



CHARIN

The way to a global standard

May 9th 2019 Jeju Island

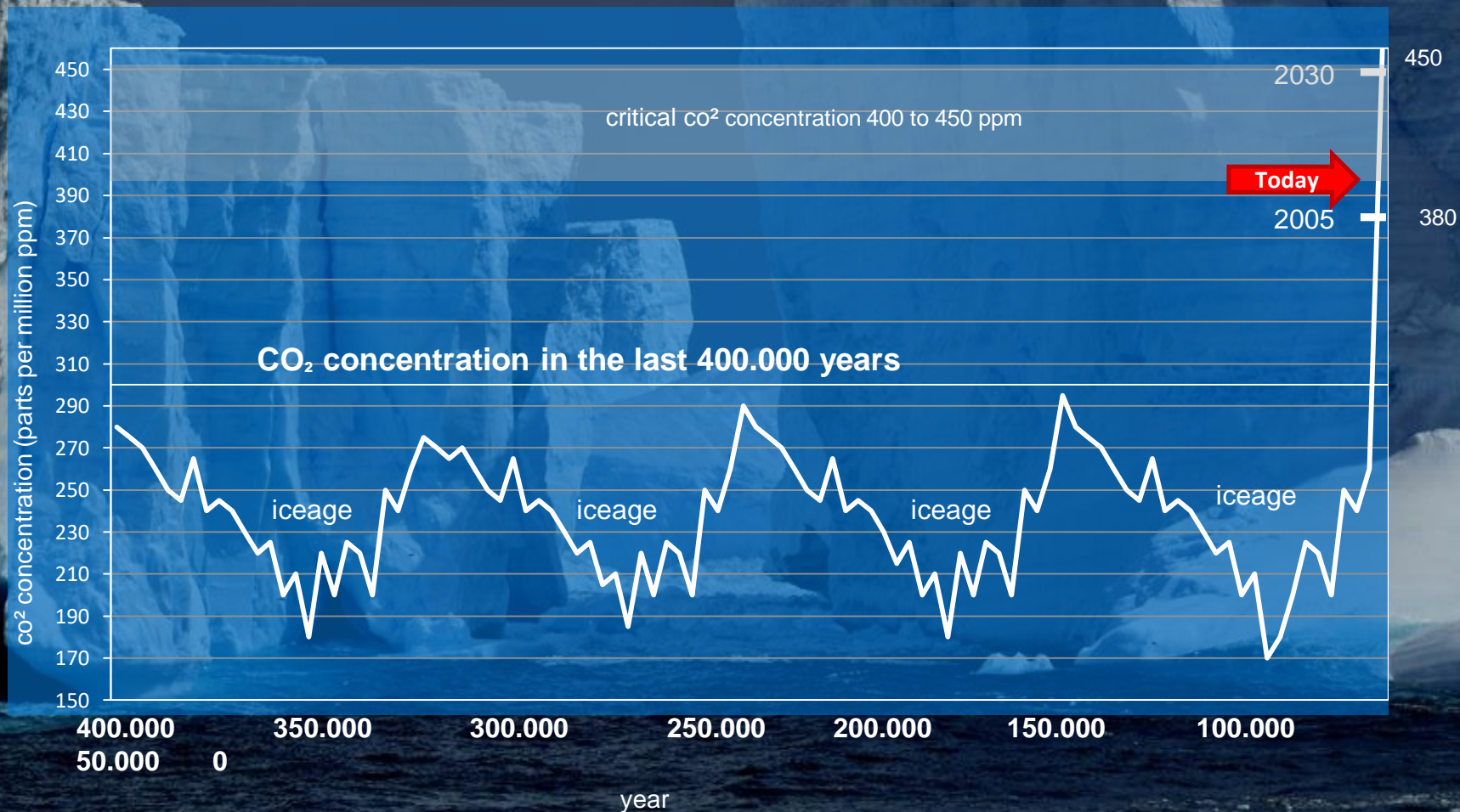
The Need for a Single charging Standard
EV and Infrastructure



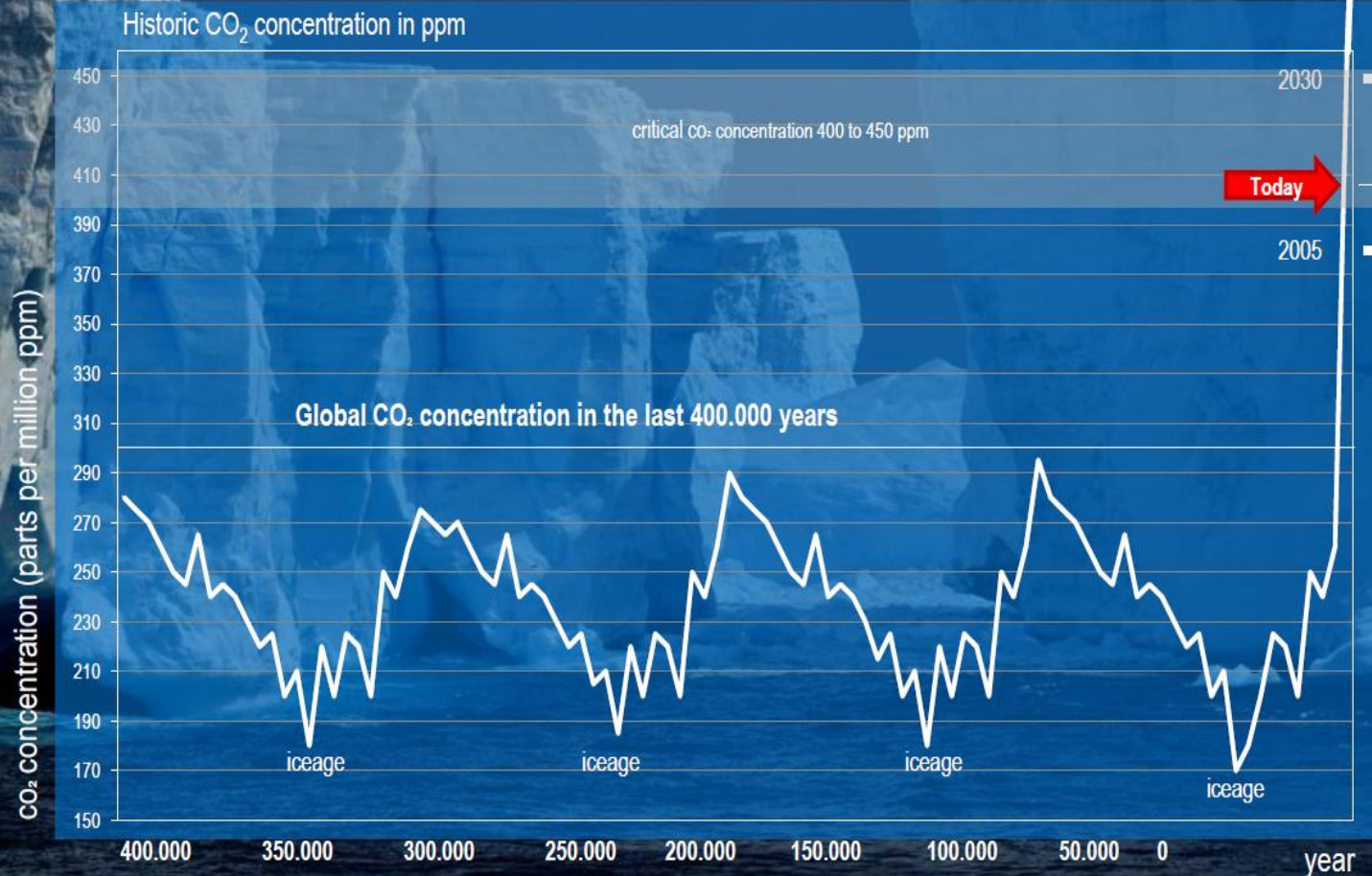


CHARIN

Historical CO₂ concentration



Development of the global CO₂ concentration in the atmosphere



+4° - 6° target

+2° - 4° target

+2° target

< 1.7°C UN agreed on stabilization of temperature rise

that means stabilization of CO₂-concentration

< 450 ppm

annually we add another **2.5 ppm** to **400 ppm** existing concentration

that leaves us another **20** years to get to **0 ppm** increase !

But what does this really mean?



Choose certainty.
Add value.



Real Estate

0 CO_2



Transport

0 CO_2



Power Supply

0 CO_2



Industry

-90% CO_2

by 2050 (industrialized countries!)

What are the coming global trends of decarbonization?

Four megatrends (technology directions) will be overriding:

- Energy conservation – energy saving
- Renewable energies – solar, wind, biomass, hydro!
- Electrification of the transport system (battery)
- Electrification of “everything” (Heat Pumps, Electric Auxiliaries)

This should be considered **an opportunity for any government** in the world

- Attracting investments in New technologies
- Development of new Industries
- Renewable energies creating local jobs

Imagine:

A world with non-compatible WIFI standards.

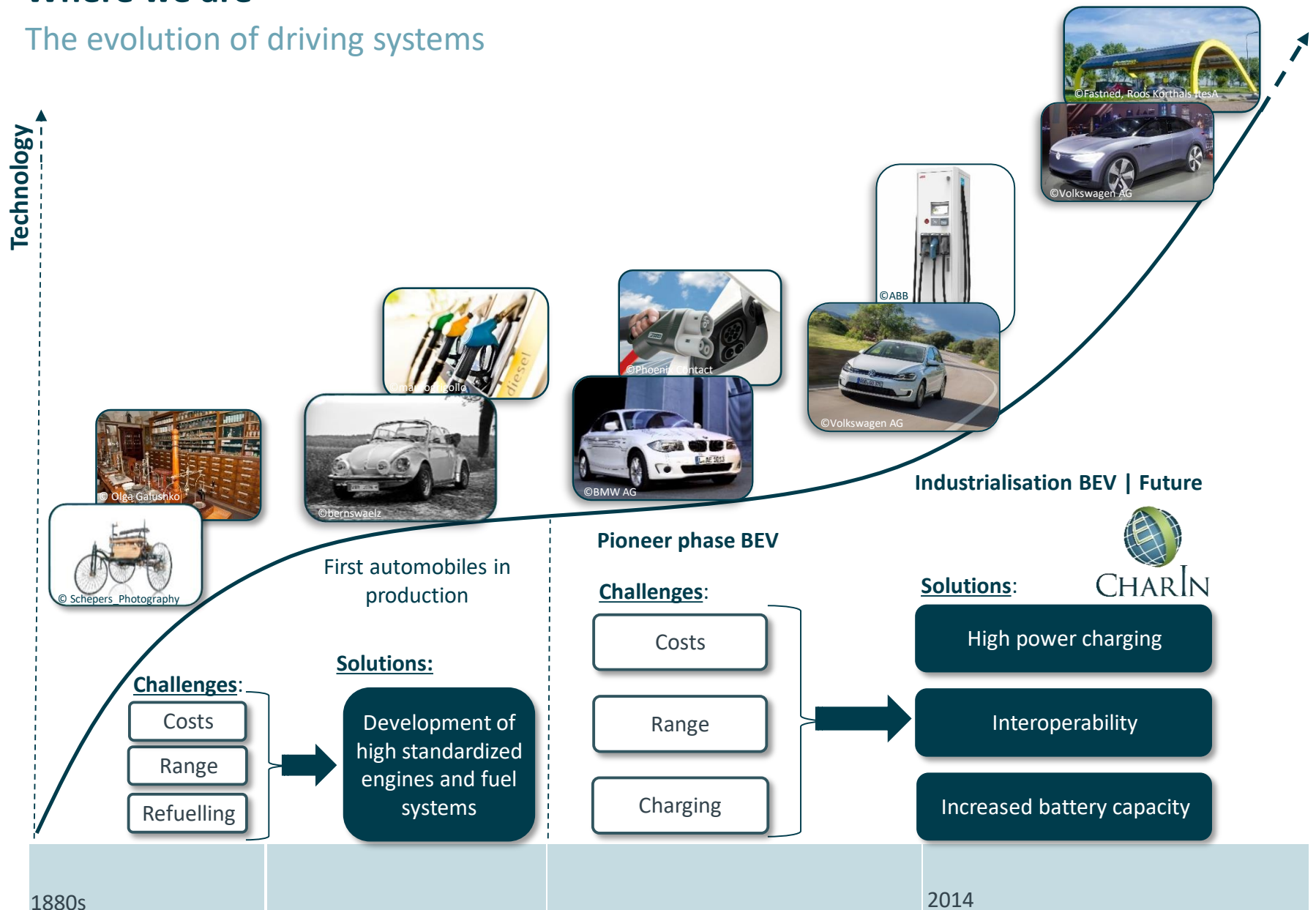


A world without Mobile Roaming



Where we are

The evolution of driving systems

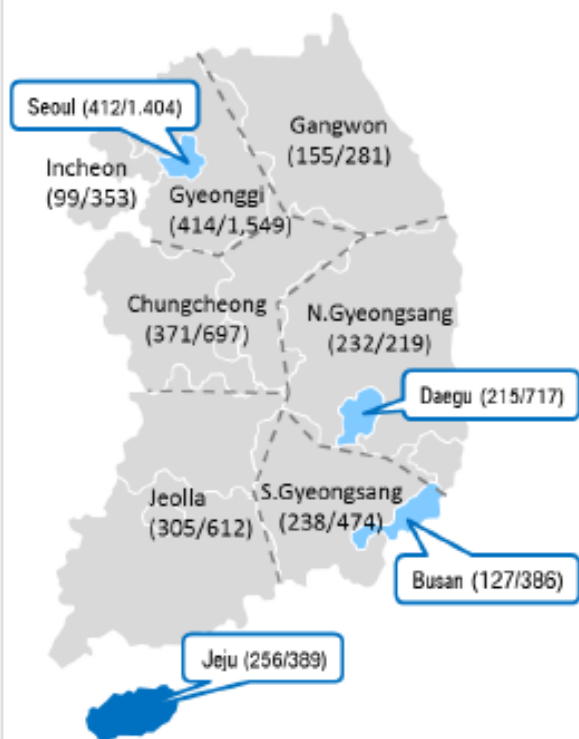


COMBINED CHARGING SYSTEM AND ISO15118

OF DC CCS CHARGER IN KOREA.

