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Hubject VGI Roadmap Update Workshop Technology Panel Presentation

Additional submitted attachment is included below.

VGI Roadmap Update Workshop

Technology Panel

Barton Sidles
Hubejct Inc.
October 30, 2018
Sacramento, CA

Hubject overview

MISSION

Leading eRoaming / interoperability platform with the mission to digitally enable our clients to offer a seamless EV charging experience to their end customers.

VISION

Seamless EV charging for everyone. Everywhere

intercharge
Extend your reach.

SHAREHOLDERS

BMW Group, MINI, DAIMLER, BOSCH, EnBW, SIEMENS, innogy, Volkswagen

How Hubject enables:

- eROAMING & INTEROPERABILITY
- ISO 15118 ECOSYSTEM
- CONSULTING


HUBJECT
What?

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Questions and Industry Collaboration

Technical Panel: CEC's staff summary of key open issues Questions addressed by Hubject Inc.

Q2. Which new technologies should be incorporated into electric vehicles and equipment to improve cybersecurity?

Q3. What standards and methods of communication need to be considered in vehicle-grid integration programs (e.g. unidirectional charging, bidirectional charging, high-powered, inductive, pantograph and automated connection charging)?

Q5. How can policymakers, researchers and industry foster advanced technologies into a global competitive e-mobility market to more quickly deliver on the promise of VGI?


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How?

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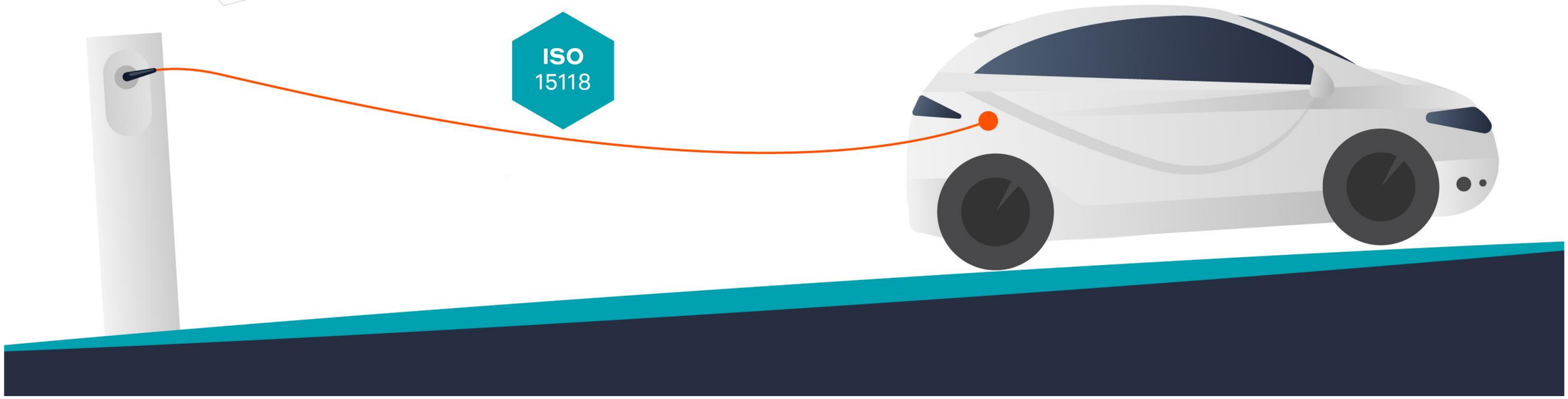
ISO 15118

International Organization for Standardization

VDE

SECURITY & VEHICLE GRID INTEGRATION

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Why?

ISO 15118 and SECURITY

- RFID chips are not secure.
- All participants use asymmetrical keys for encryption to improve the security (industry standard).
- Contract information are protected with hybrid encryption (Diffie Hellman Key based on ECSDA) and can be only decrypted by the receiver.
- EVs and EVSEs store private keys securely in hardware devices (HSM).
- Certificates of the charging devices are renewed in short timing periods (2-4 months) to minimize a possible compromising.

