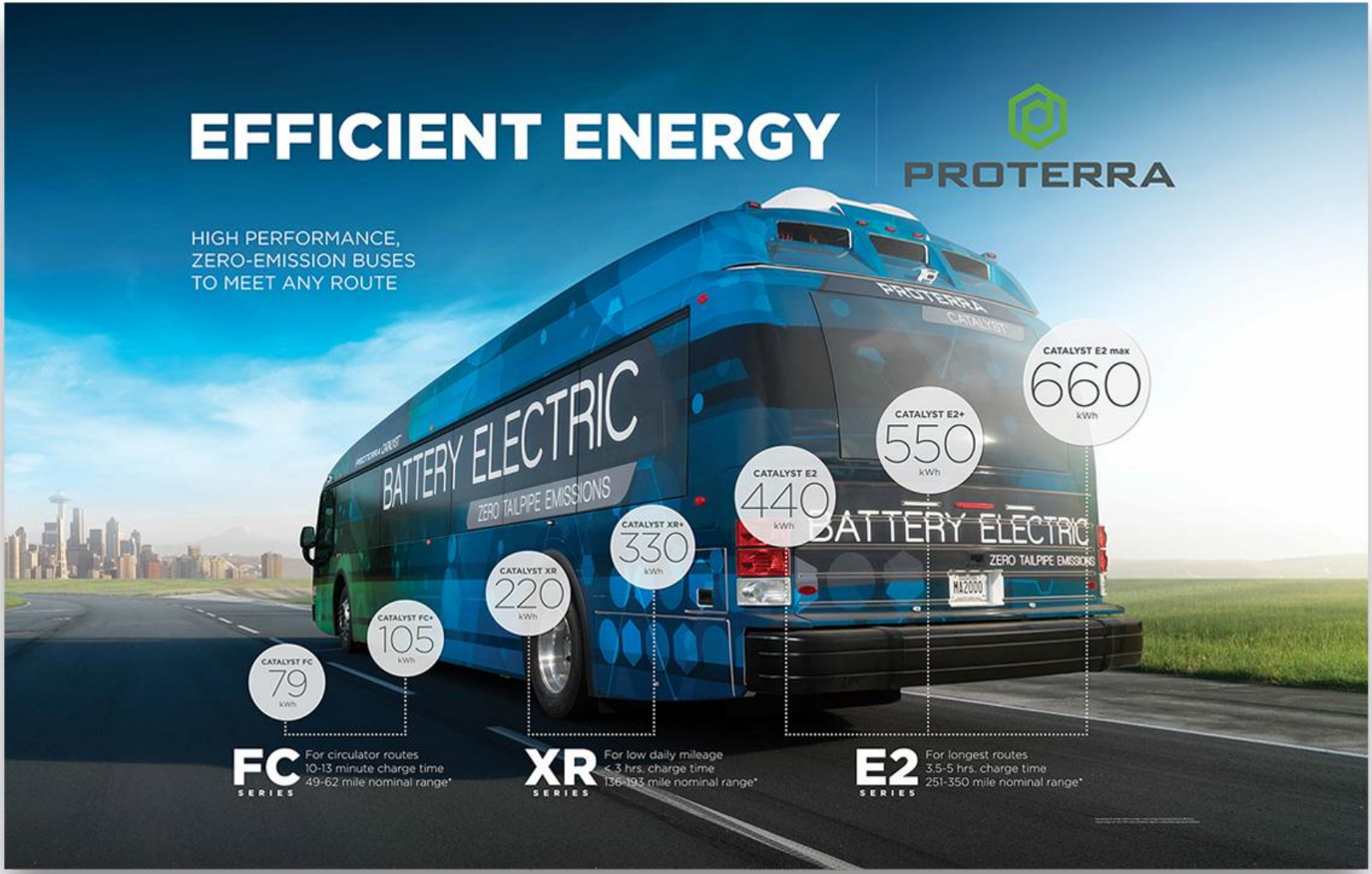


12 meter bus

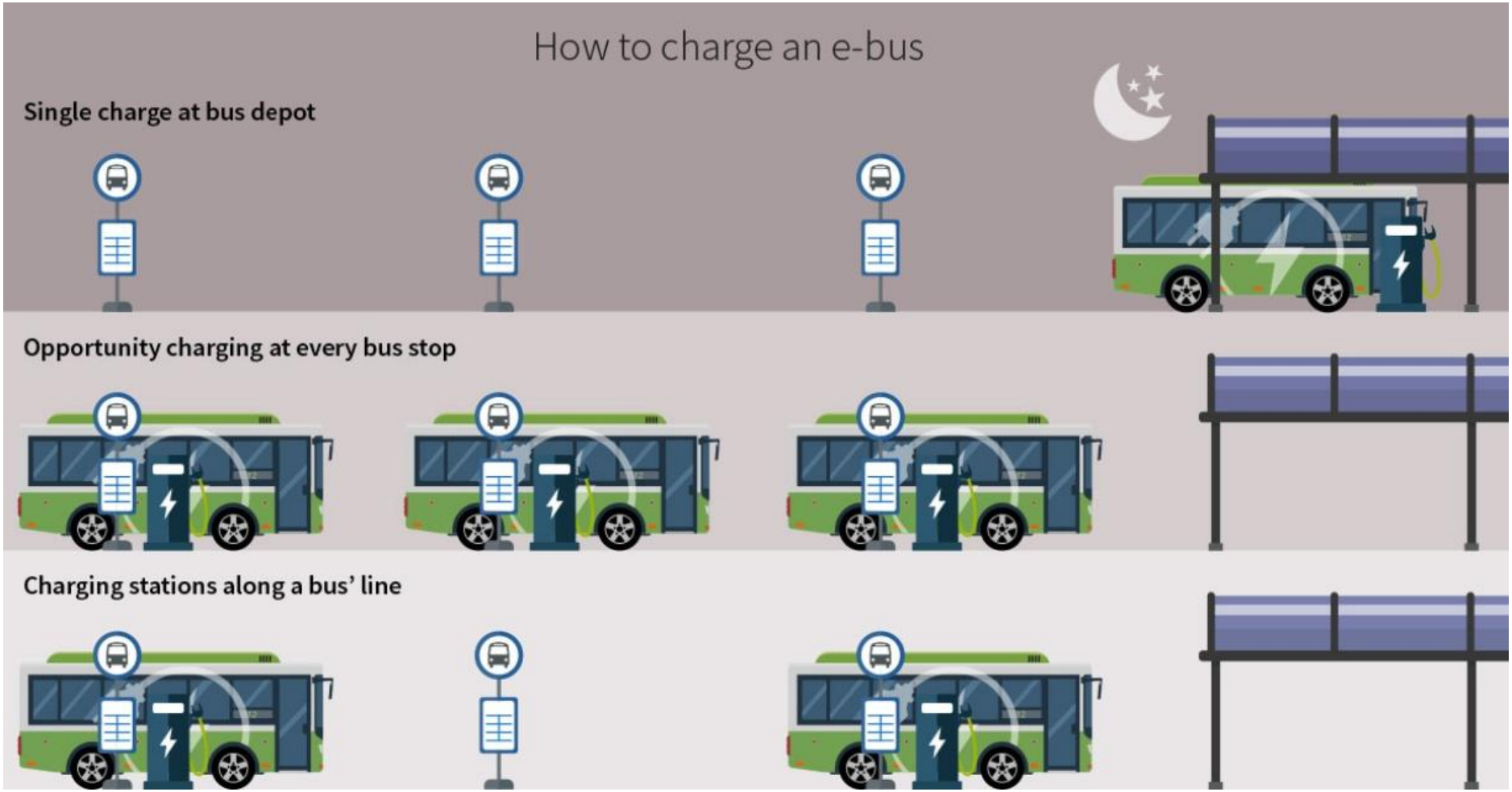
Consumption 80kWh/100 km

+/- 400kWh battery

Public Transport: Range vs charging time



Charging strategy



Pantograph

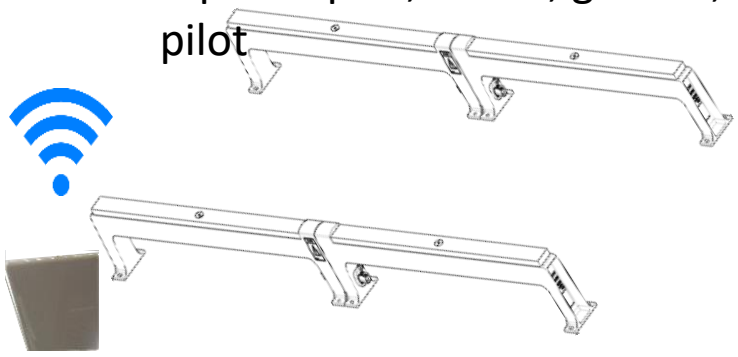
For Opportunity charging

What is OppCharge?