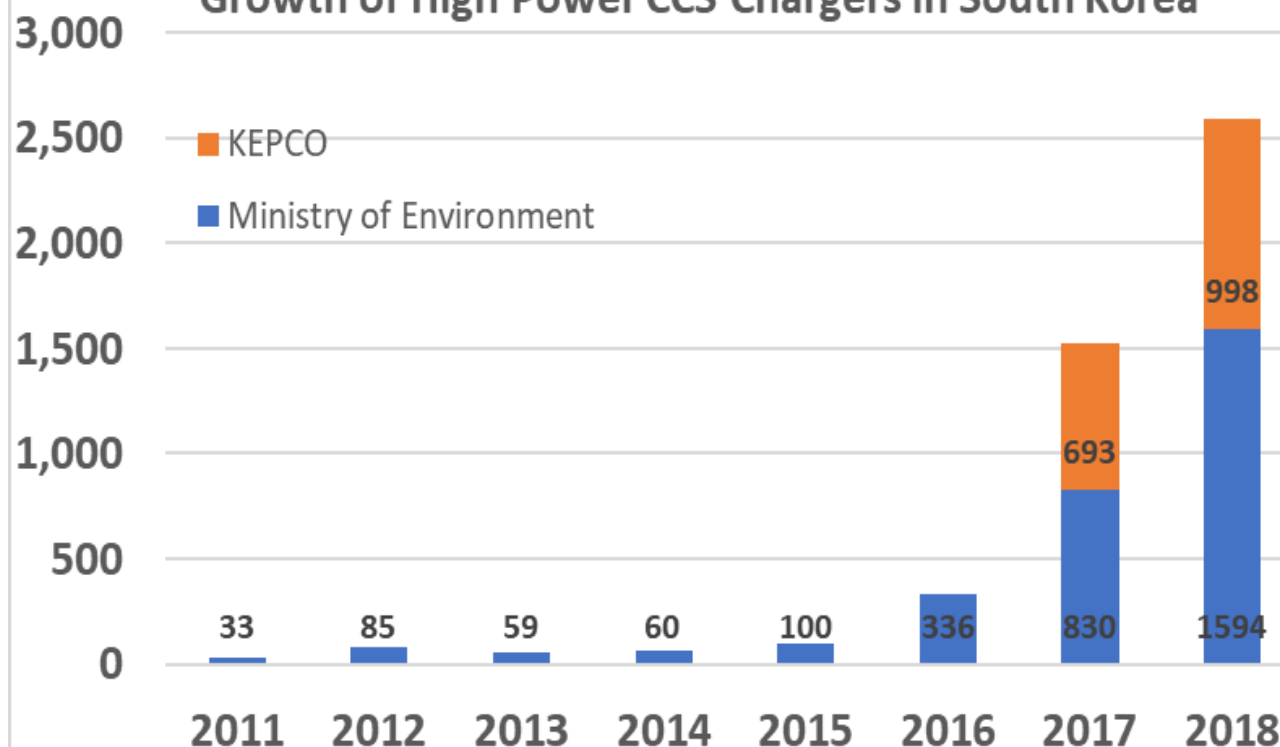


EV Charging stations in Korea

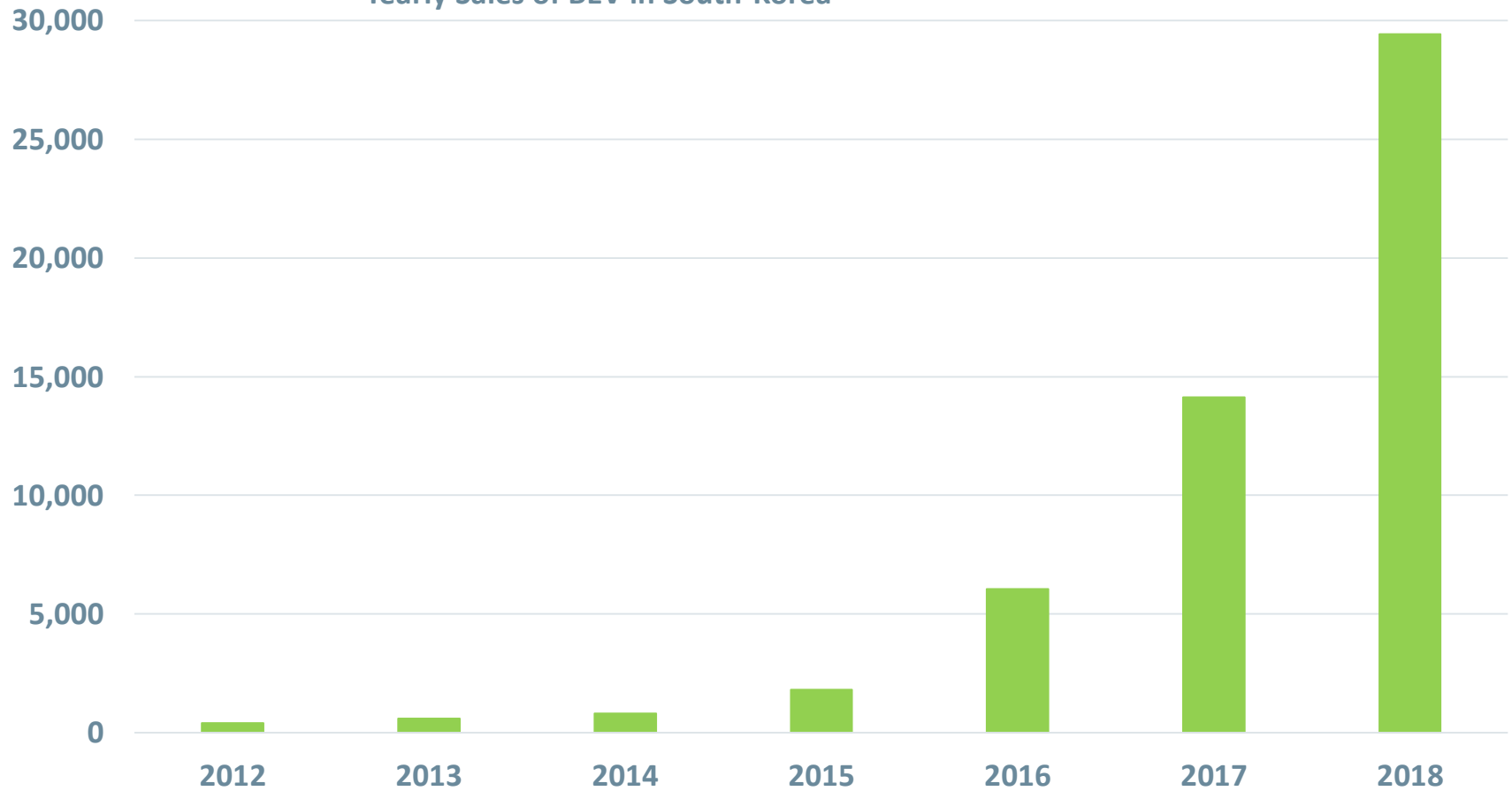


(CCS/AC, as of 03/18)

Growth of High Power CCS Chargers in South Korea

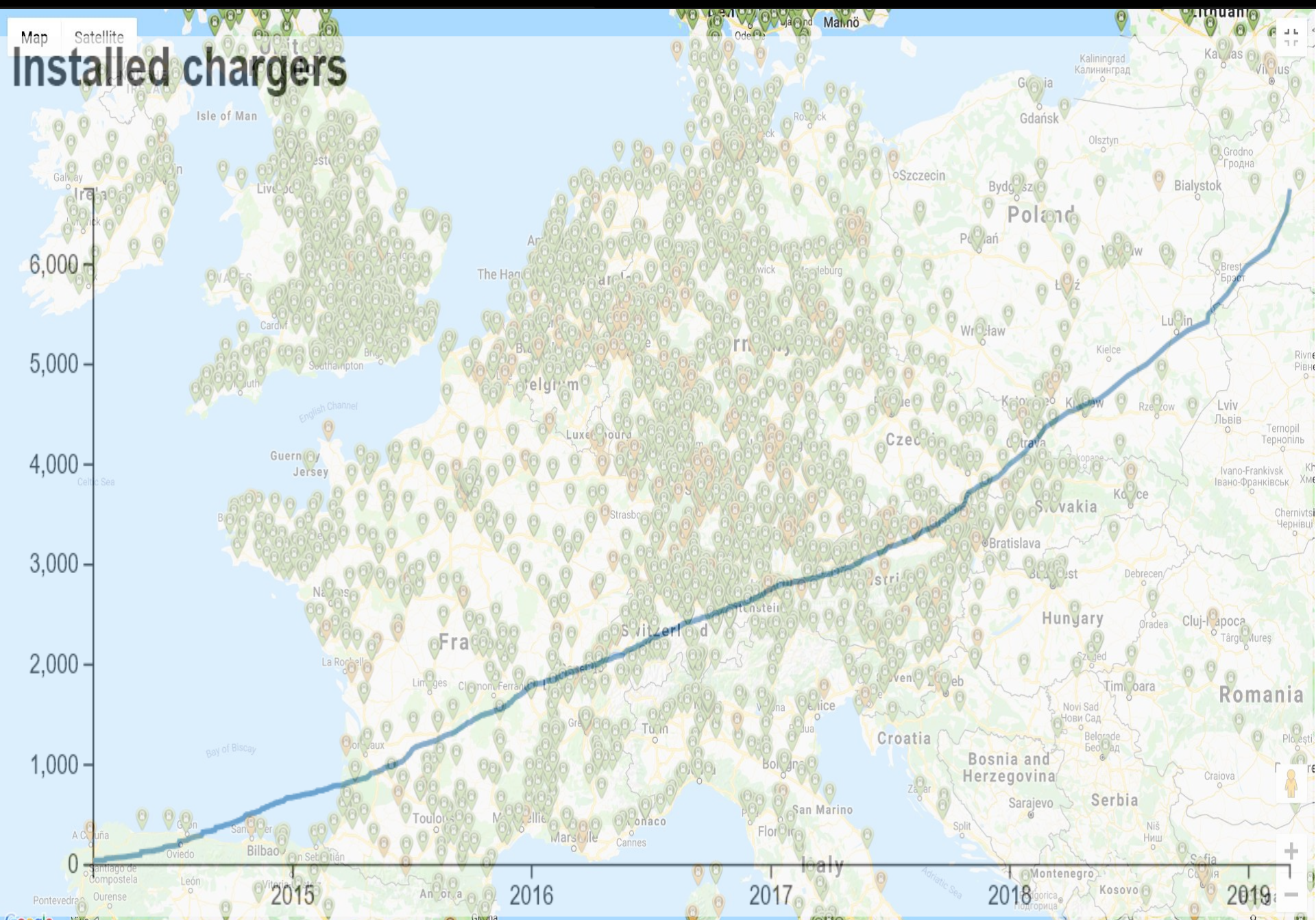


Yearly Sales of BEV in South-Korea



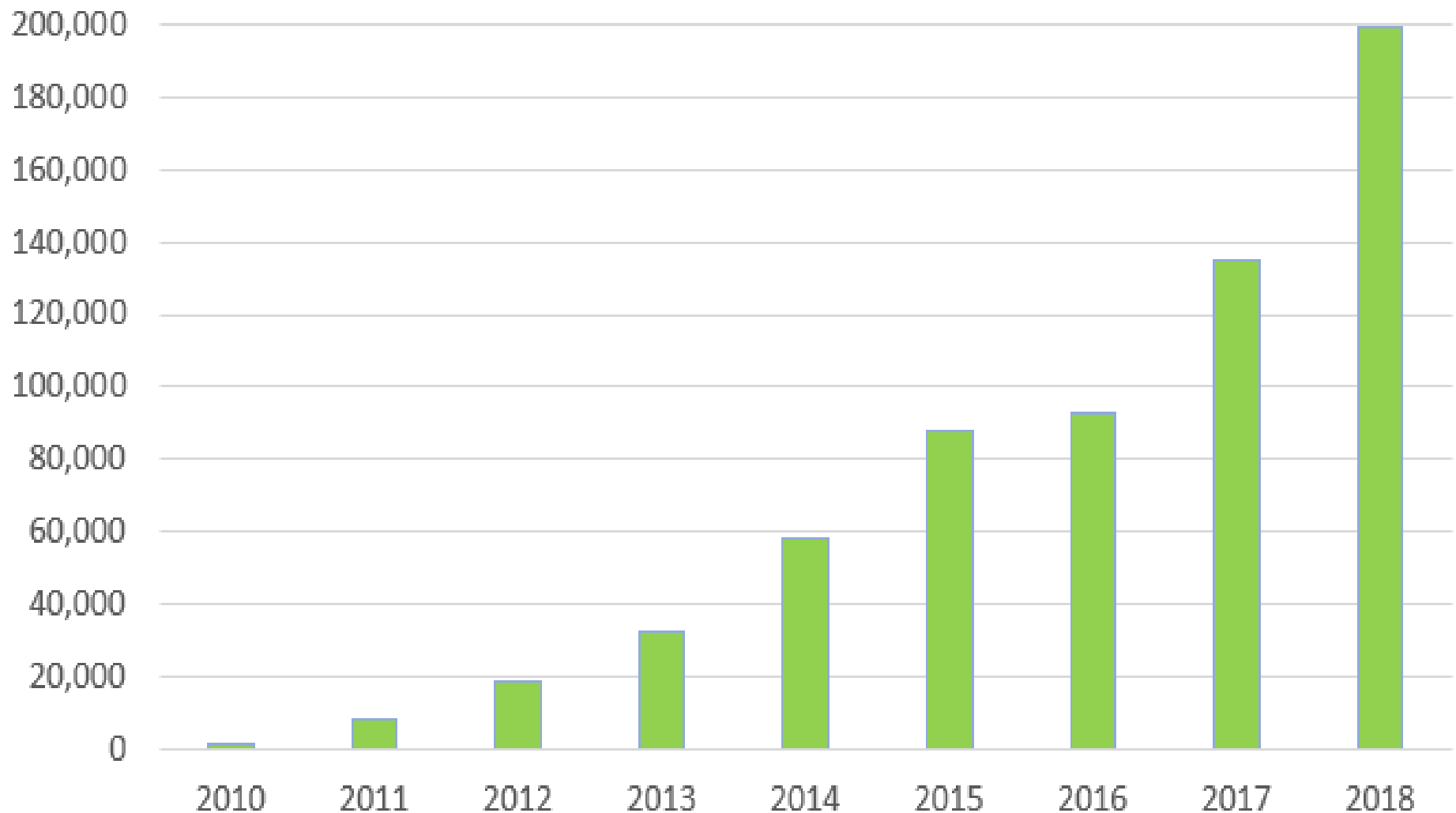
CCS Charge Map - Europe

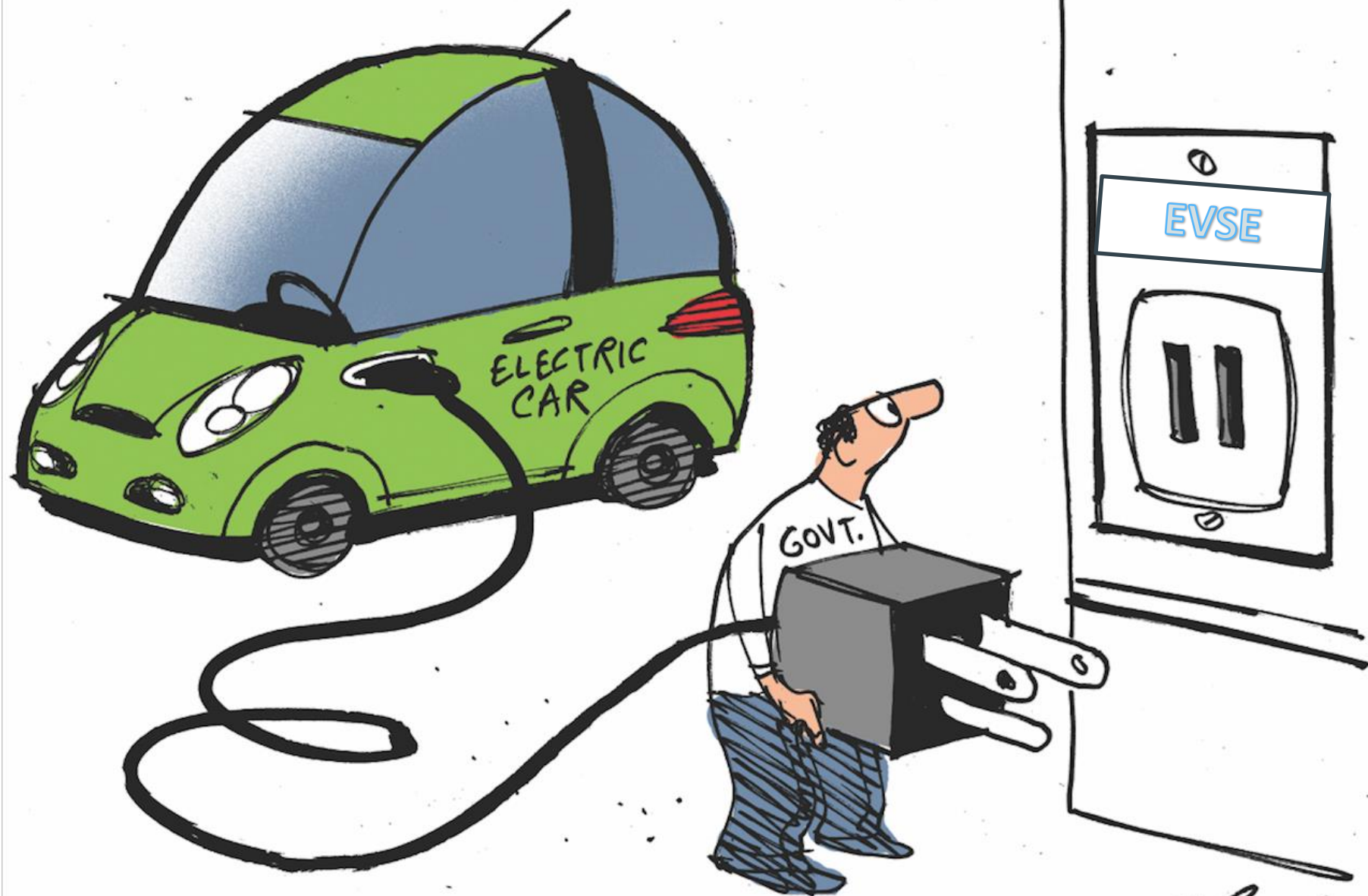
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Evolution of BEV in the EU