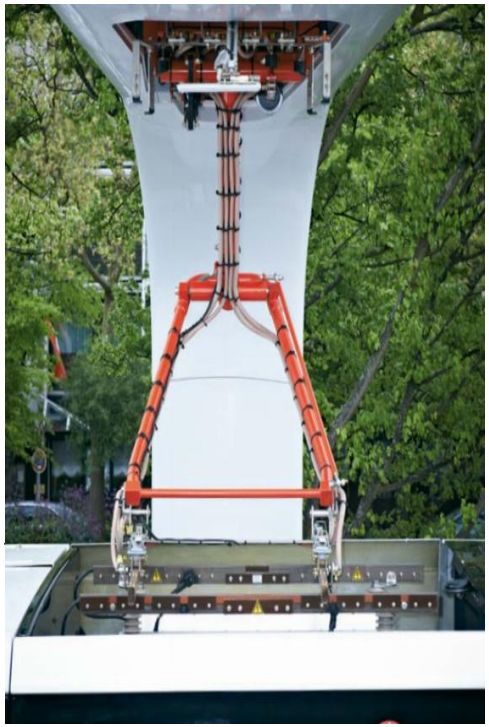
offboard

onboard

4-poles: plus, minus, ground, pilot



Courtesy ABB



Charging is done according to:

- EN/IEC 61851-23
- ISO/IEC 15118
- DIN70121

(aka CCS-2)

Public Transport

metlink

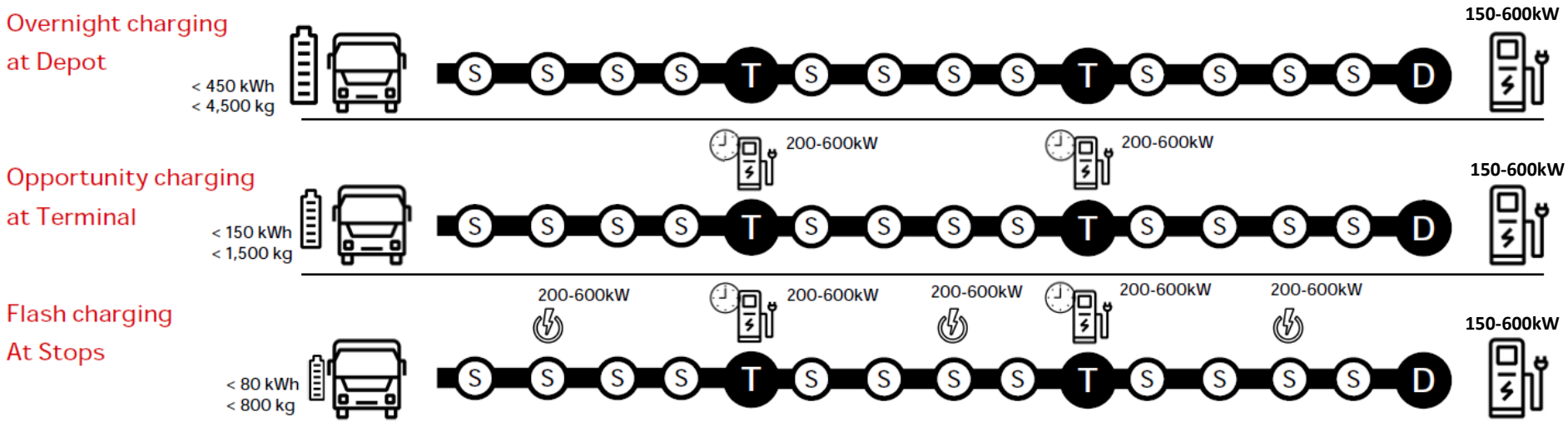
InterCity

BUSIT

CHARIN

The optimal trade off for batteries

Different solutions for different needs



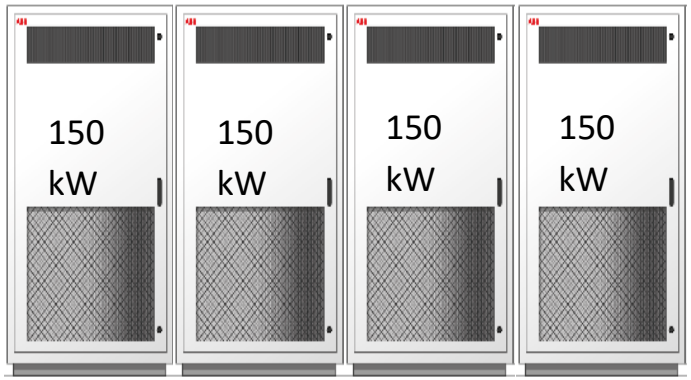
The optimal solution depends on multiple factors

Opportunity Charging

- Industrial quality power cabinet
- 150kW, 300kW, 450 kW and 600 kW modular
- Redundancy per each 150kW module
- 200-920 V_{DC}
- Galvanic isolation
- Remote management

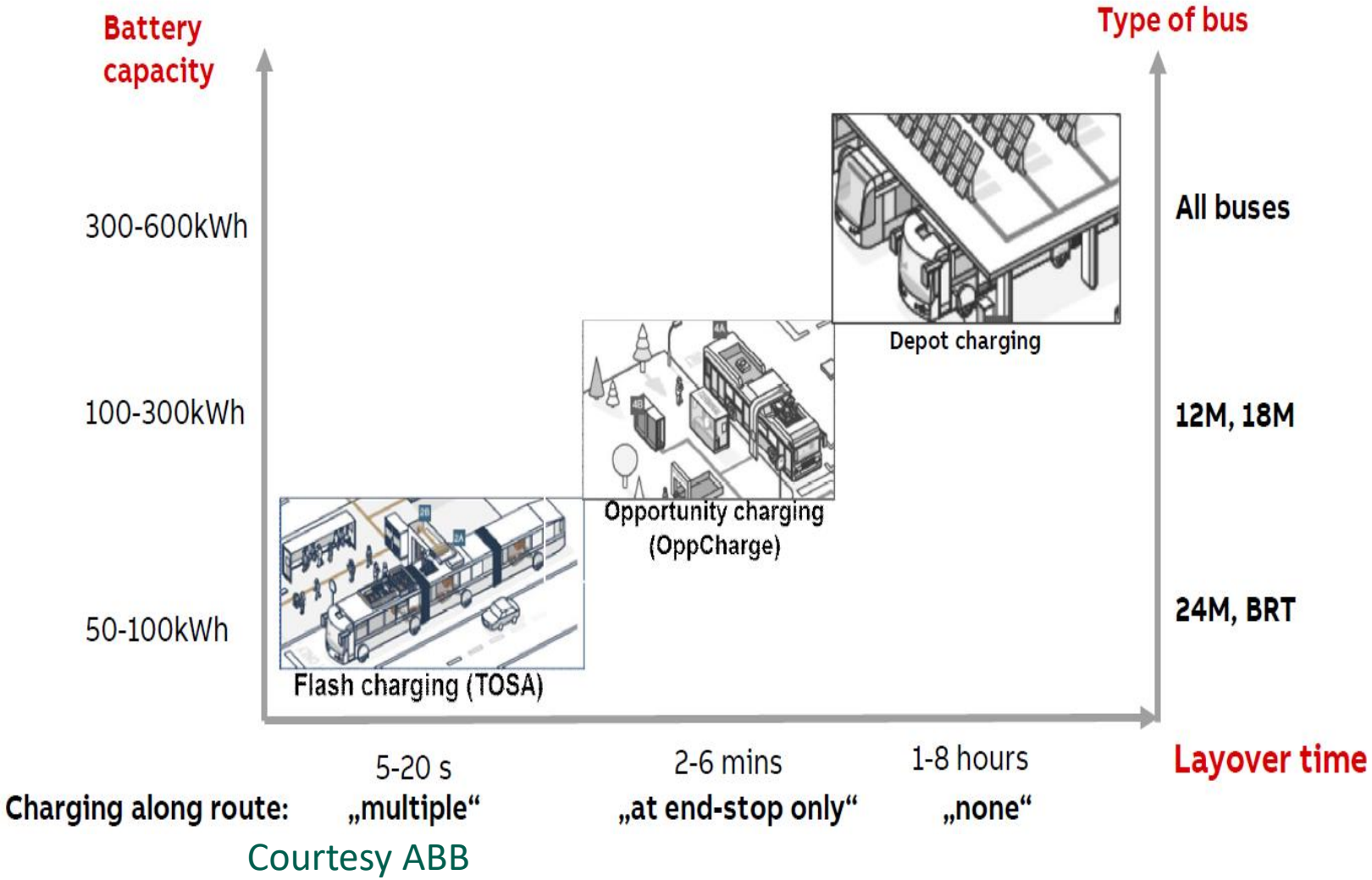
Courtesy ABB

- Automated connection system
- High power DC transfer to bus
- Wireless communication to bus
- Based on
  - EN/IEC 61851-23
  - ISO/IEC 15118
- OPPCharge compatible



Choosing the Right Bus Charging Solution

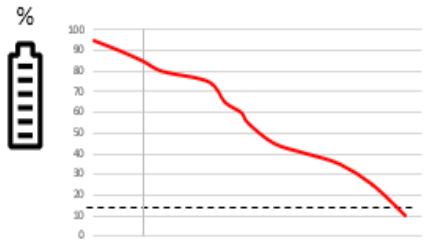
Fit for Purpose



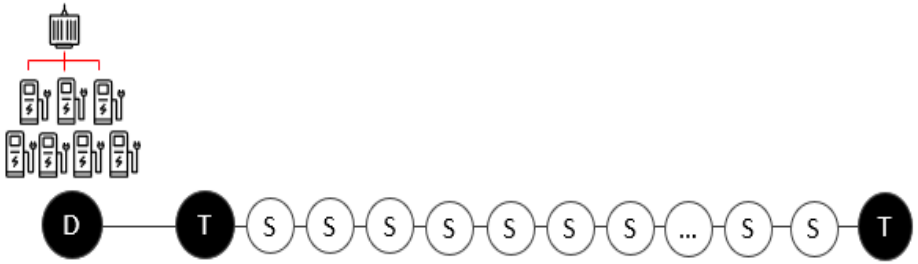
Courtesy ABB

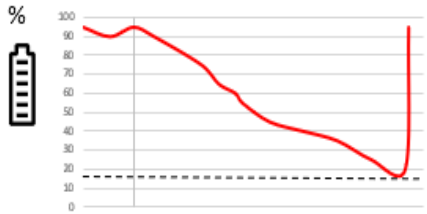
The impact on the utility grid and fleet operations