BEV sold in Europe





H. Payne



FASTNED

>100 Charging stations

- 400 chargers
- Operational since 2012

Multi-standard charger usage data over time



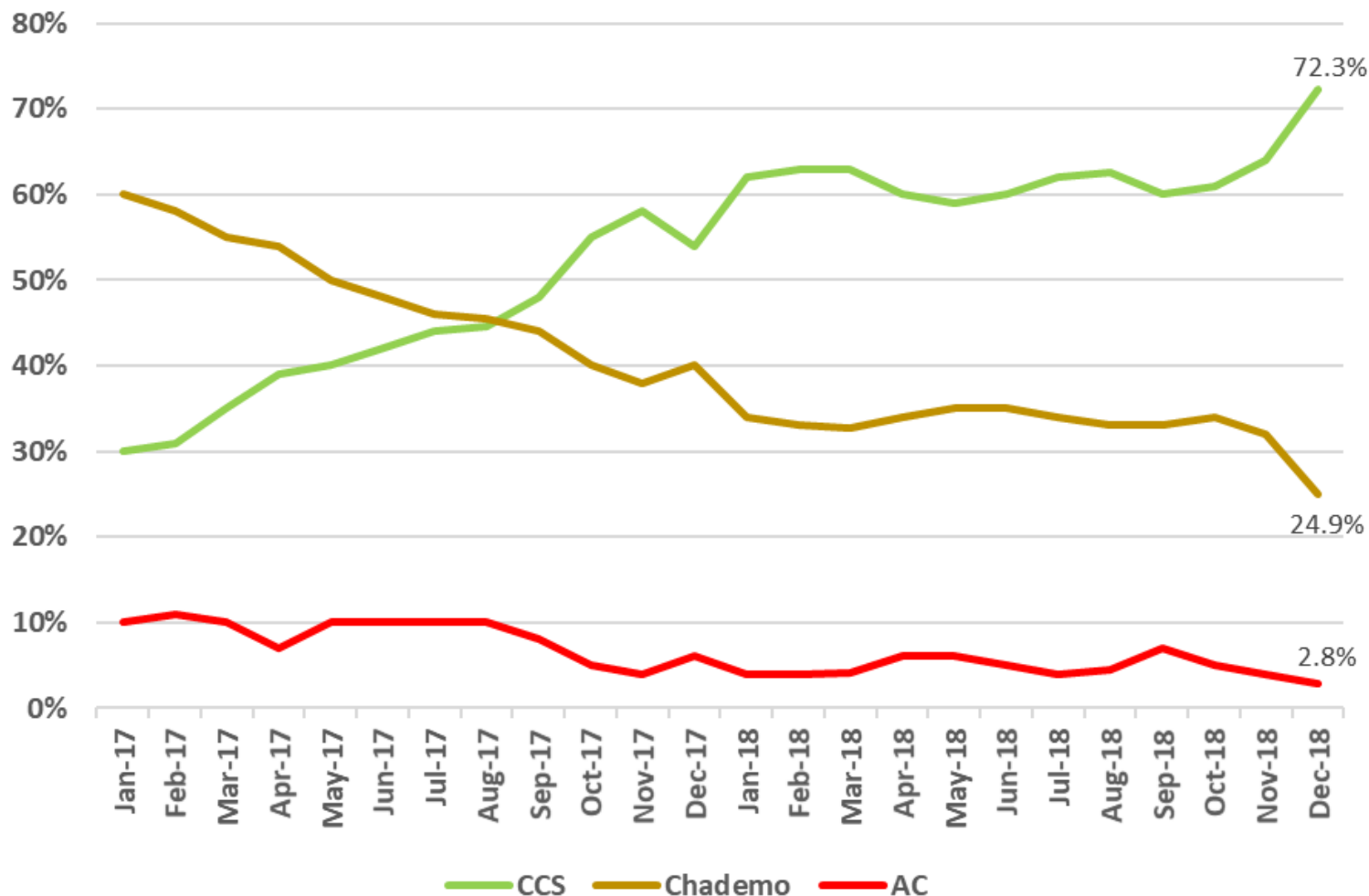
CHARIN

FASTNED

>100 Charging stations

> 400 chargers

 **FastNed Charging by Outlet**





VISION

MISSION

ACTIVITIES

Vision

Challenges from a customers view – CharIN initiative solutions

Customers view | barriers

Simplicity

Safety

Cost

Reliability & Quality

Power & Time

Interoperability



CharIN initiative solution

Single System

One standard for all use cases

Long term invest protection

450 kW+

AC / DC

Up-/downward compatible

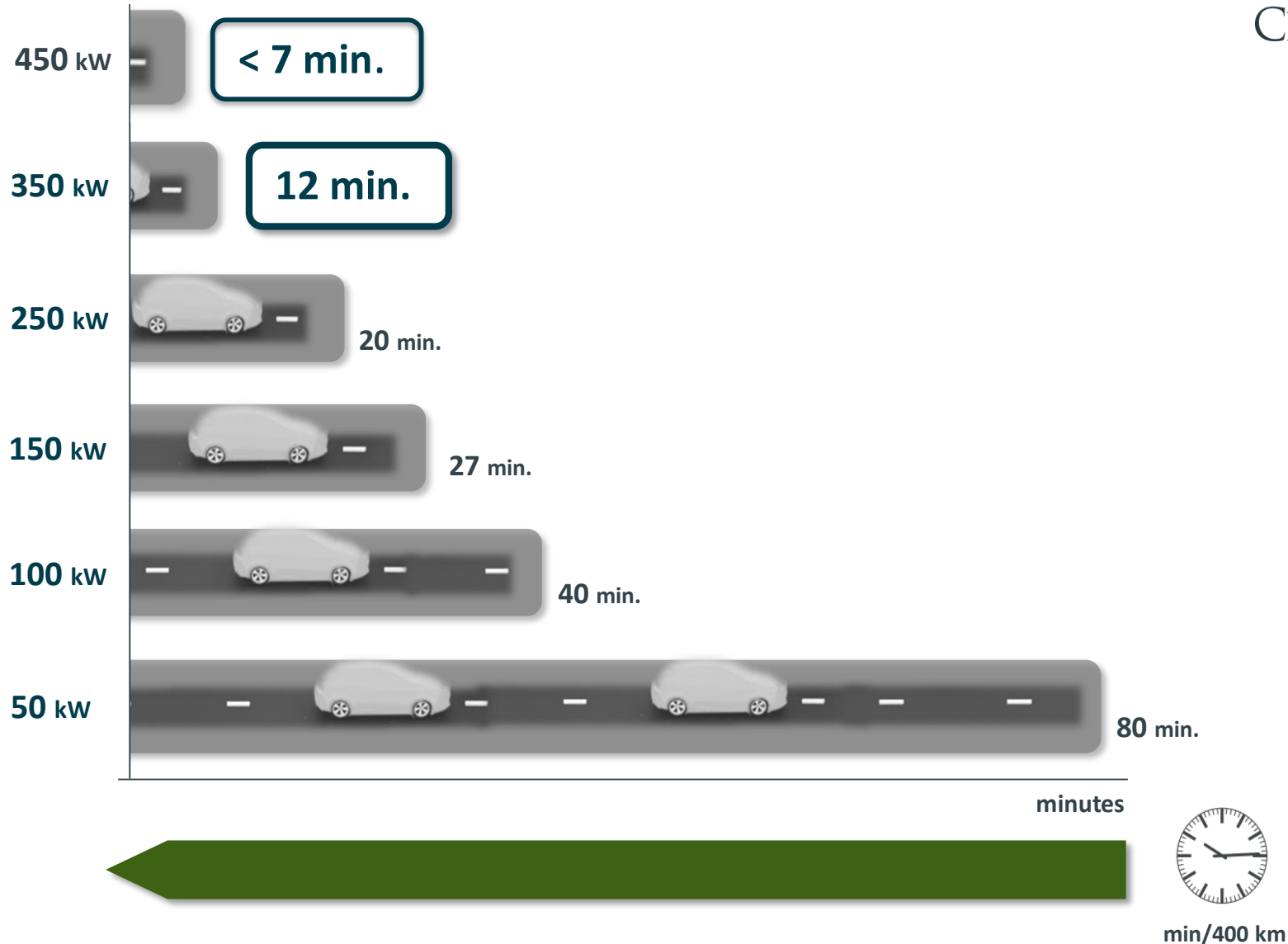
Customer perspective

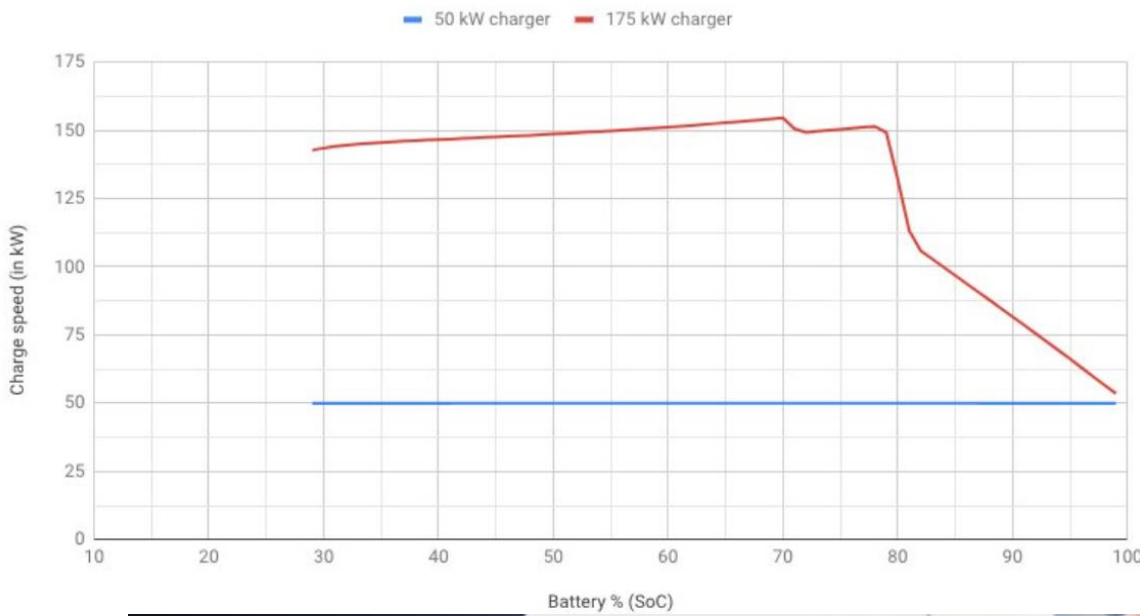
A vision becomes reality



Standardization – perspectives for CSS

Charging times for about 400 km range





175 kW Charger

Charging 95 kWh
battery pack

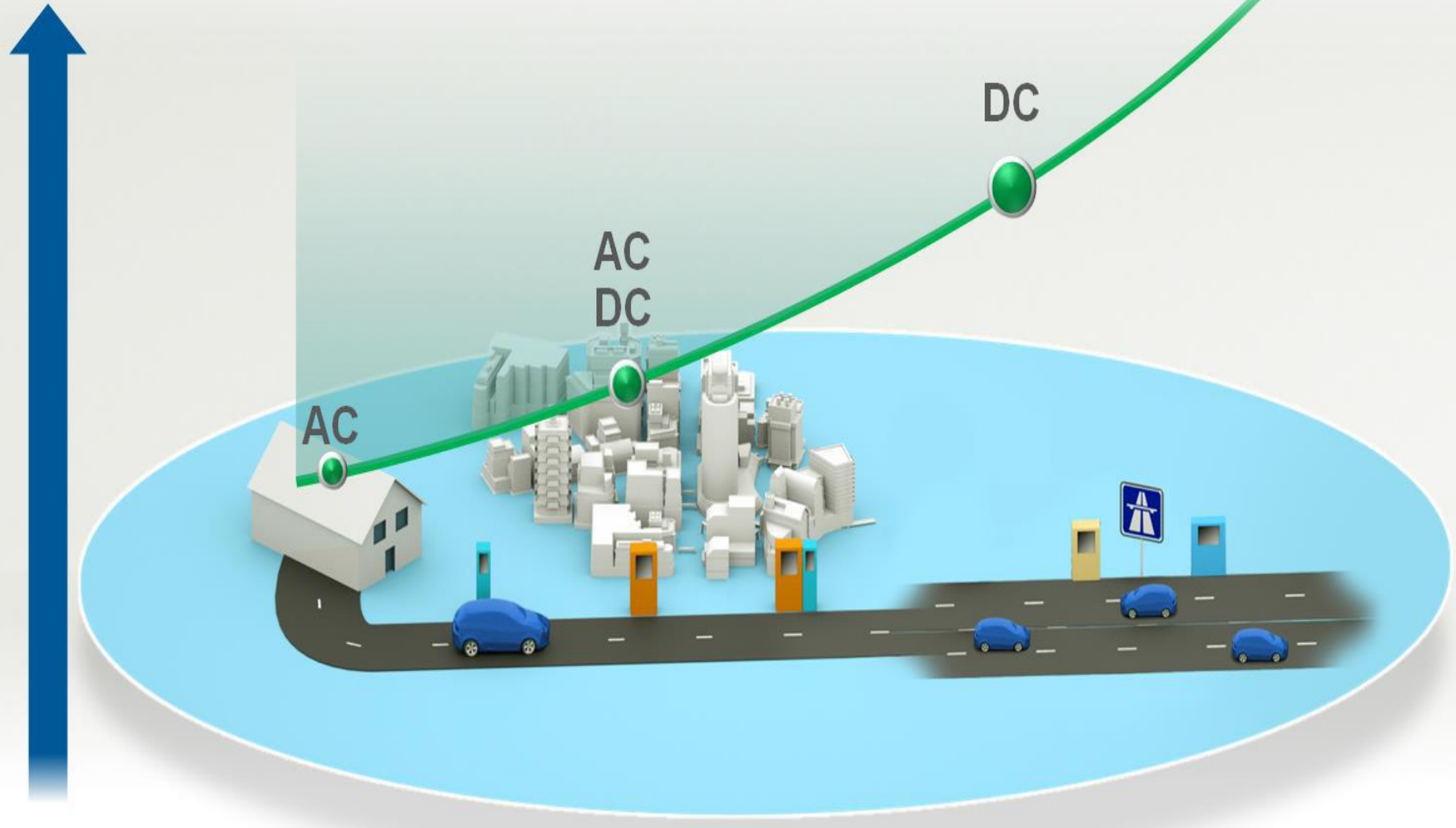


CHARIN

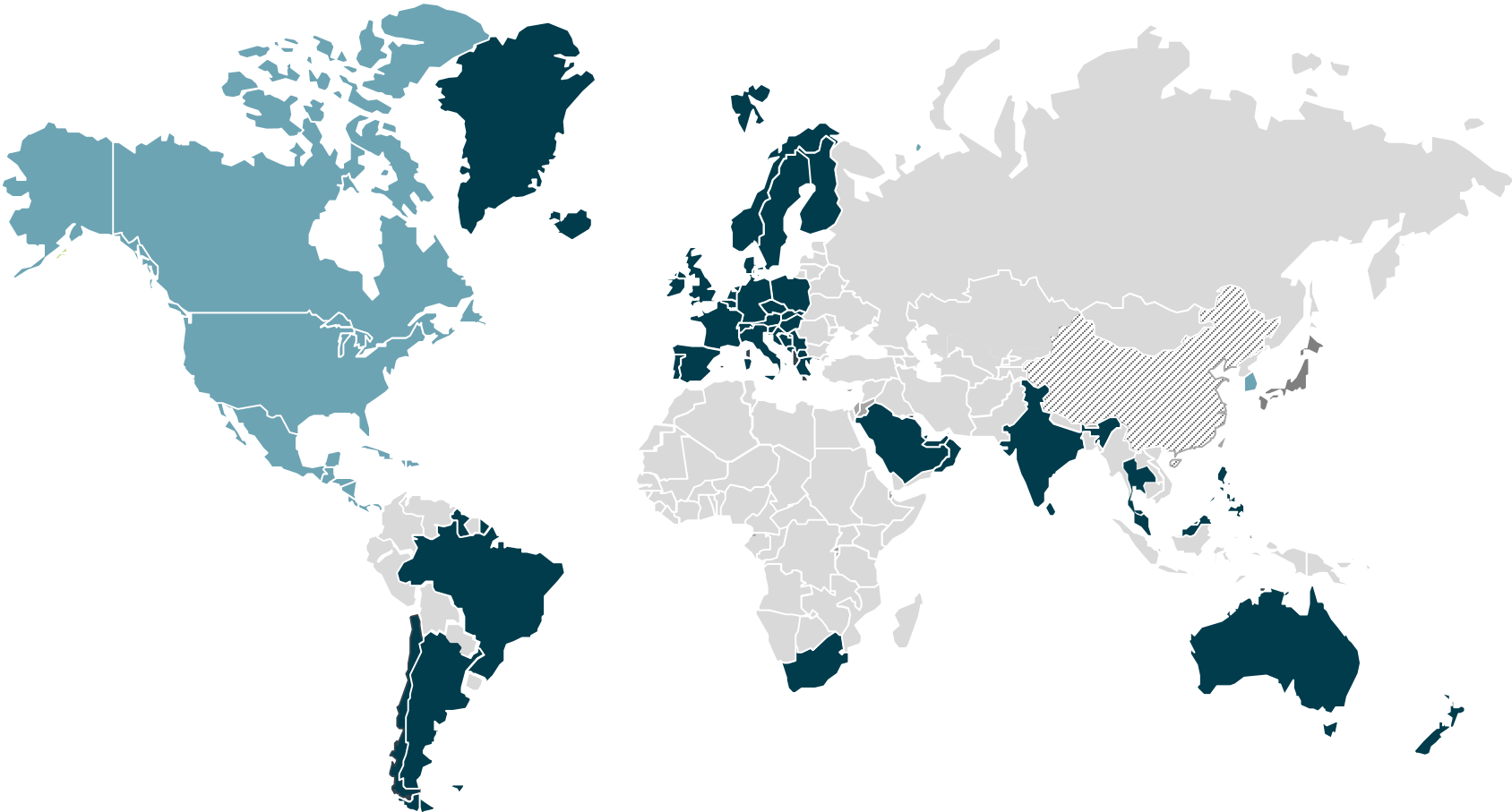


Charging behavior

Charging performance



World Map of Charging System Standards



CCS 1

An icon of a CCS 1 charging connector, which is a black, rectangular plug with two circular ports at the bottom and four smaller circular ports at the top.

CCS 2

An icon of a CCS 2 charging connector, which is a black, rectangular plug with two circular ports at the bottom and four smaller circular ports at the top.

CHAdeMO

An icon of a CHAdeMO charging connector, showing two different types: a red and blue high-power connector and a black low-power connector.

GBT

An icon of a GBT (GB/T) charging connector, showing two different types: a black high-power connector and a black low-power connector.

ChaoJi

An icon of a ChaoJi charging connector, which is a square, metallic-looking plug with multiple circular ports.

DRAFT

Not decided

A solid grey circle representing an undetermined or "Not decided" status.

CharIN association

Our members – currently 161 (total) 1/2



Core Members



Core members: 91

CharIN association

Our members – currently **161** (total) 2/2



Regular Members



Associated Members



Supporters of CharIN



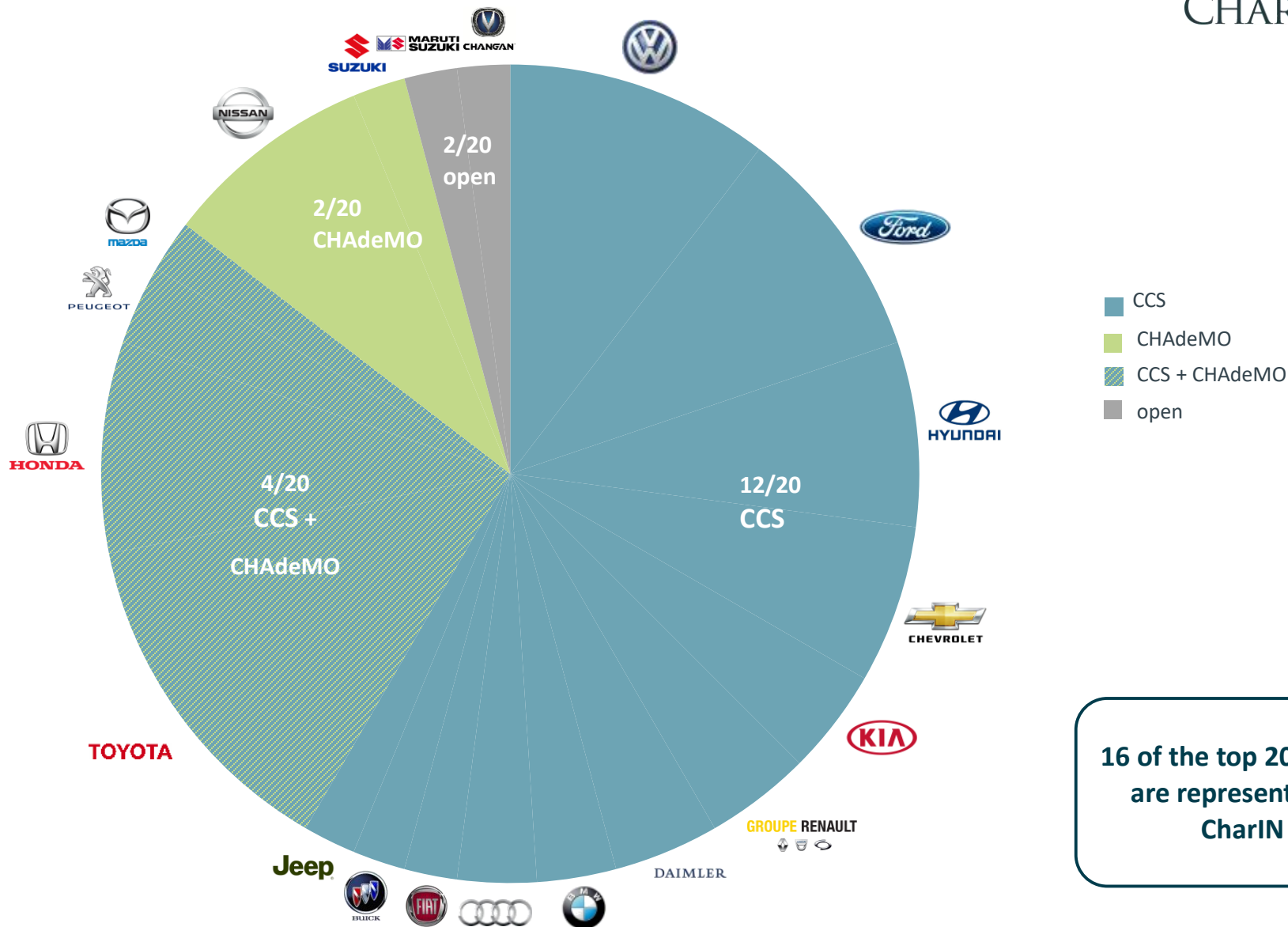
Regular members: 68



Supporters of CharIN: 12

Membership Share

Top 20 brands 2017 by volume



16 of the top 20 brands
are represented in
CharIN



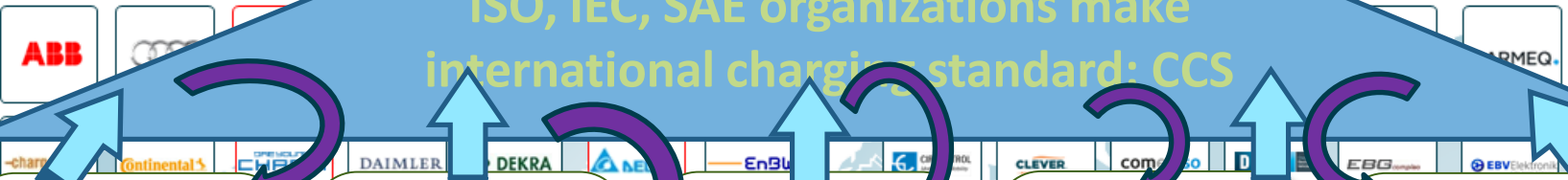
VISION

MISSION

ACTIVITIES

ISO, IEC, SAE organizations make international charging standard: CCS

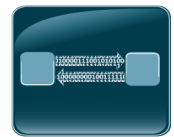
Core Members



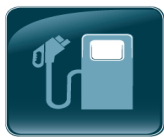
Charging Connection



Charging Communication



Charging Infrastructure



Conformance Test | Interoperability



Grid Integration



Grid Operators

Utility companies

Charging Station Operators

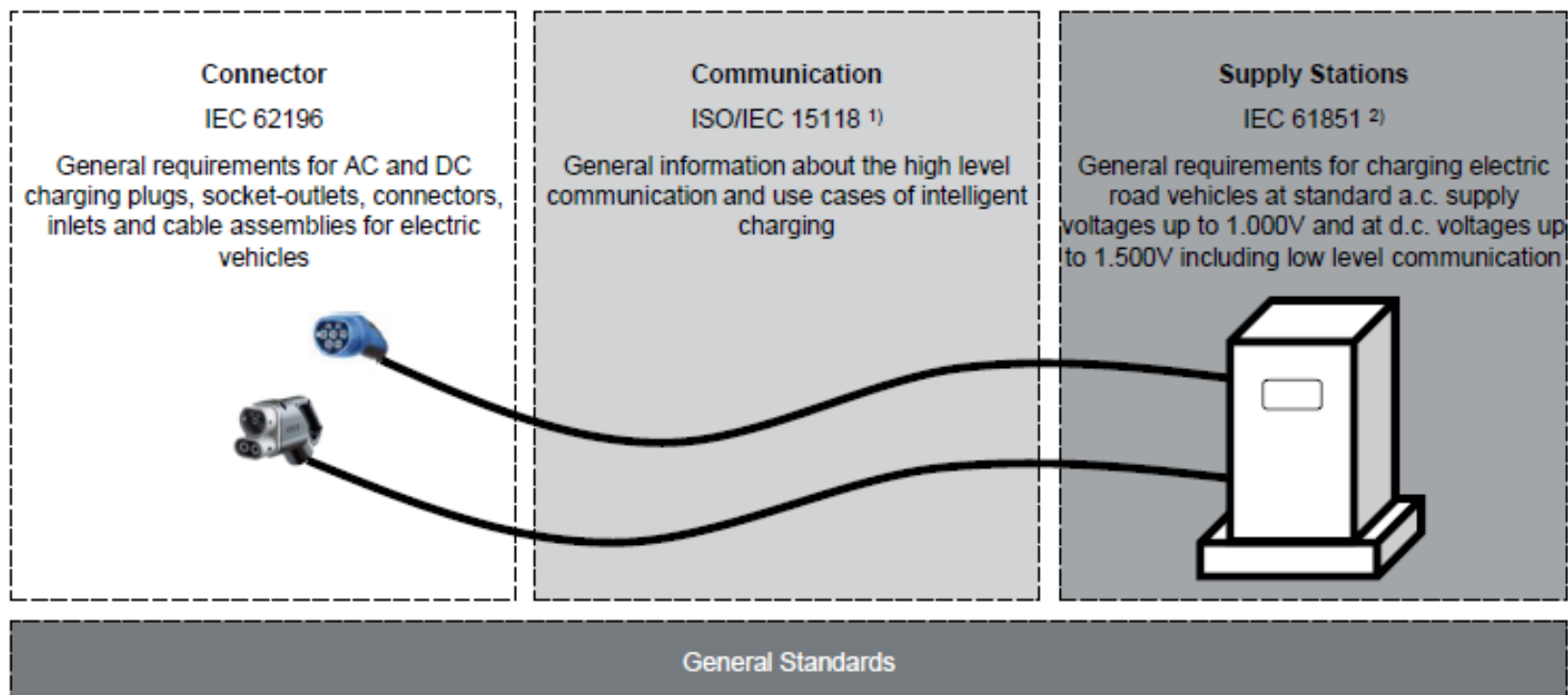
EVSE, Test Equipment, Hardware, Software companies

EV producers

Members

Worldwide based CharIN members

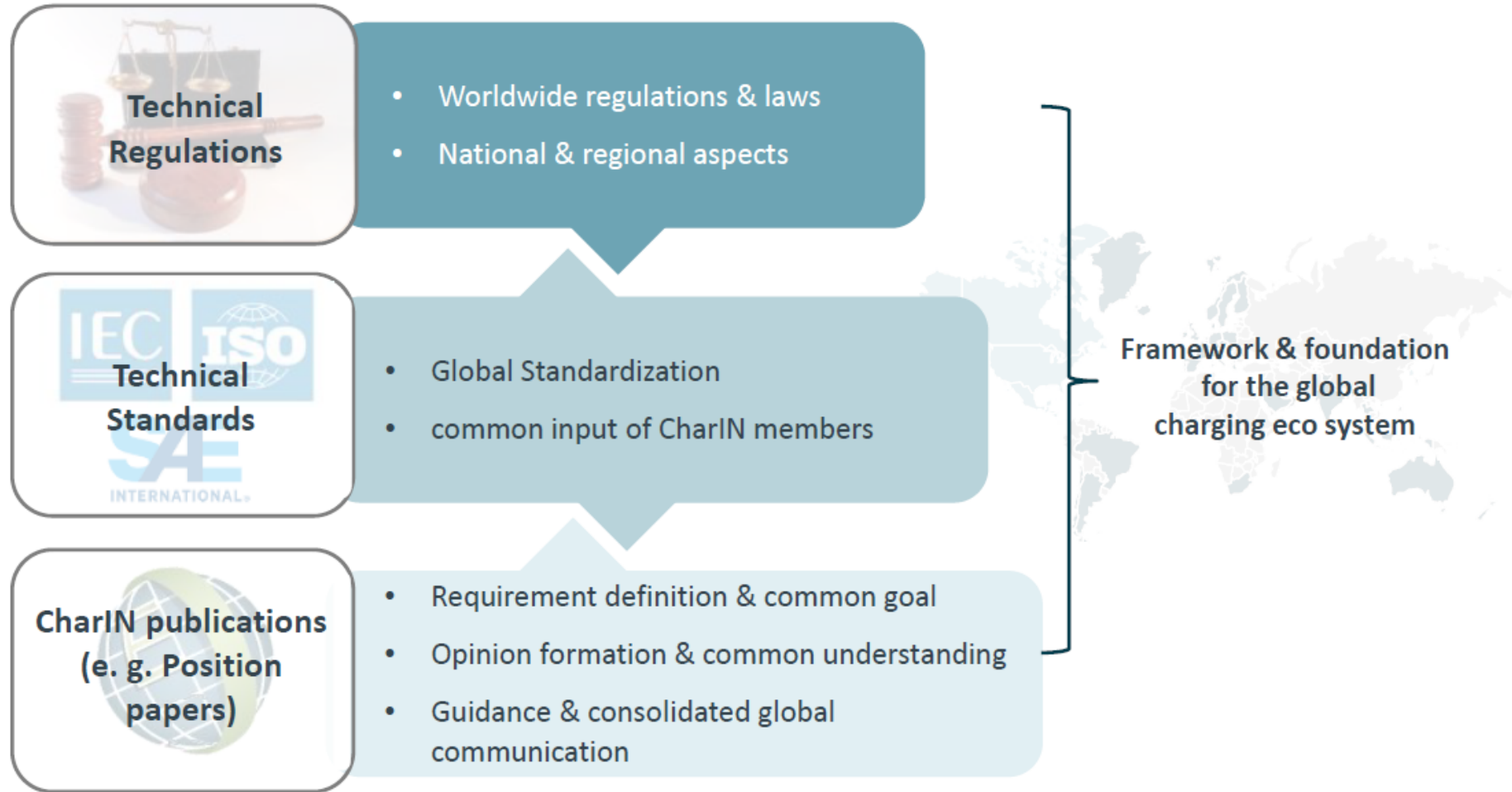
General Standards/Description – Functions of the fast charging station

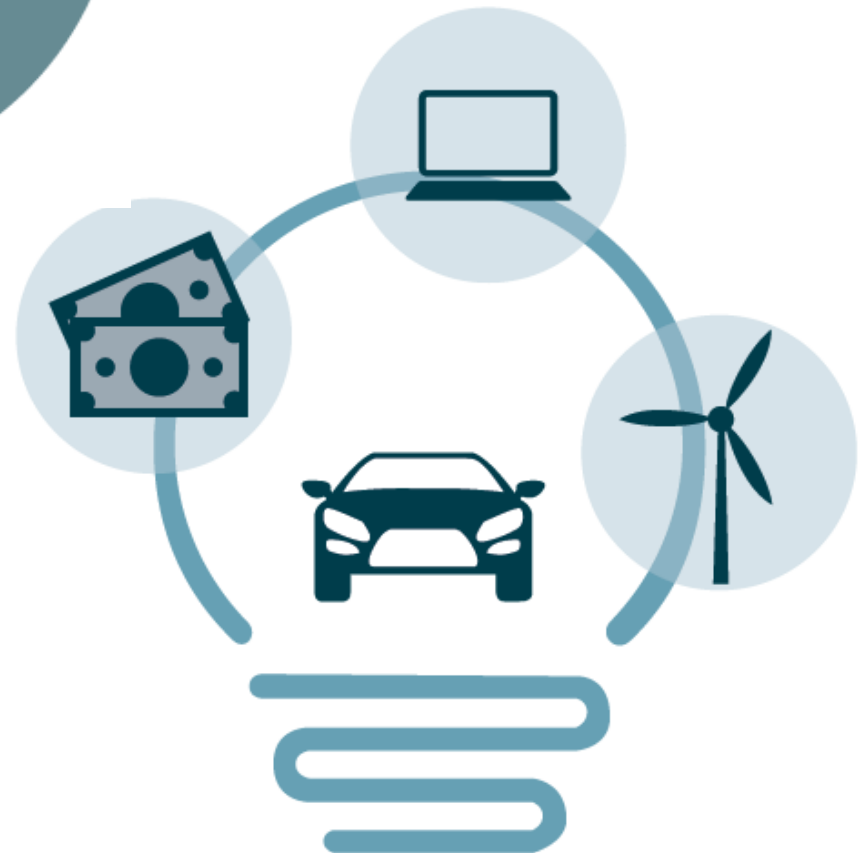
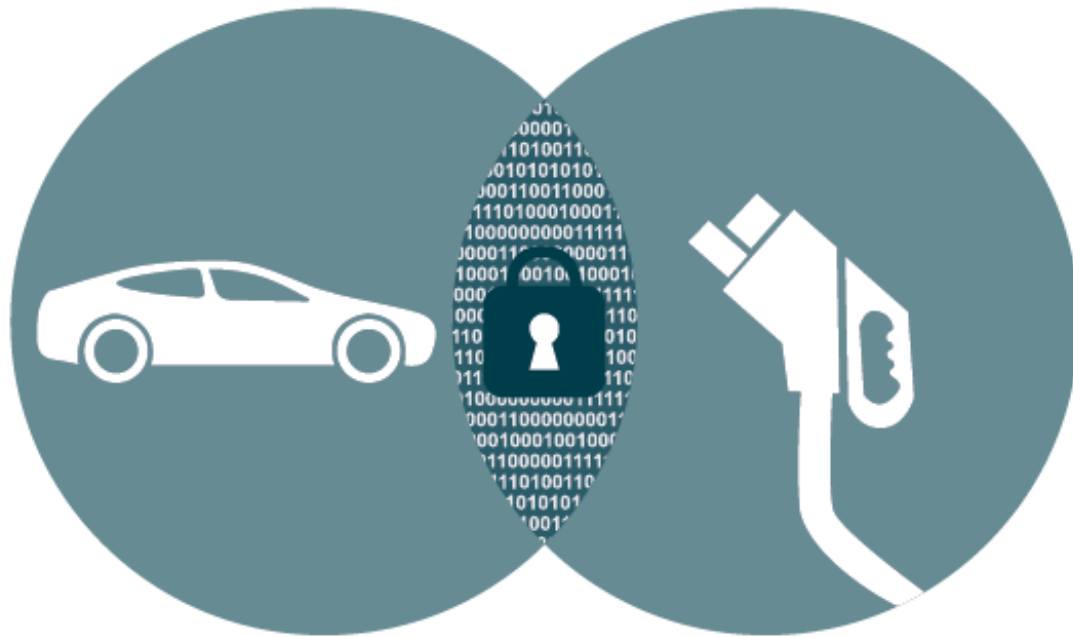


¹⁾ In conjunction with ISO/IEC 15118 please note also DIN SPEC 70121.

²⁾ Please note that IEC 61851-21 as part of IEC 61851 will be replaced by ISO 17409 in the near future.

Big picture CharIN's role in standardization





Value added services with the International Charging Standard CCS

Communication protocol: ISO 15118



Software

Software houses, Apps, CCS uses the ISO 15118 communication protocol is based on IPv6 & Ethernet-compatible Data Link Layer

The CharIN e.V. Association firmly supports ISO/IEC 15118 as the key component of the CCS Standard and as part of the end-to-end solution solving a wide variety of use cases and addressing diverse regional requirements. ISO/IEC 15118 enables an automated, user friendly charging and billing process, multi-stakeholder interoperability and the economy of scale. The protocol is chosen by the association as the standard for communication between the electric vehicle and the electric vehicle supply equipment and it assures a future-proof communication.

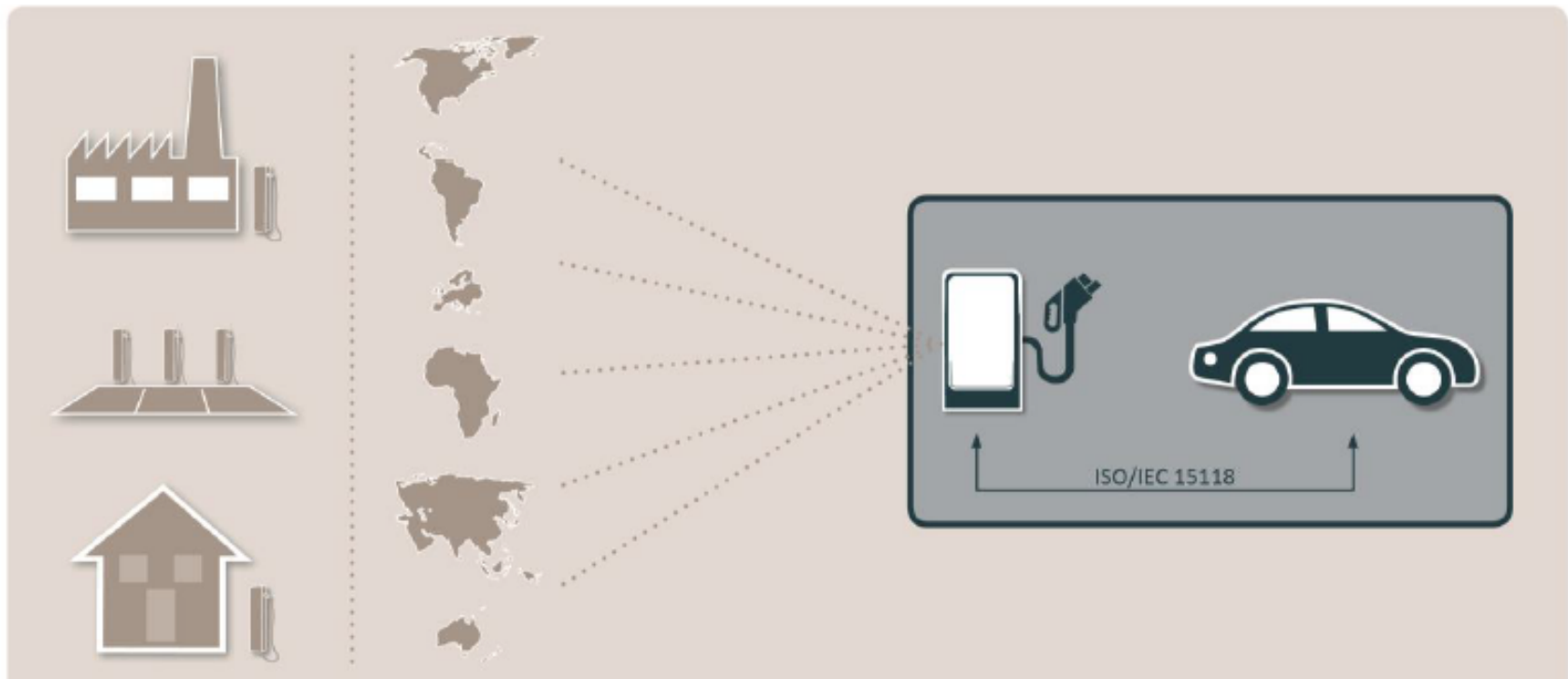


Figure 1 Visualization of the outlined communication between vehicle and charging station