No down-time needed to charge the e-bus fleet, lighter charging infrastructure

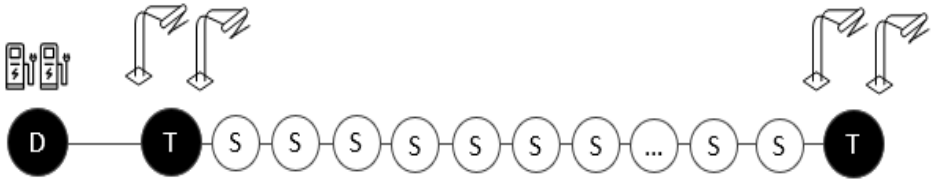


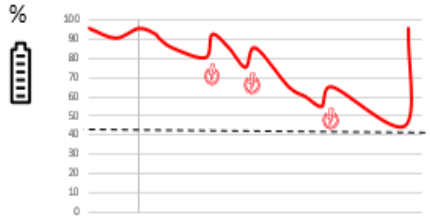
Overnight charging at depot



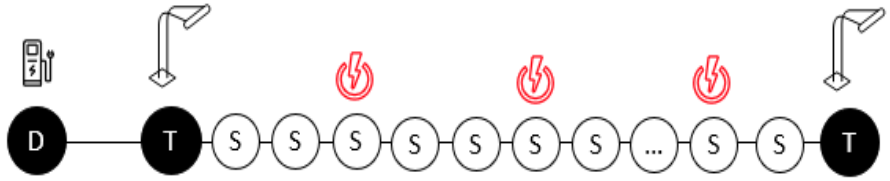


Opportunity charging at terminals (OppCharge)





Opportunity charging at some stops (on-board flash-charging)



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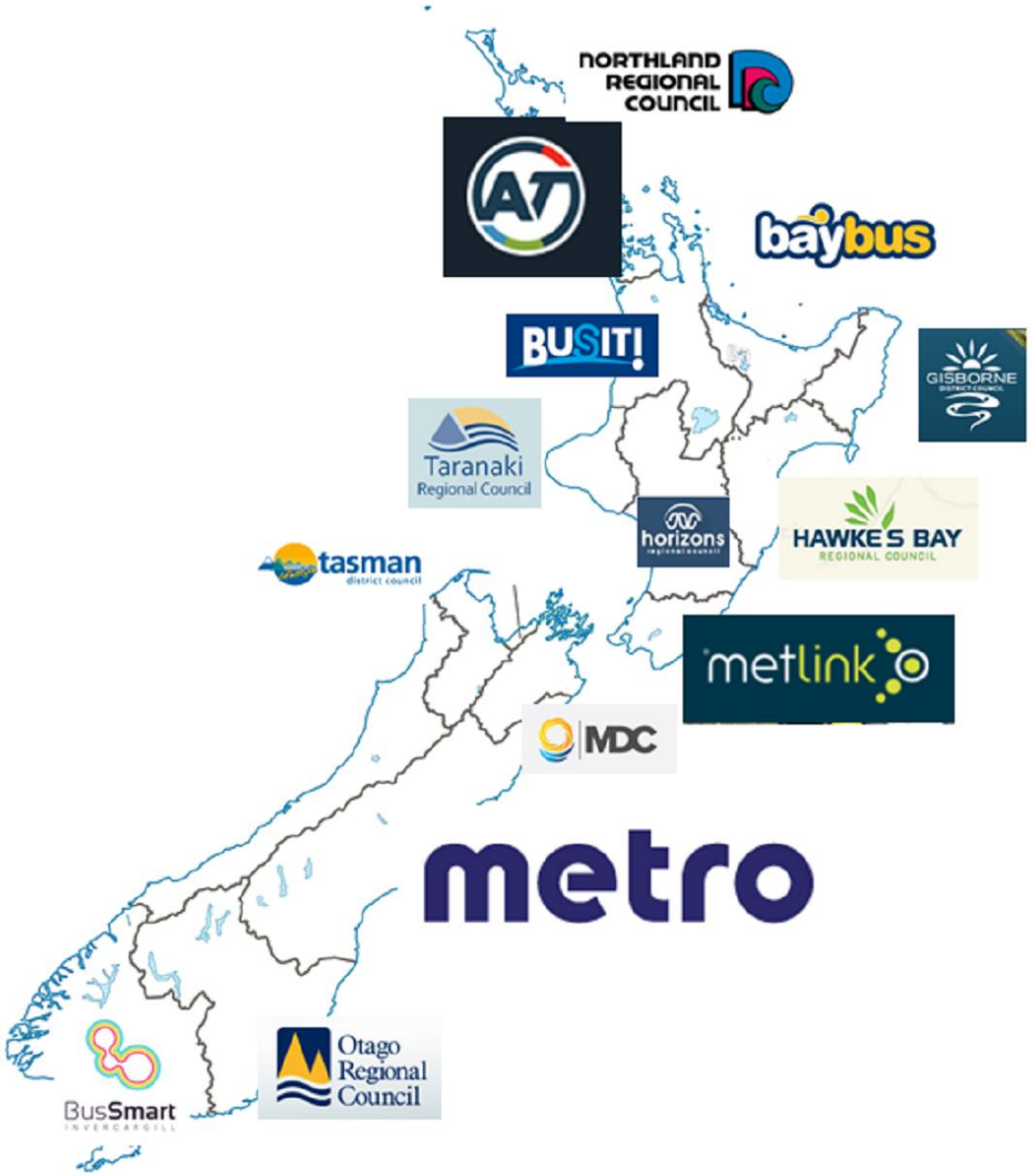
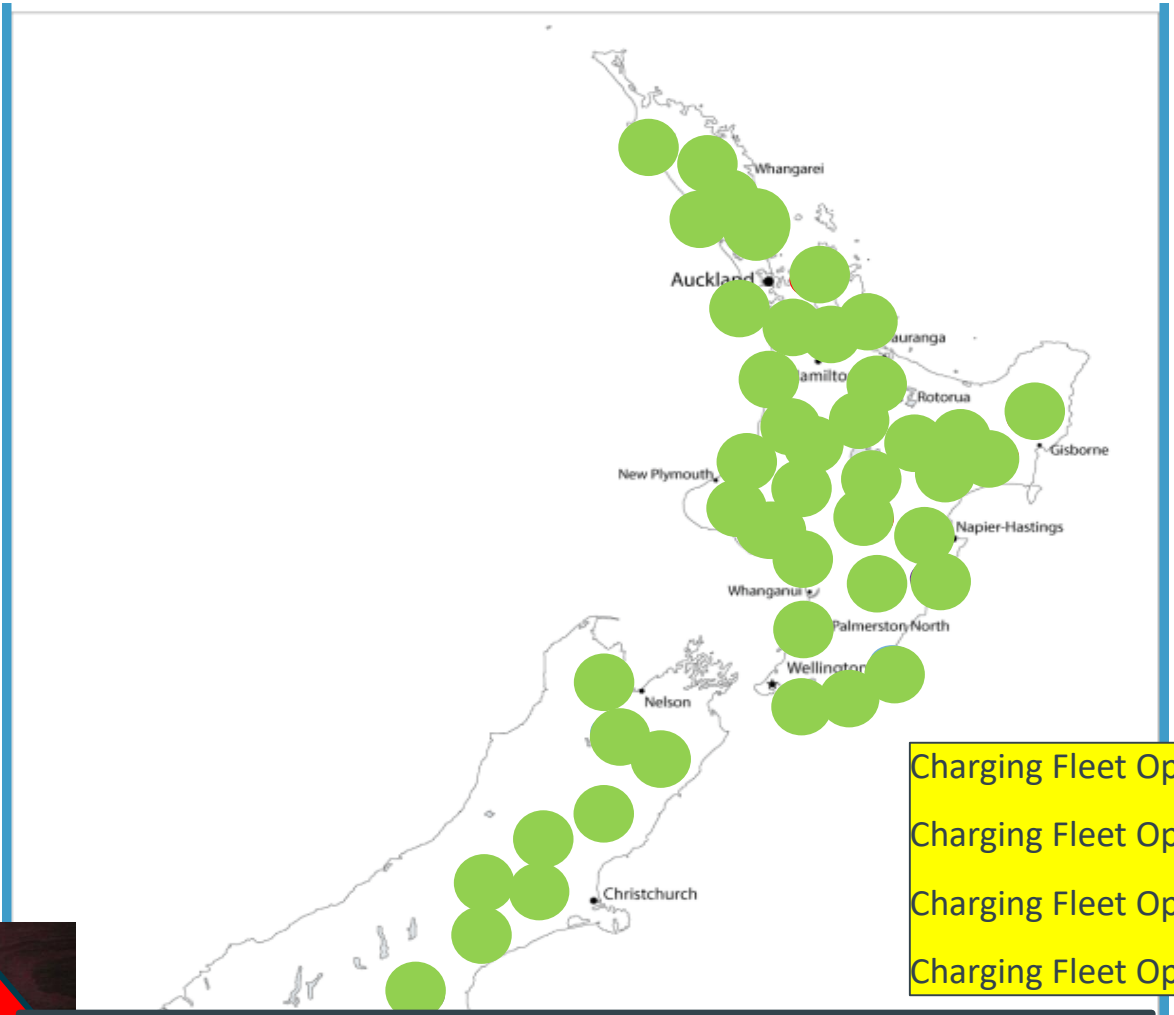
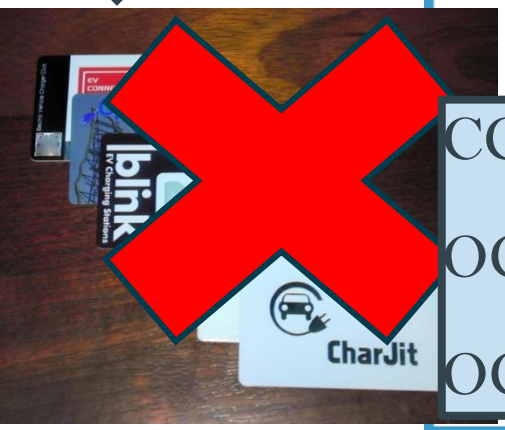
What does a real-world E-bus charging infrastructure require ?

Seamless roaming among Fleet Operators


NORTHLAND REGIONAL COUNCIL
AT
baybus
BUSIT!
GISBORNE
Taranaki Regional Council
horizons
HAWKE'S BAY REGIONAL COUNCIL
tasman
metlink
MDC
metro
Otago Regional Council
BusSmart

Roaming among different fleet operators using ISO 15118





CCS ISO 15118 communication protocol

OCPP 2.0 : Open Charge Point Protocol

OCPI: Open Charge Point Interface

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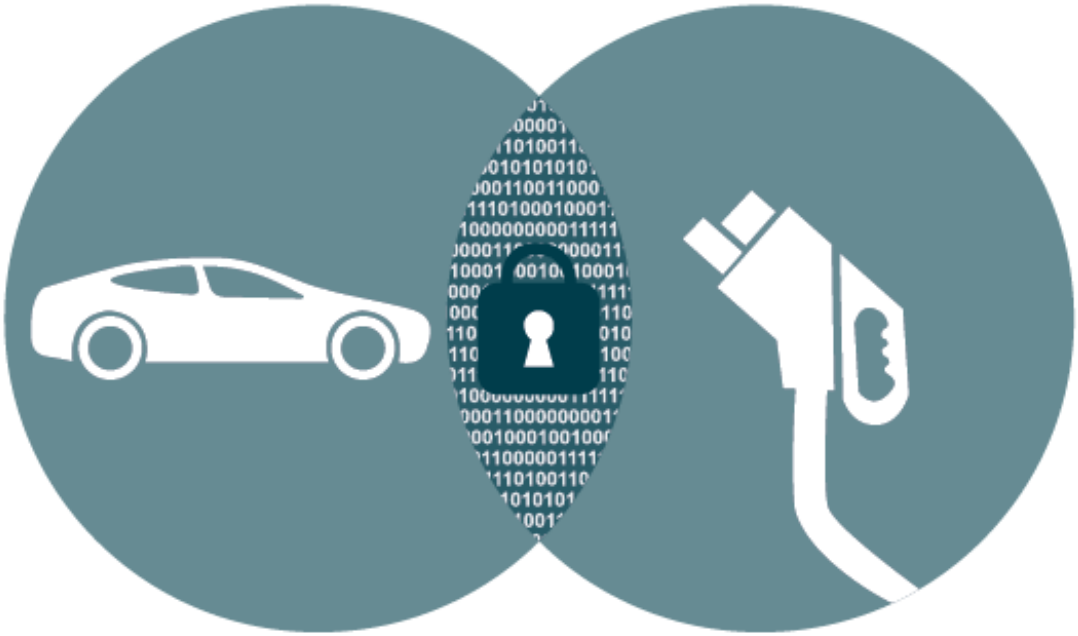
What does a real-world E-bus charging infrastructure require ?

Secured Payments



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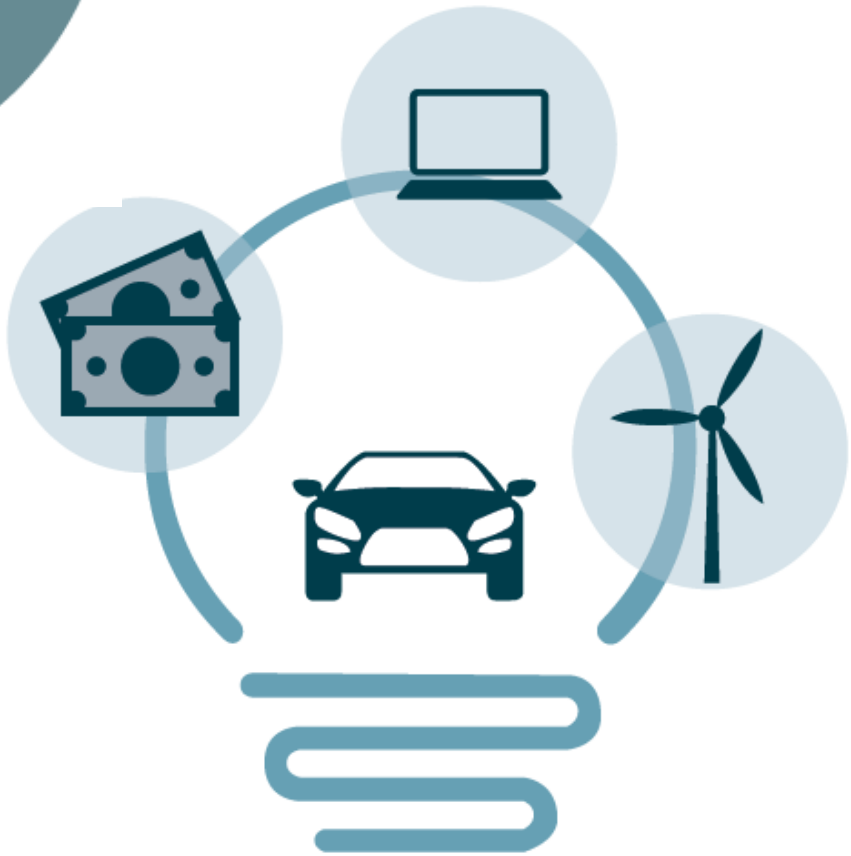
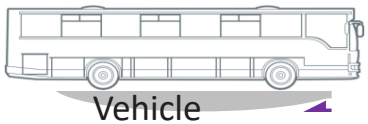