Roaming with different operators using ISO 15118



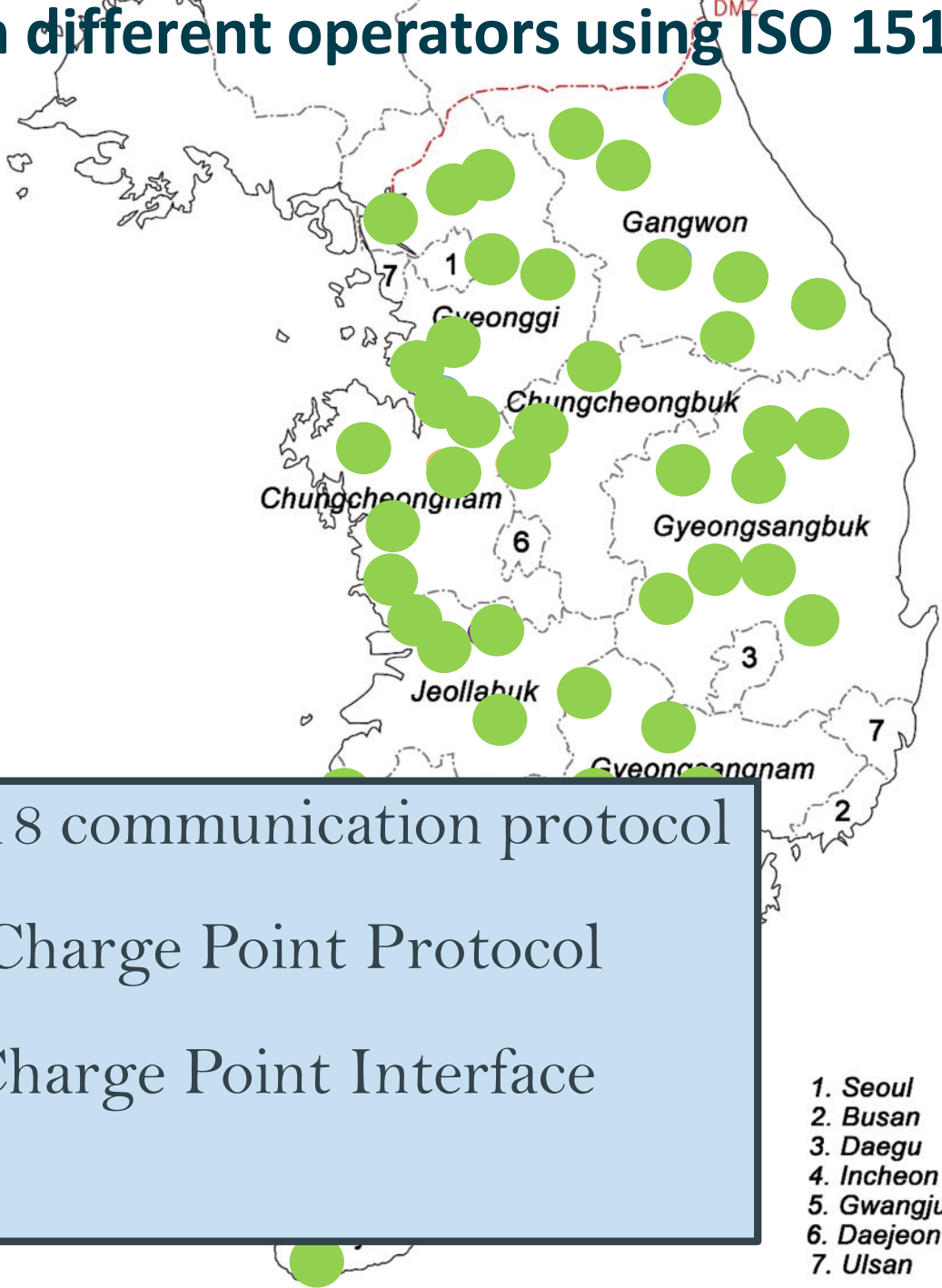
- Charging Operator1 (blue circle)
- Charging Operator (red circle)
- Charging Operator (purple circle)
- Charging Operator (yellow circle)



CCS ISO 15118 communication protocol

OCPP: Open Charge Point Protocol

OCPI: Open Charge Point Interface





HUBJECT

Why is Plug 'n Charge Important for future developments?



Autonomous driving



Fleets / Car Sharing / Rental companies



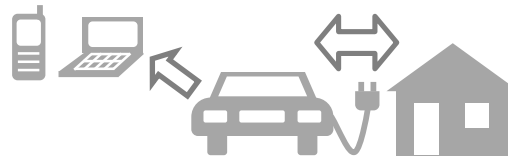
Pantograph Charging



Wireless Charging



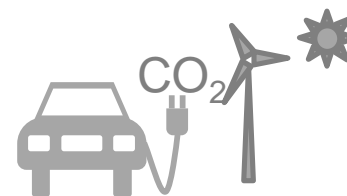




CCS MyEnergy allows me to use my car as power supply for my home or for electric devices



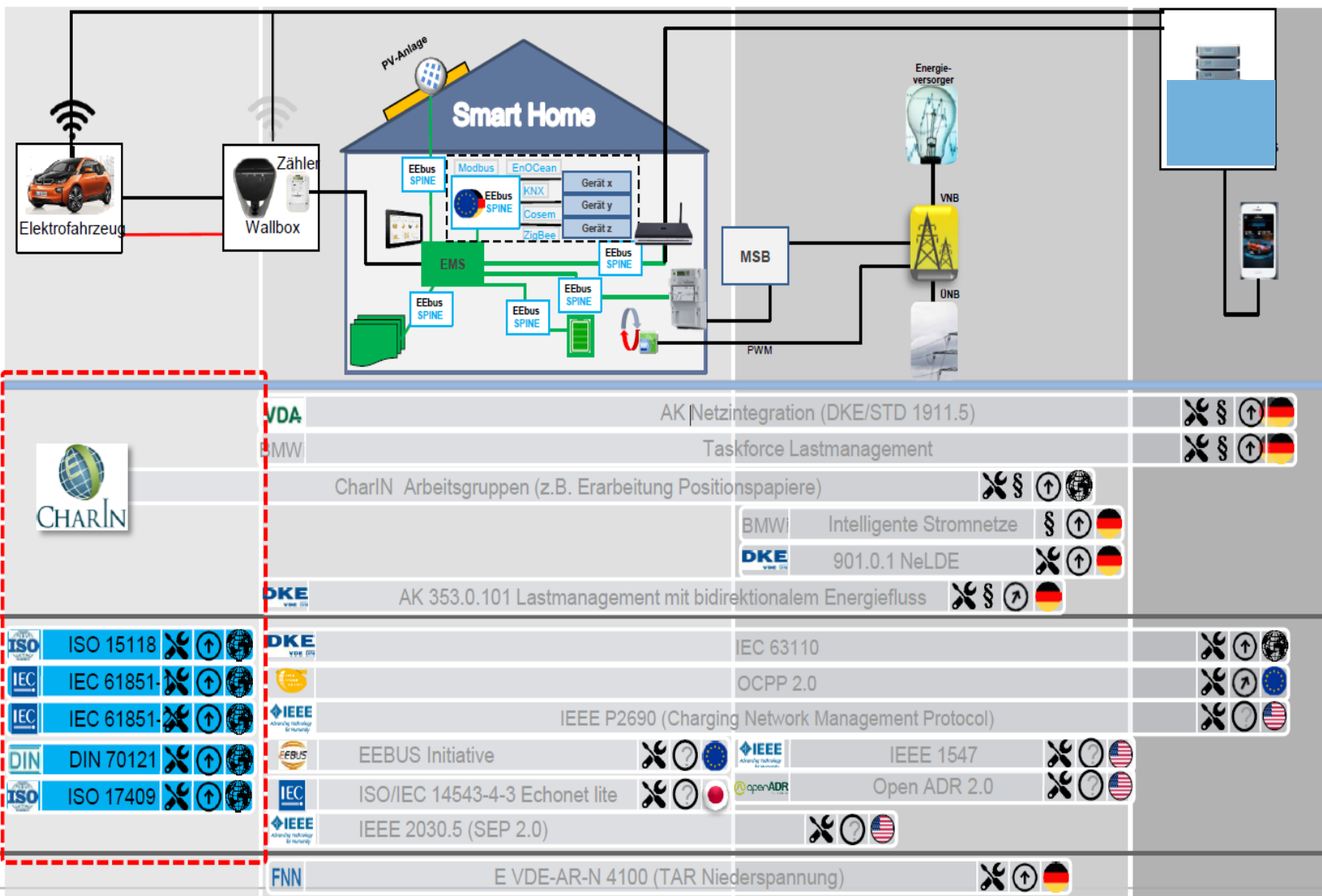
CCS SmartCost optimizes long charging sessions to achieve a low price in a smart grid environment



CCS SmartCO₂ uses my car as energy storage in a smart grid based on renewable energies

Smart grid: EV charging & Energy Management

STANDARDISATION AND REGULATORY FRAMEWORK ARE THE KEY.