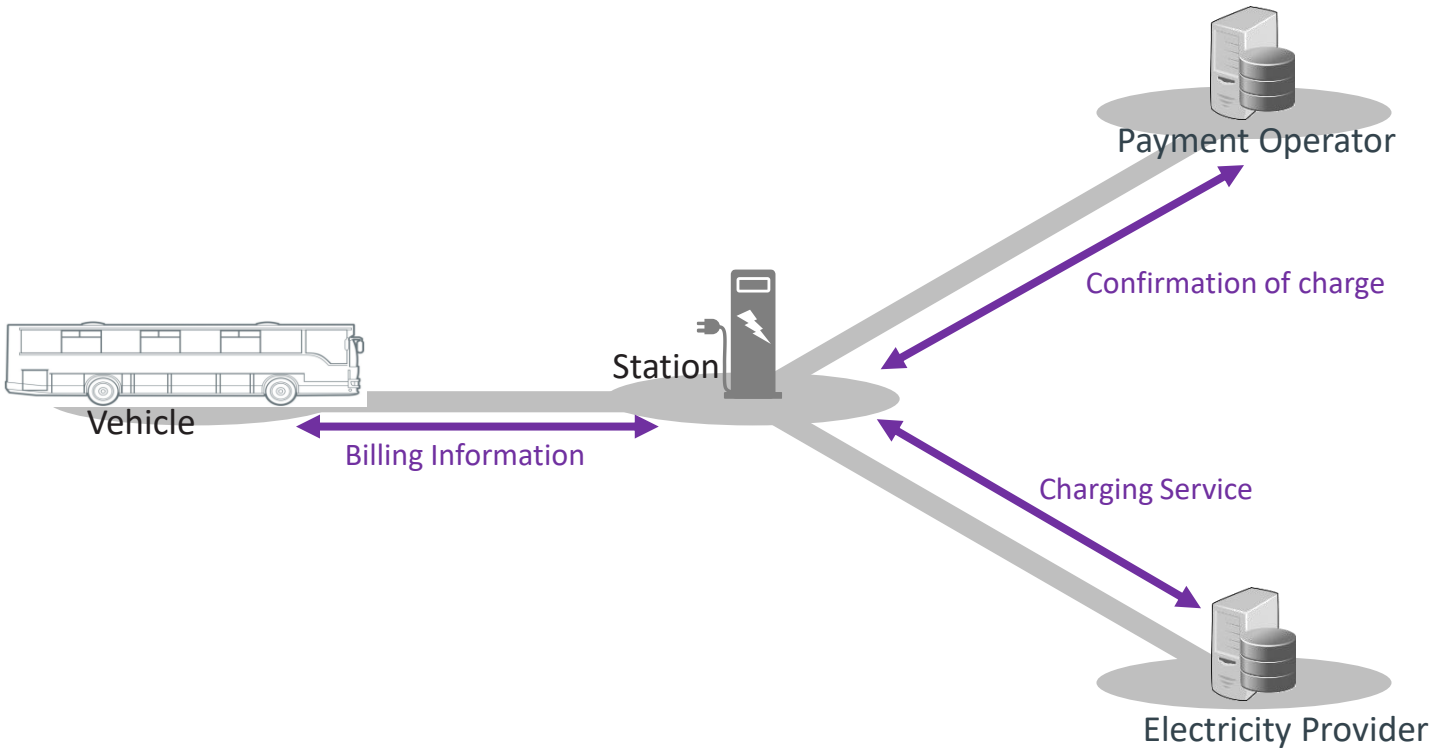
Software: Security

Communication security @ Charging Station



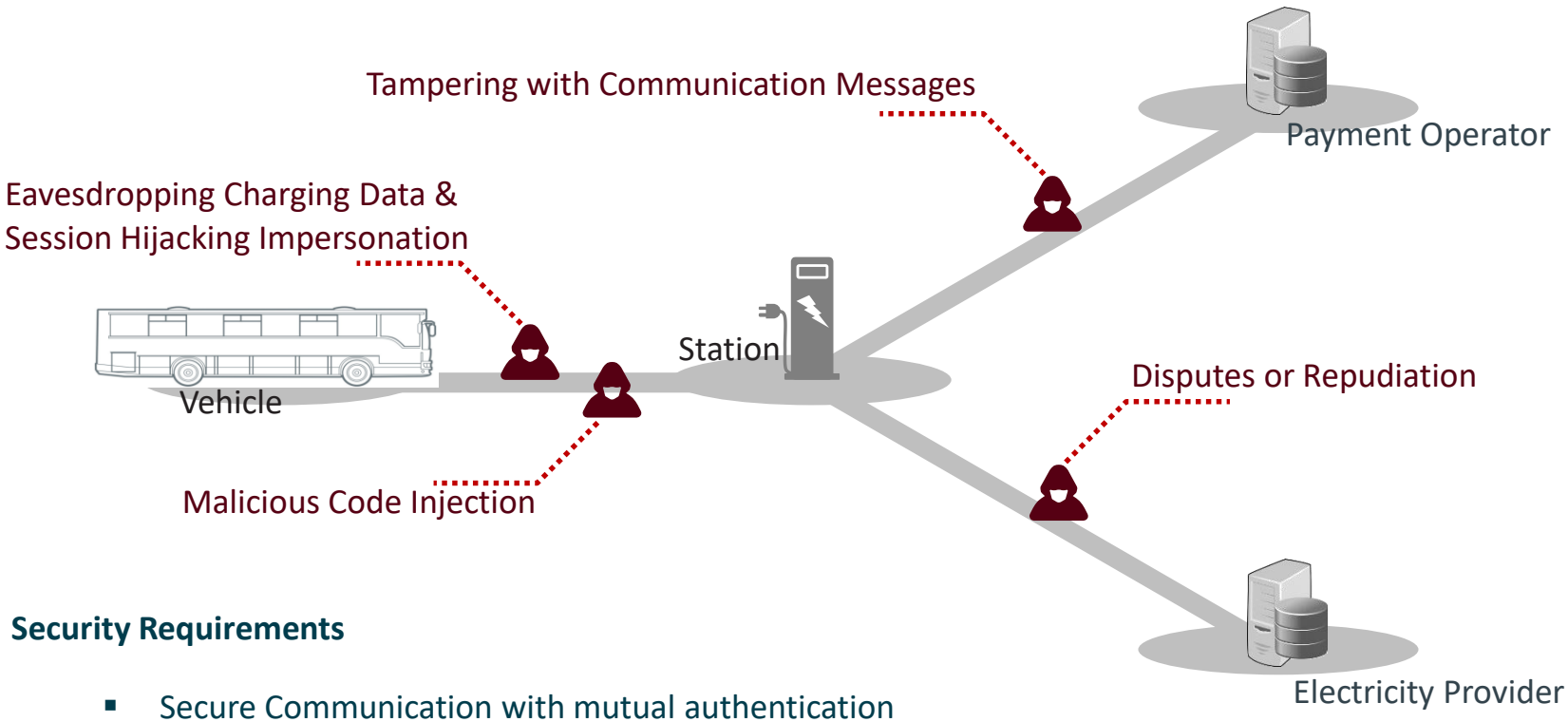
Software: Security

Communication security @ Charging Station



Software: security

Security Threats in EV and Charging Infrastructure



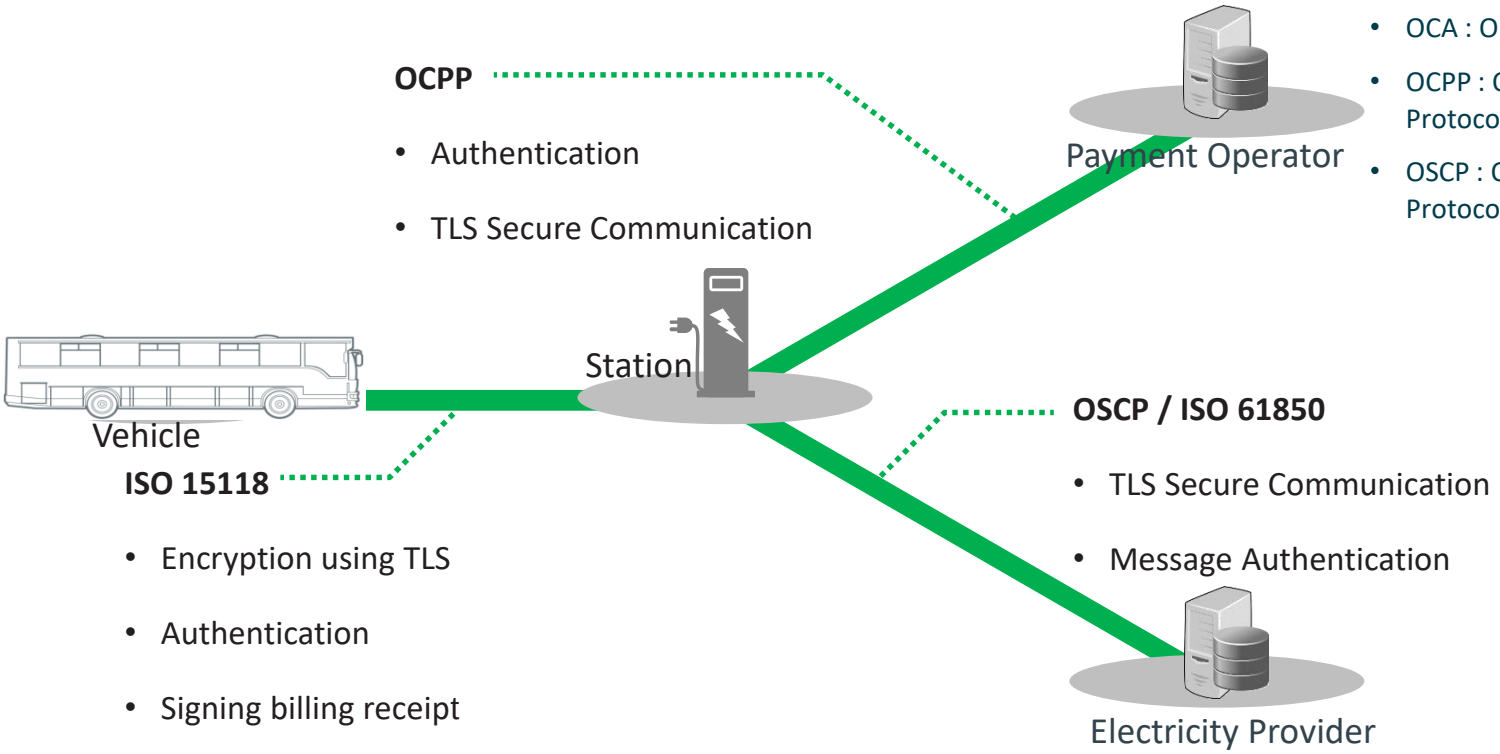
Security Requirements

- Secure Communication with mutual authentication
- Integrity and non-repudiation for billing
- Confidentiality for personal & business information
- Availability of electricity

Software: security

Protocols and Security Features

PLUG 'N CHARGE



OCA

OCPP standardizes the communication between the charge spot and the party that operates the charge, thereby allowing CSO back-ends and charge spots of different vendors to communicate.

- OSCP(Open Smart Charging Protocol) allows a DSO (Distribution System Operators) to vary the capacity available to charge stations in time,
  given the varying predicted capacity needed for other consumers in an area.

CHARIN

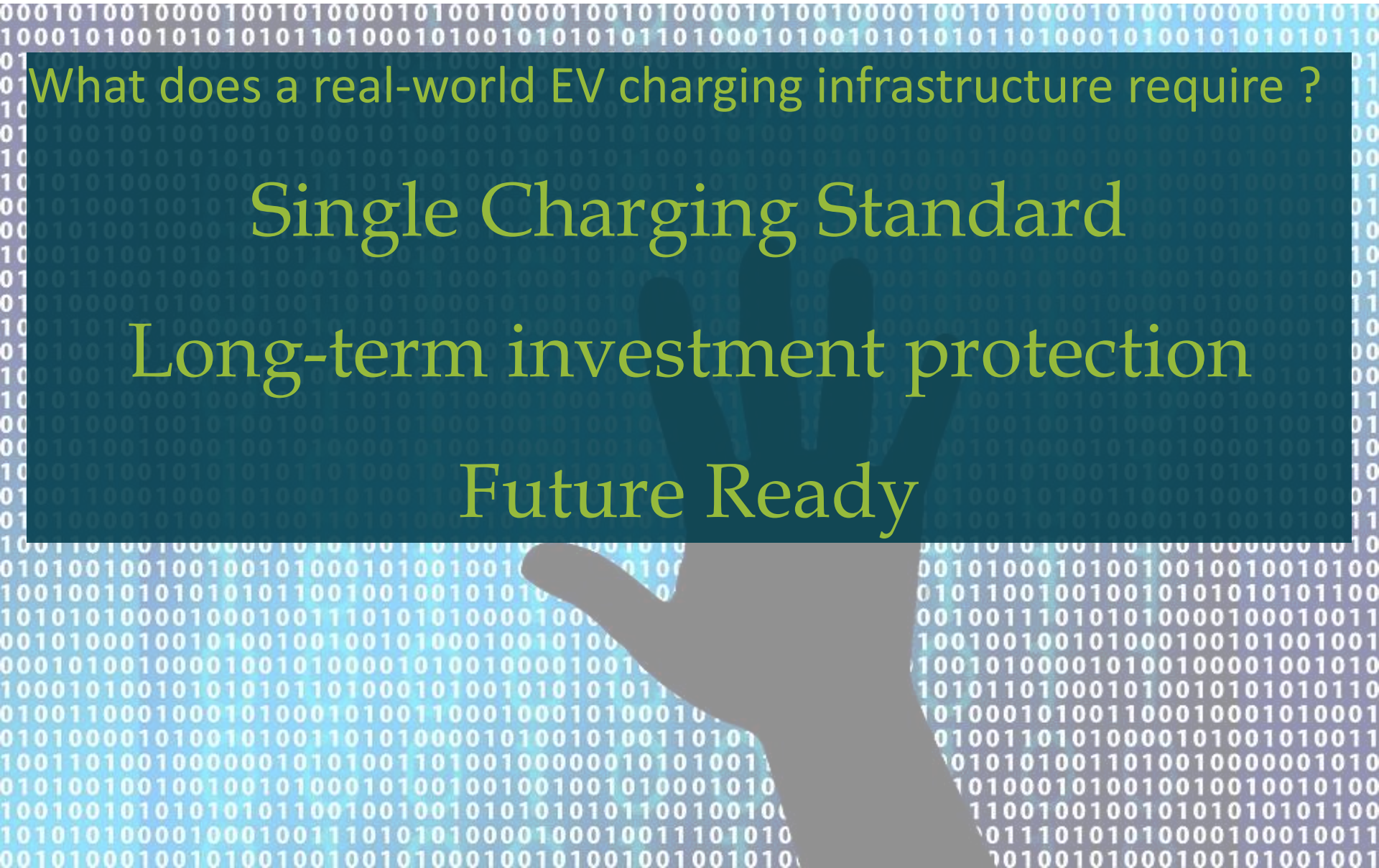
VISION
MISSION
ACTIVITIES

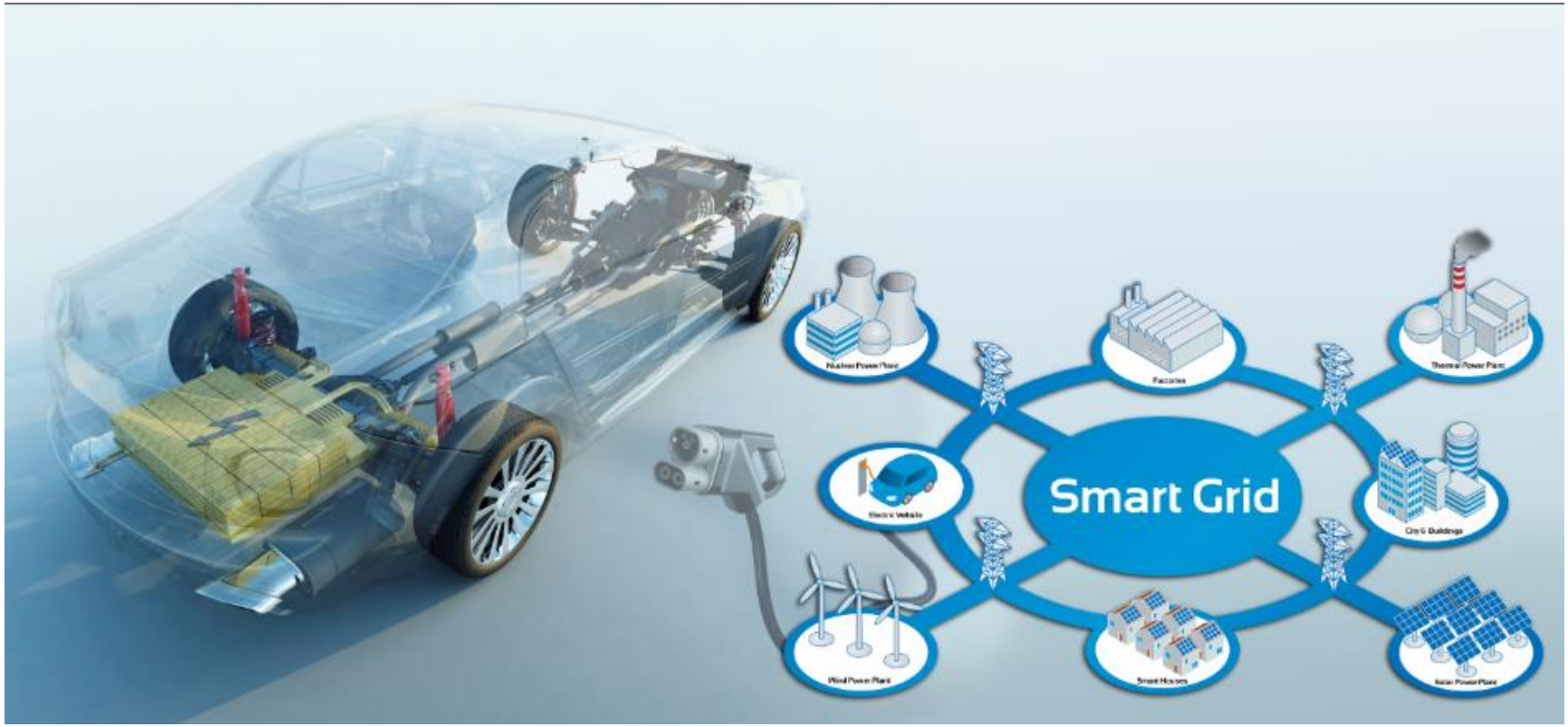
What does a real-world EV charging infrastructure require ?