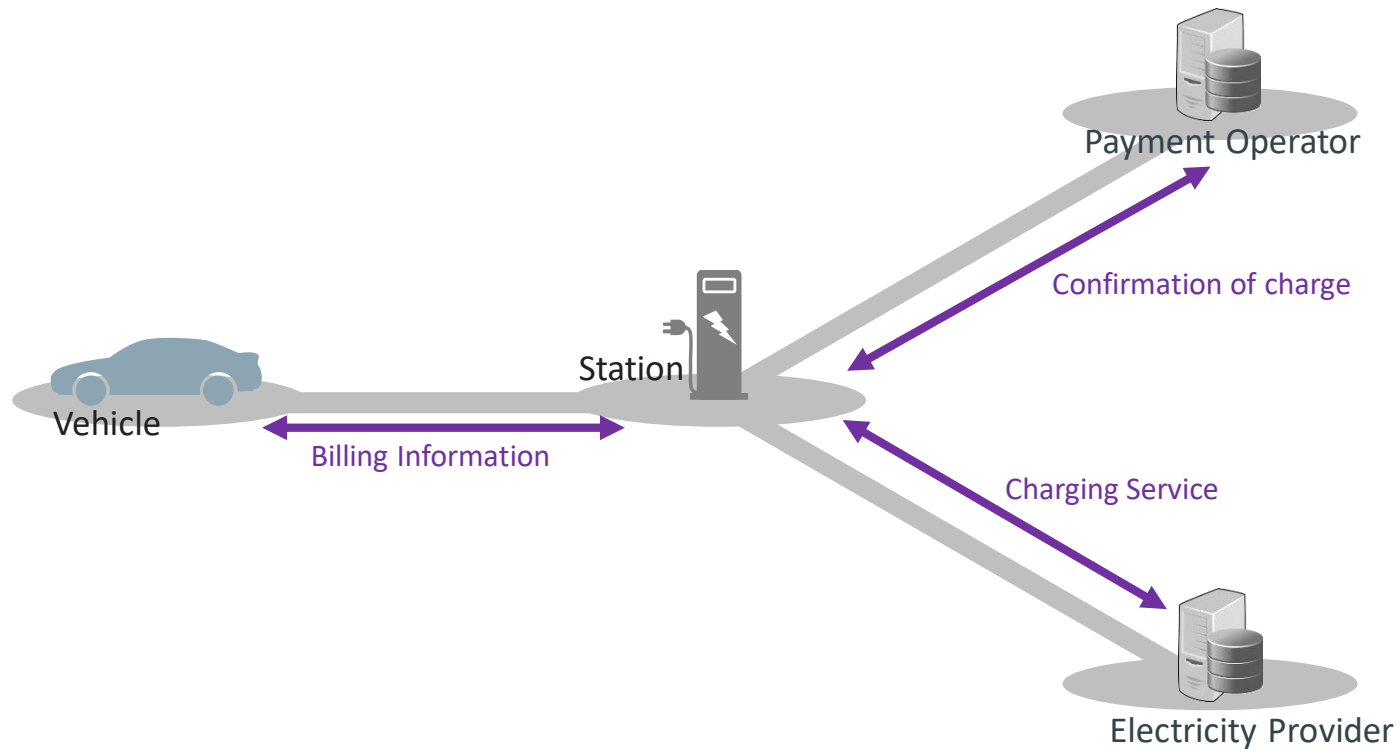
Software: Security

Communication security @ Charging Station



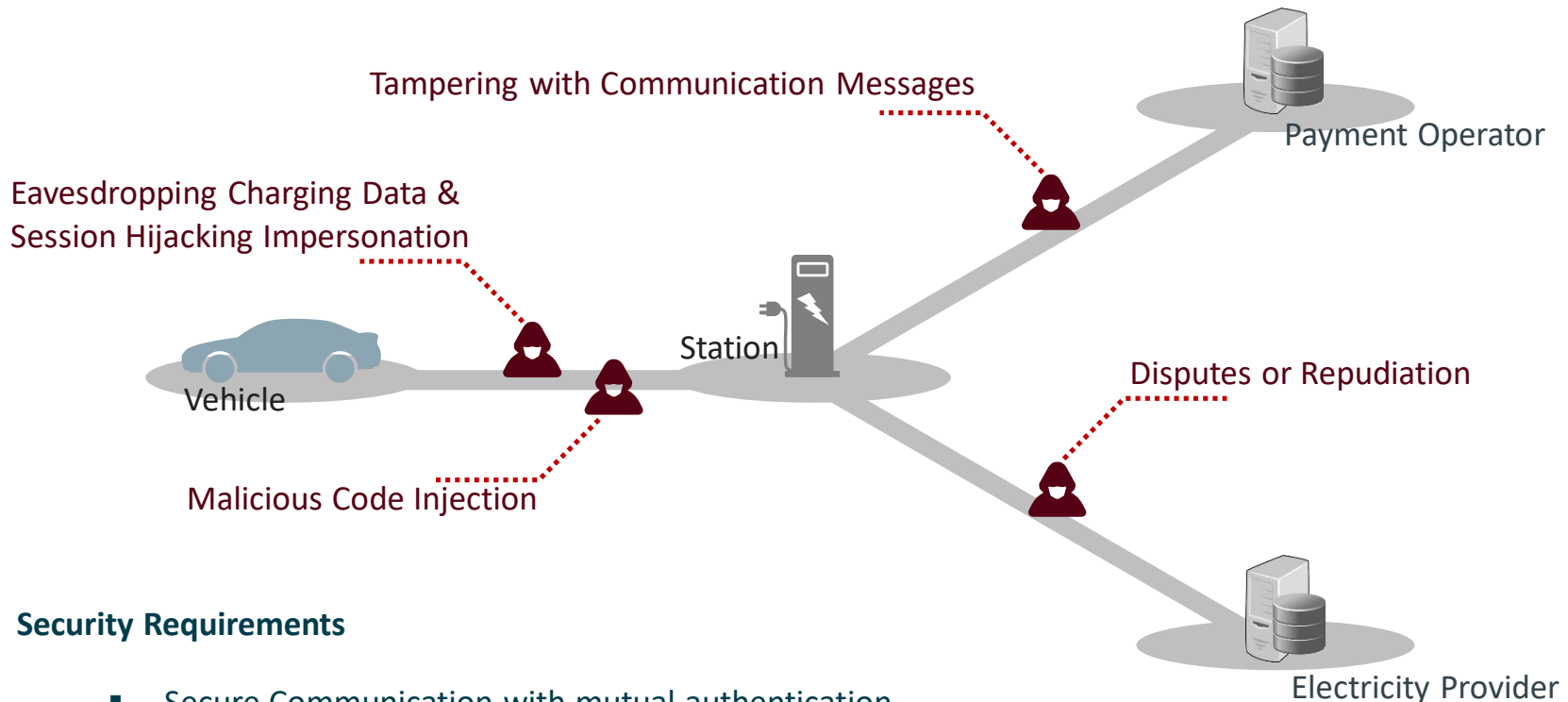
Software: Security

Communication security @ Charging Station



Software: security

Security Threats in EV and Charging Infrastructure



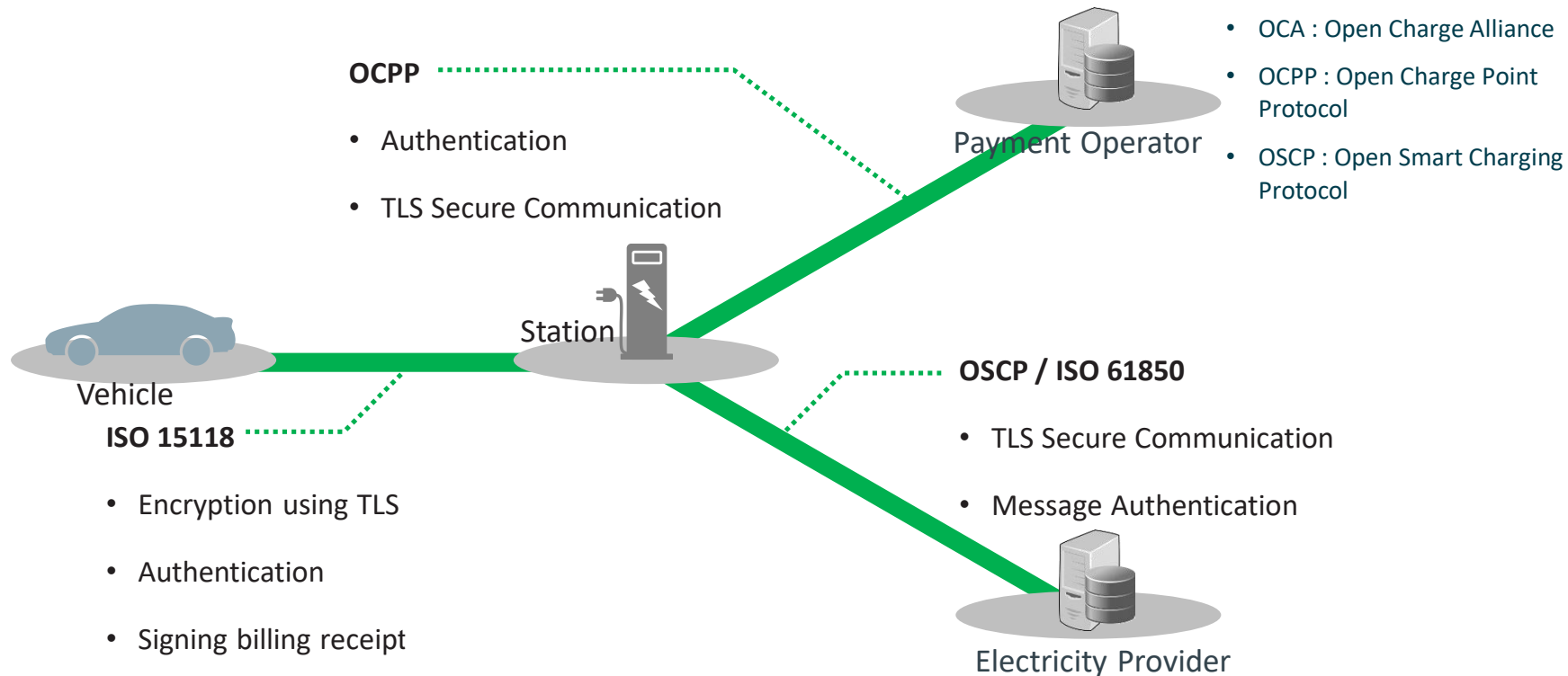
Security Requirements

- 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



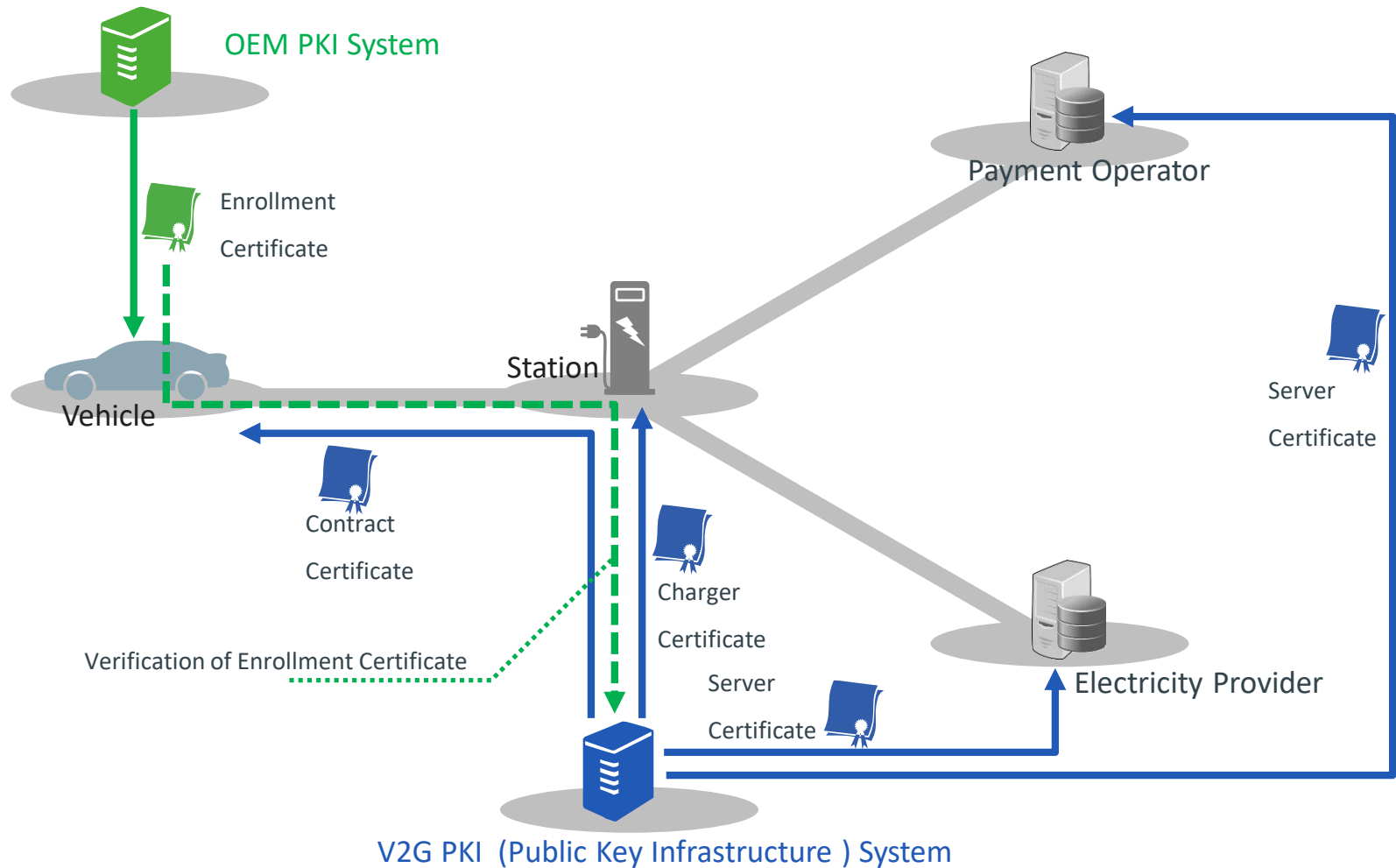
OCA

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.

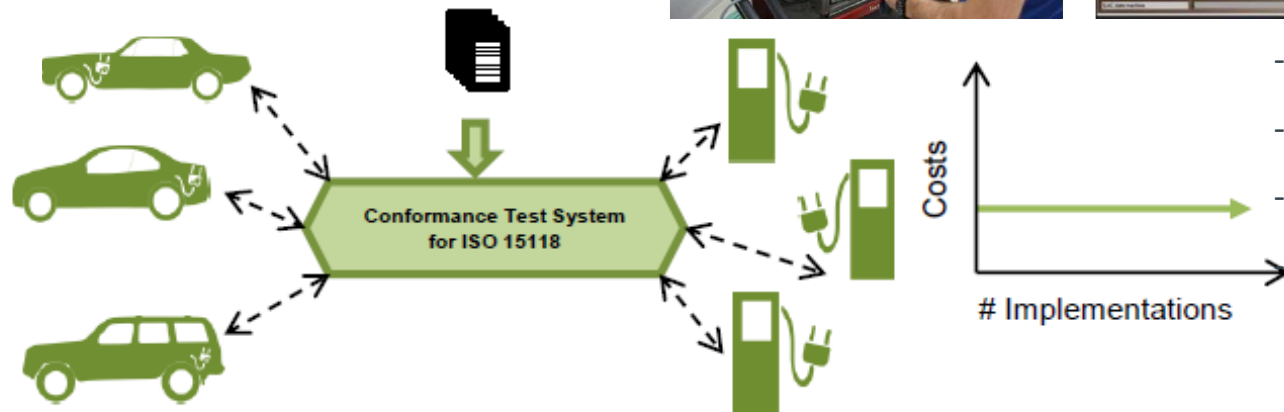
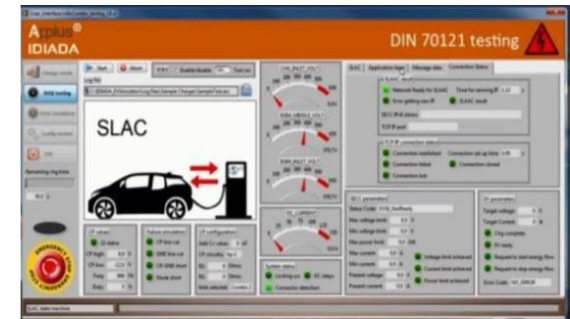
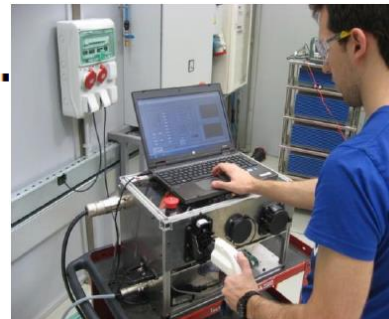
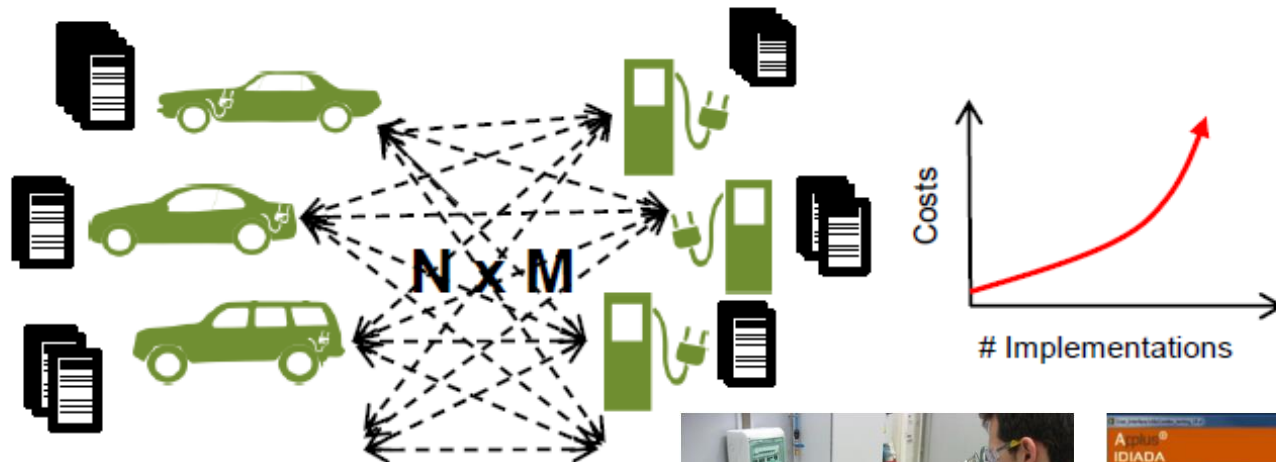
Software: Security

Security Model for EV & EVS



Golden Test Device: conformity and interoperability

Third party accreditation



- Manufacturers
- Homologation agencies
- Accreditation org.