Single Charging Standard

Long-term investment protection

Future Ready





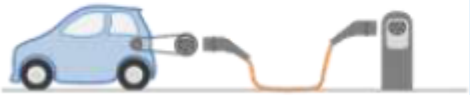
KEPCO

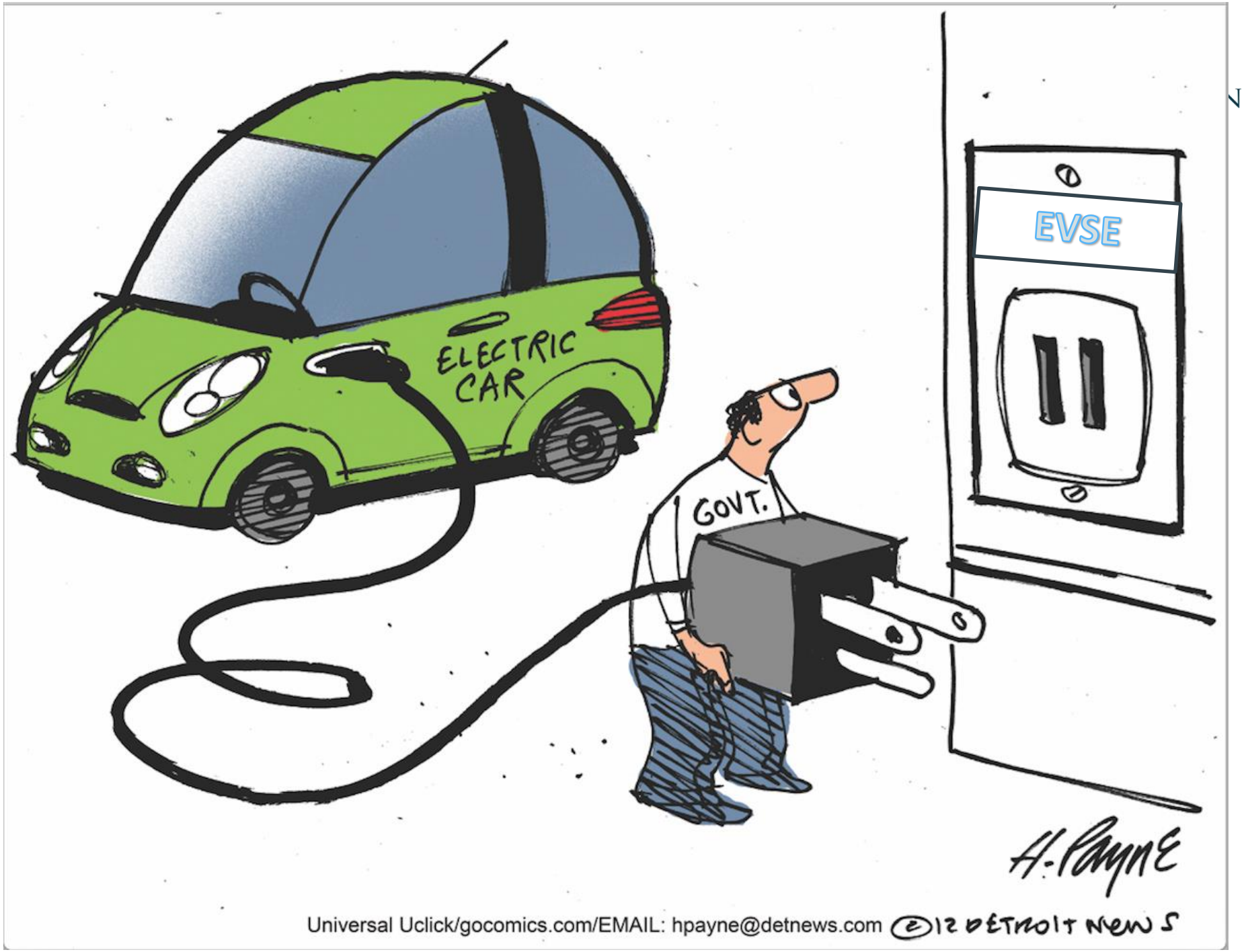
ISO 15118

m = mandatory o= option

CharIN

Concept for CCS Charging Modes and Features

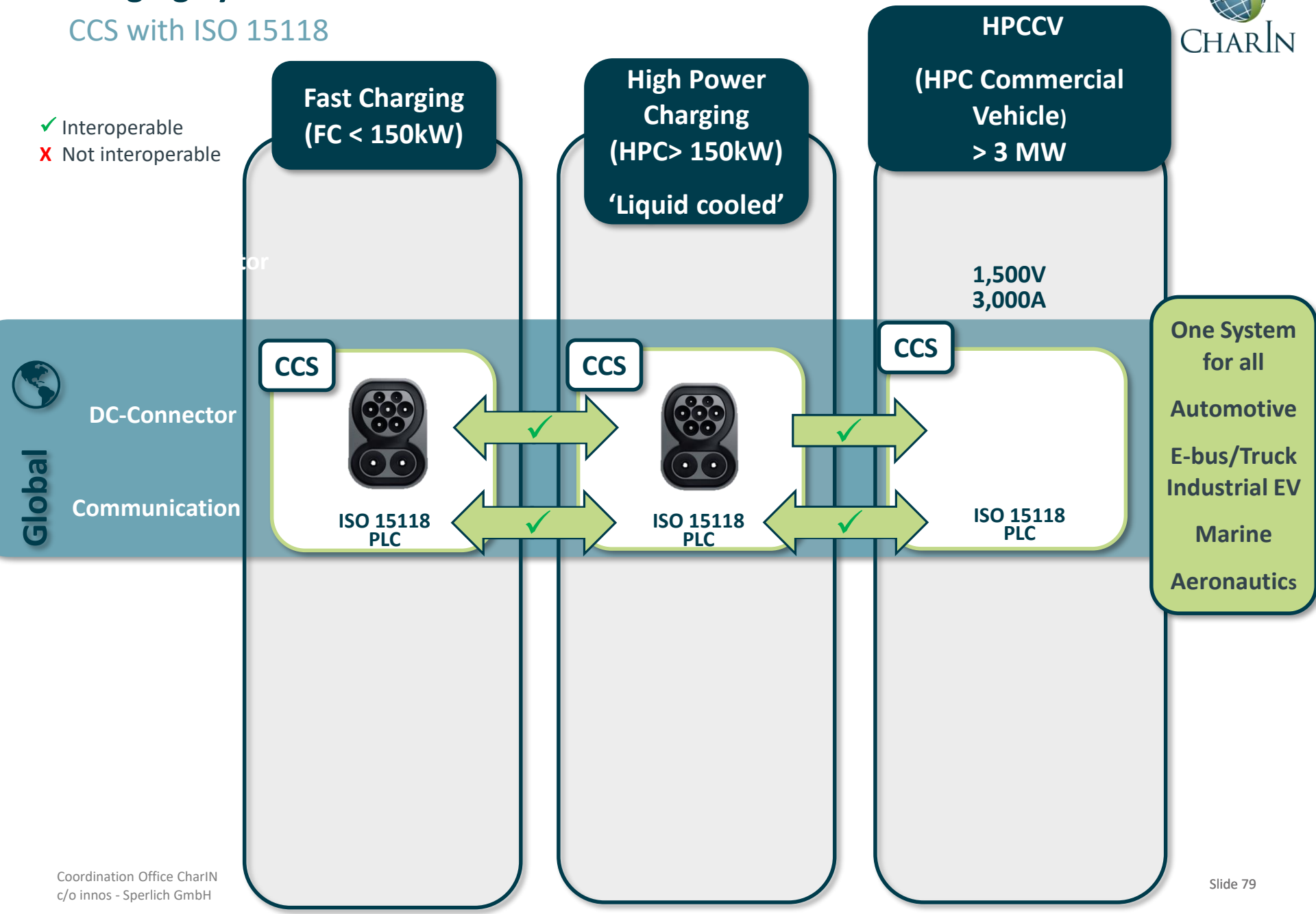
Charging Modes \ Charging Features	Secure Charging	PnC	Smart Load Balancing	BiDi Charging
ACD 	o	o	o	o
WPT 	m	m	o	na
DC 	m	m	o	o
AC 	o	o	o	o
Feature Availability	CCS2.0			CCS3.0


ELECTRIC CAR
GOVT.
EVSE
H. Payne
Universal Uclick/gocomics.com/EMAIL: hpayne@detnews.com ©12 DETROIT NEWS

Charging System Standards world-wide

CCS with ISO 15118

✓ Interoperable
X Not interoperable



Long distance Transport

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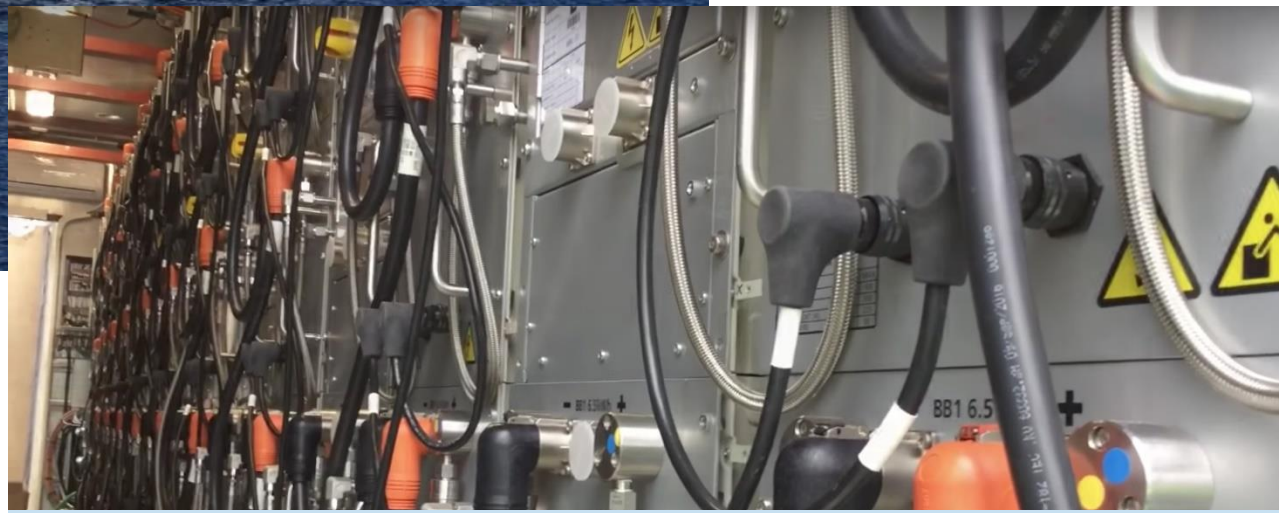
ACTIVITIES

DAIMLER PLANS A CHARGE RATE OF "UP TO 3MW" FOR THEIR ELECTRIC TRUCKS

written by Denis Gurskiy | April 30, 2019

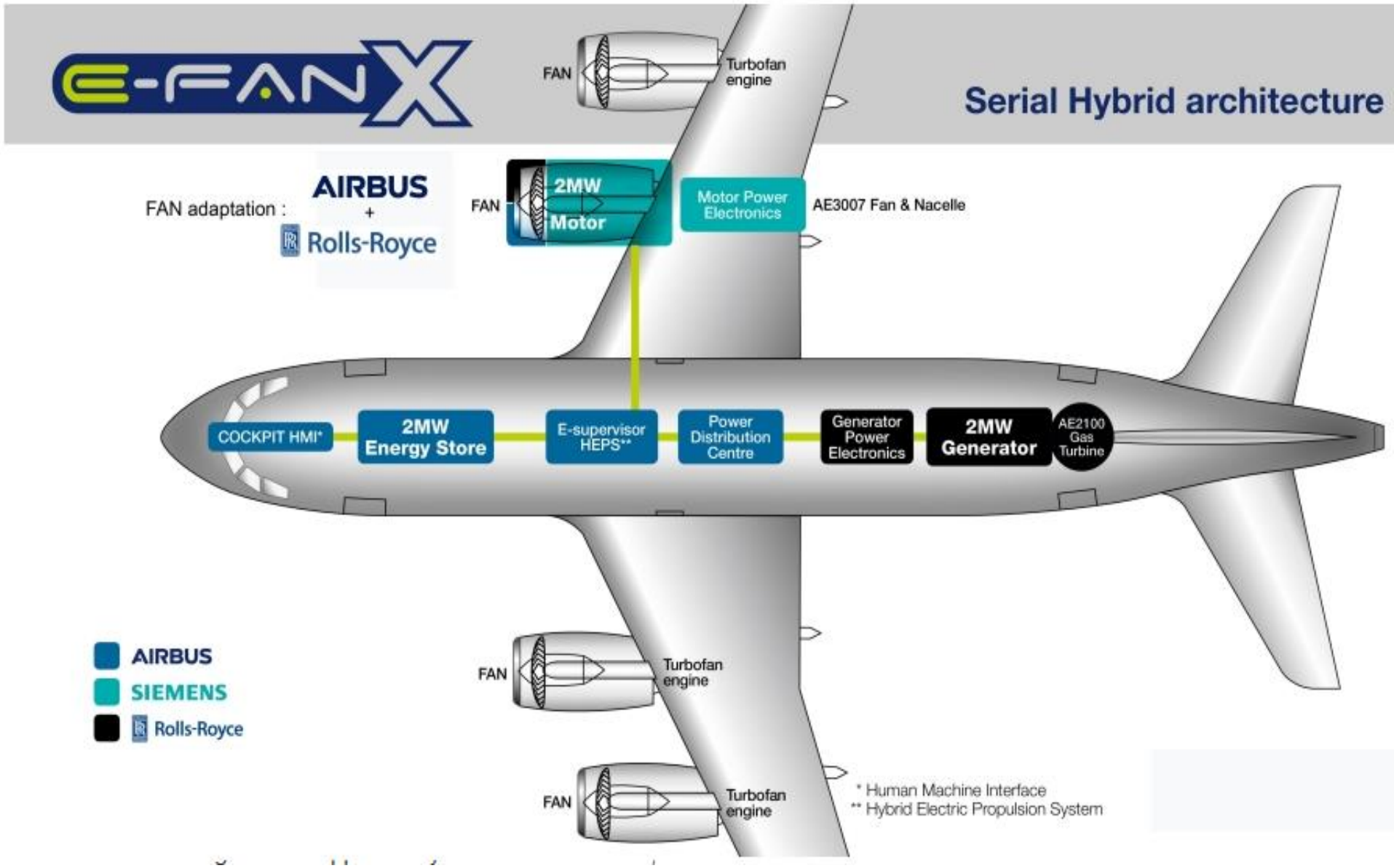
Heavy Duty Trucks, busses will use HPCCV

Marine



4 MWh of battery packs inside ship

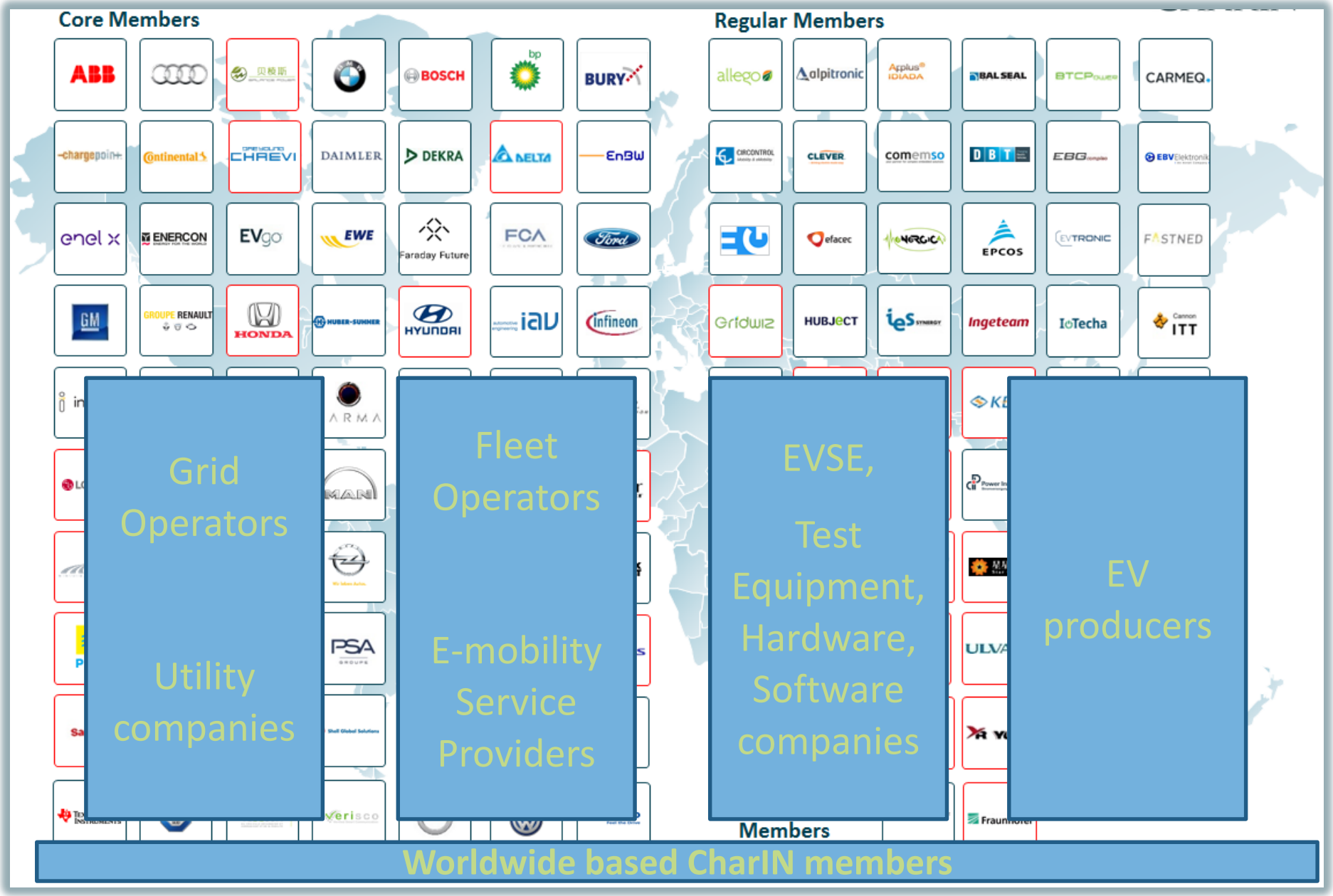
Aeronautics



Urban Air mobility with e-VTOL

Who should have the biggest say in the Charging Standard?

CharIN



CharIN e.V.

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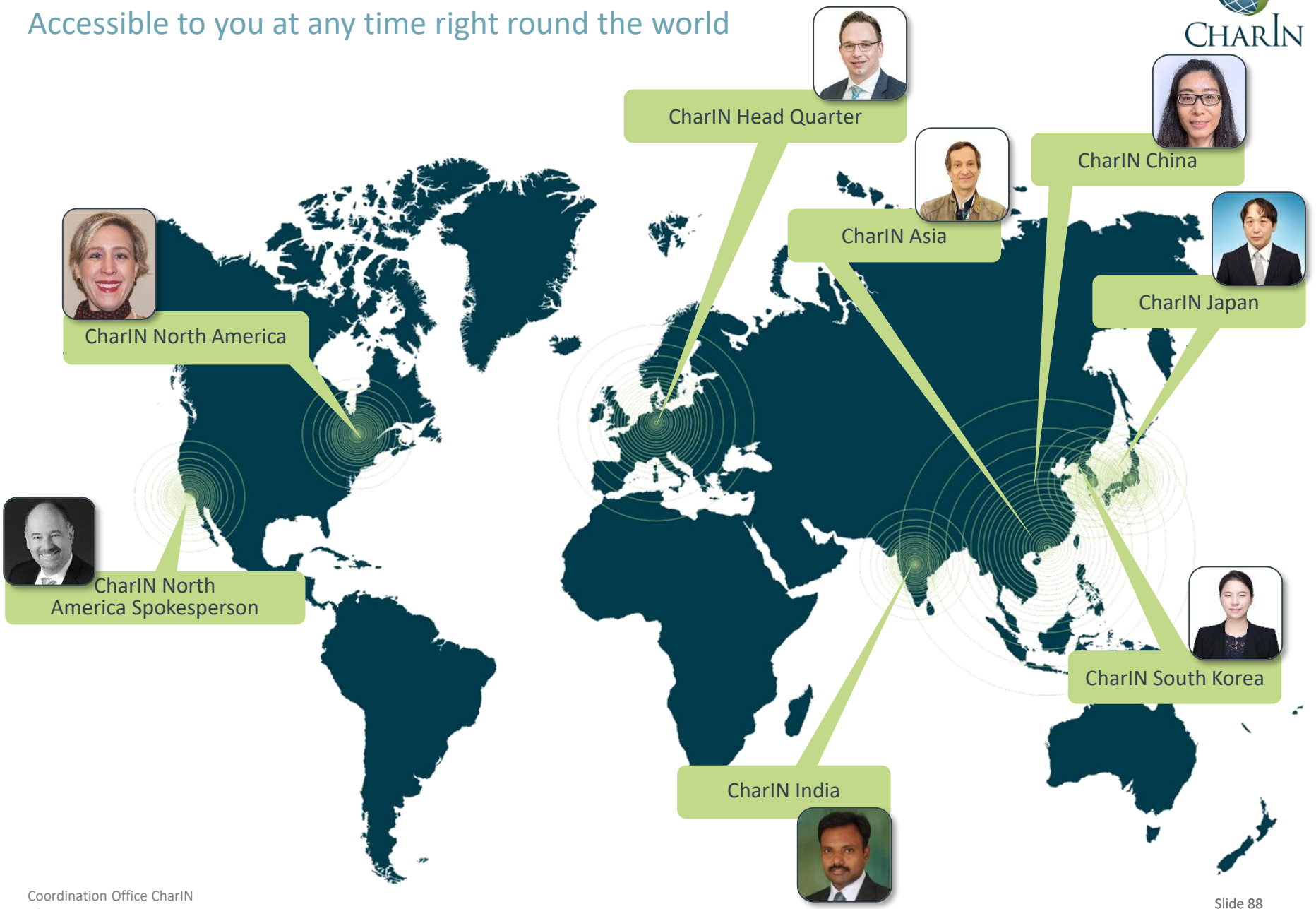


UITP
ADVANCING
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Thank you for your kind attention!

@charginginterface

@worldwideccs

@CharIN e.V.

CharIN association

Our members – currently **182** (total) **1/2**

Core Members

Core members: 102

Coordination Office CharIN
c/o innos - Sperlich GmbH

CharIN association

Our members – currently **182** (total) **2/2**

Regular Members

CharIN **Regular members: 78**

Associated Members

Supporter of CharIN

CharIN **Supporters of CharIN: 15**