Pantograph

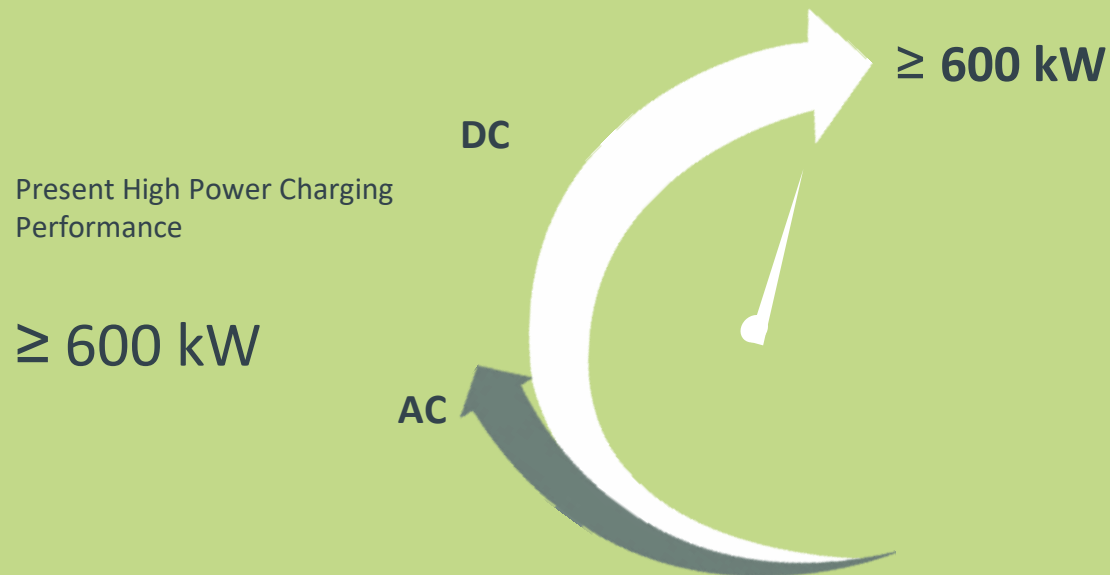


Upcoming standards: Wireless charging



Present: HPC

High Power Charging



Scope of application

Motorbike | Car | Bus | Truck



ISO 15118, CCS2, CCS1 standard has no IPR

It's an international standard freely
available to all

Upcoming Standard: Ultra-Fast Charging

Ultra Fast Charging

Upcoming Ultra Fast Power Charging for
commercial vehicles: Trucks, Busses, Heavy
equipment, Marine, Aviation

> 1MW – 5 MW

DC

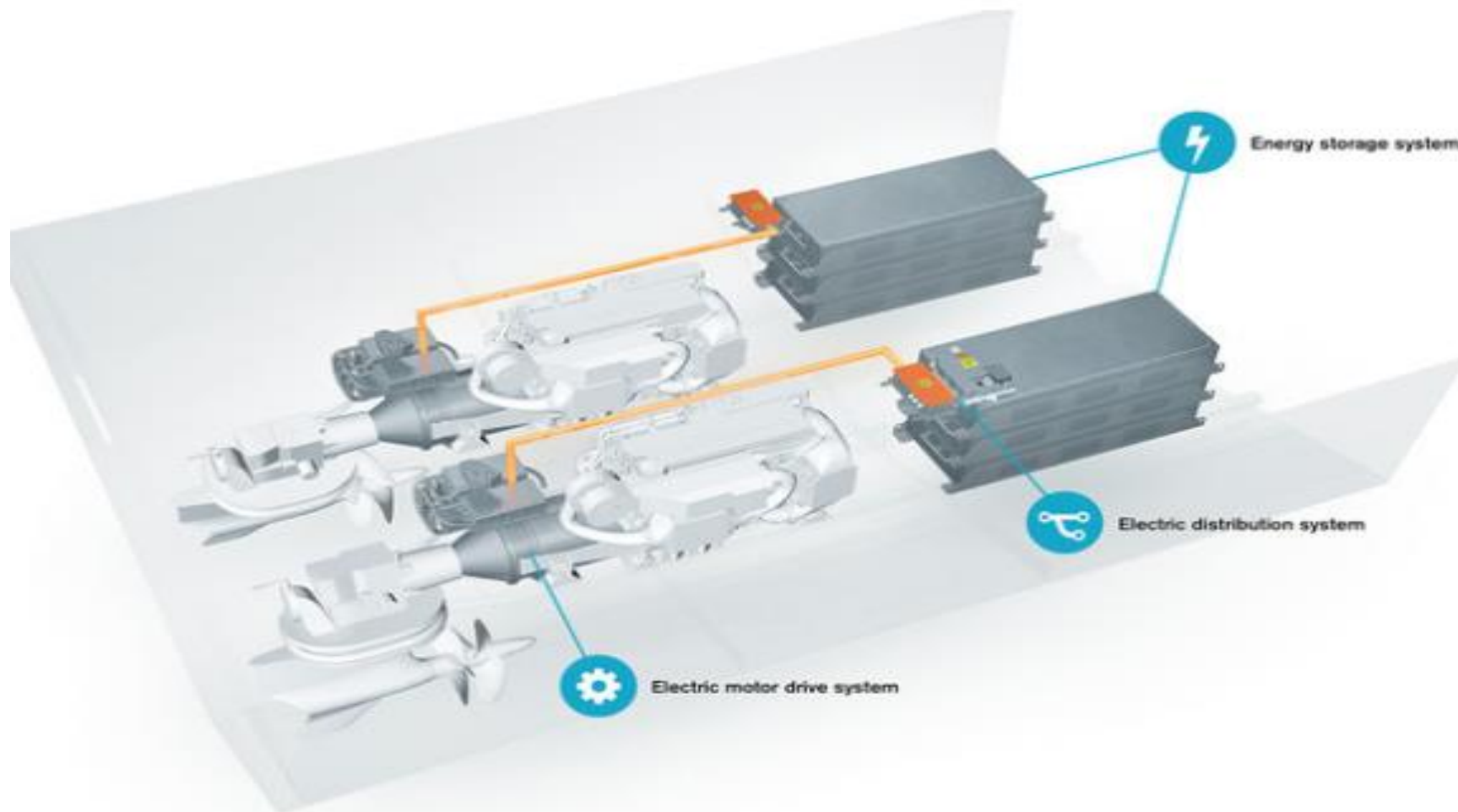


> 1 -5 MW

Heavy Duty Trucks



Why Marine ?

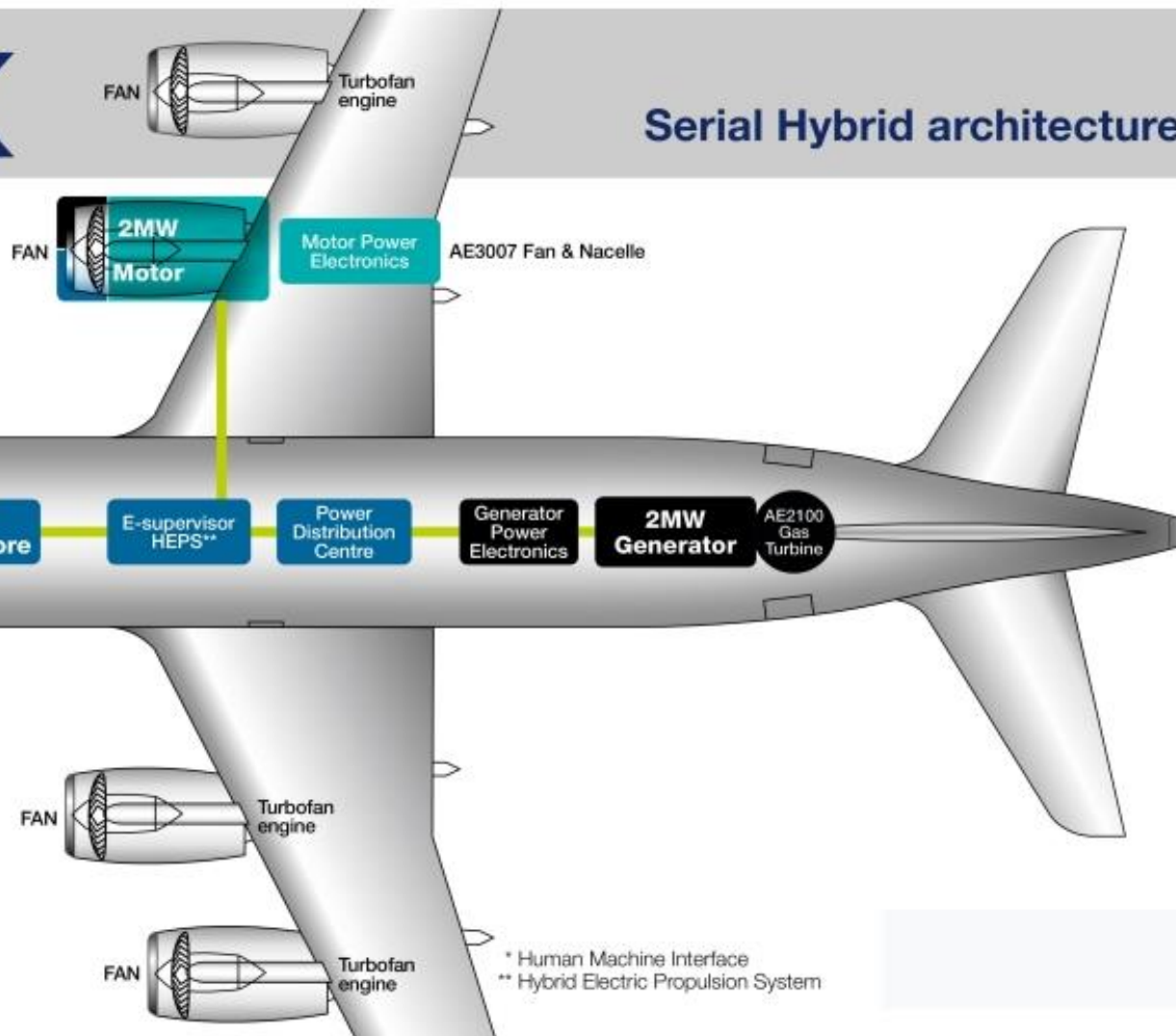


hybrid IPS propulsion system will enable zero emissions operation for marine vessels.

E-FAN X

Serial Hybrid architecture

FAN adaptation :
AIRBUS
+
Rolls-Royce



AIRBUS
SIEMENS
Rolls-Royce

* Human Machine Interface
** Hybrid Electric Propulsion System



CharIN e.V.

Accessible to you at any time right round the world



CharIN North
America Spokesperson



CharIN Head Quarter



Coordination Office
Asia & China



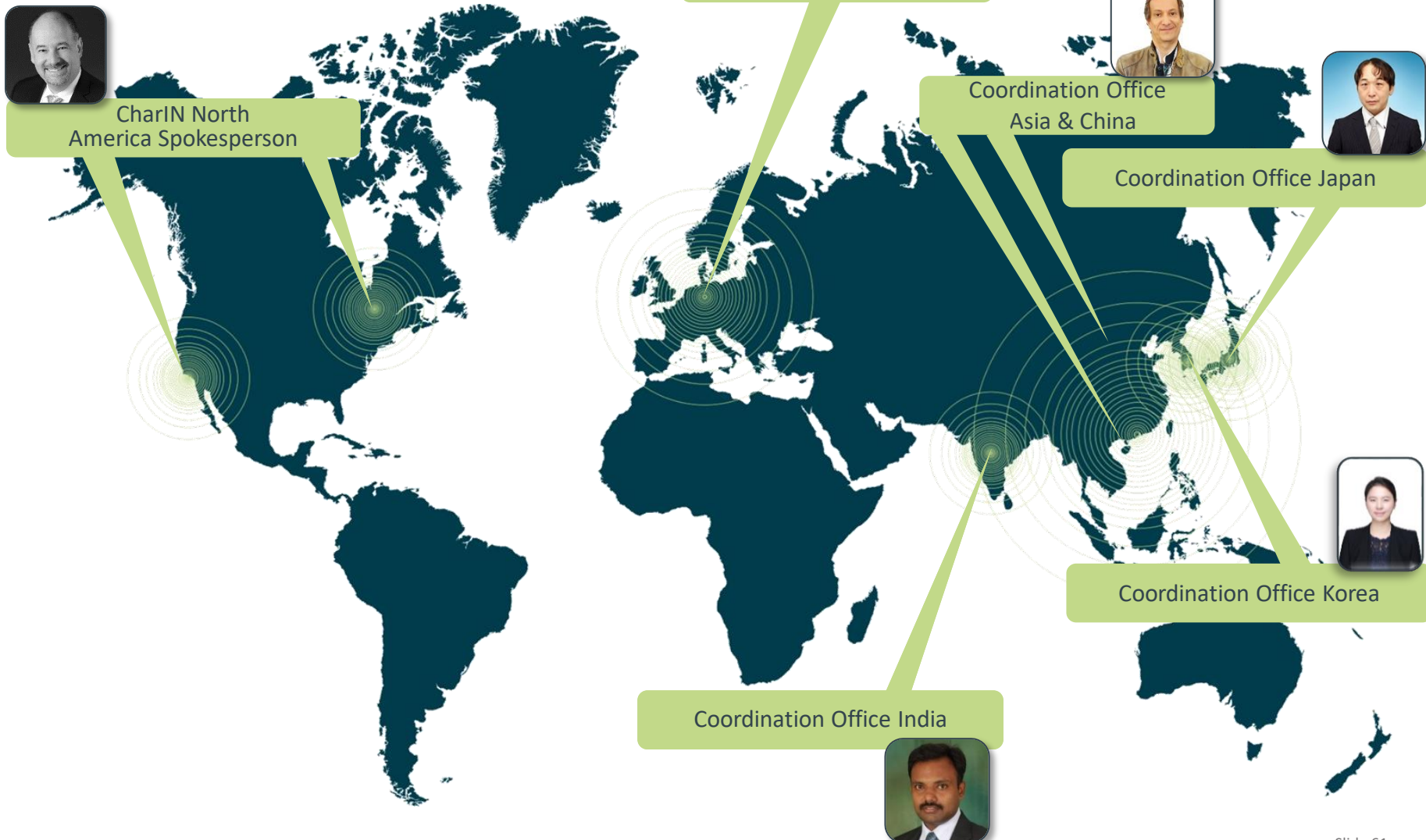
Coordination Office Japan



Coordination Office Korea



Coordination Office India



Focus Groups

Charging Connection



Harmonise future developments of coupler systems for AC and DC

Develop recommendations for standardi-sation

Charging Communication



Support of development, specification and test of charging communication

Close gaps and provide recommendations for communication protocols of the electric vehicle (EV) charging system

Charging Infrastructure



Harmonization of the ramp-up of CCS charging infrastructure and the involved charging process based on the market needs: removing market entry barriers for EV owners, charge point operators and manufacturers

Conformance Test | Interoperability



Requirements for Golden Test Device (GTD)

Interoperability of customer use cases
Enabling of multiple GTDs of manufacturers or test houses
Achieve global acceptance of GTD

Grid Integration



Vehicle-to-grid/vehicle-to-home: regulations for standardisation

Solving of technical issues
Integration of end user view

Dialogue with utilities

Expert Team

North America

Europe
André Kaufung

Asia
Jacques Borremans



Thank you for your kind attention!

Are there any further questions?