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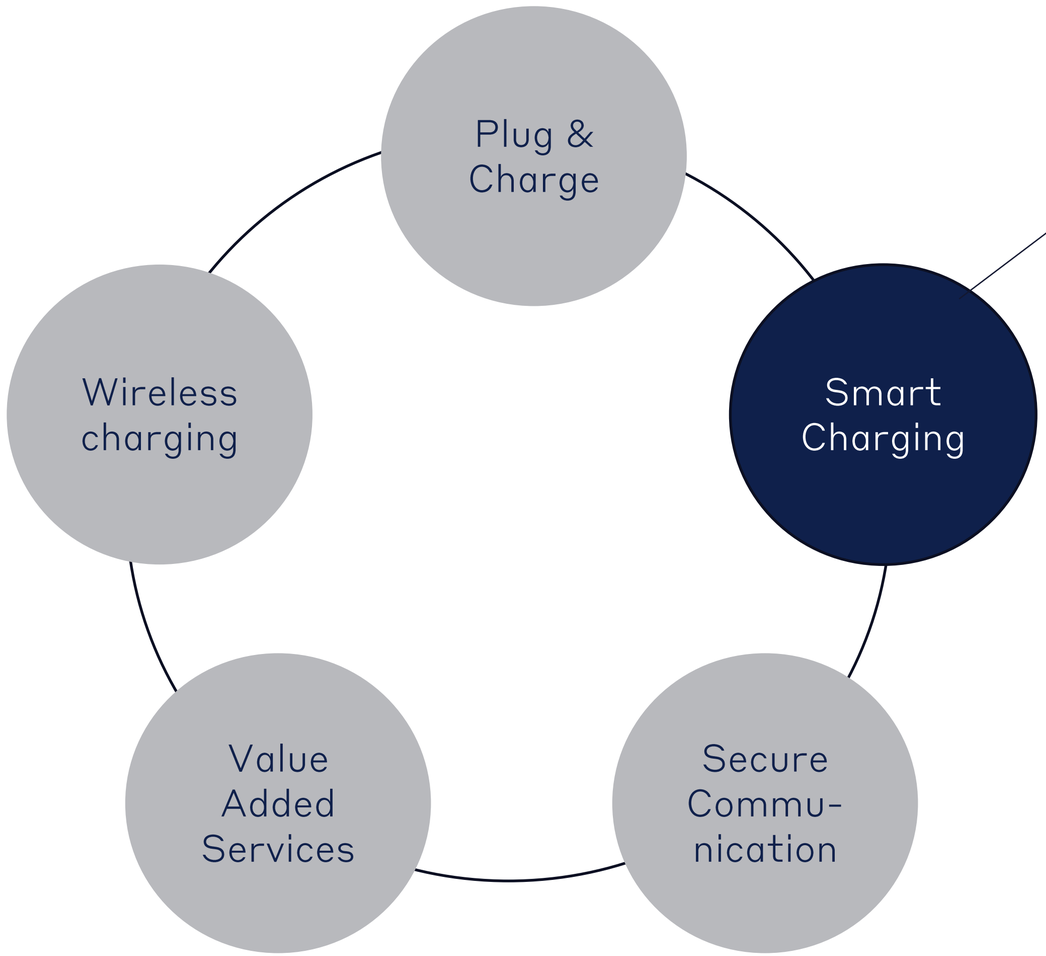
VGI: Smart Charging is one of the high level goals of ISO 15118



Integration of the EV into the energy grid in order to enable a flexible load control and the provisioning of value added services without compromising the driving habits of consumers.

The ISO 15118 implementation of the **intelligent communication** between charging station and vehicle makes it possible to implement **Smart Charging** functionalities:

- to forecast the energy demand and optimize grid utilization,
- to integrate renewable energies into electricity offers
- to provide time-variable tariffs
- to use non-moving vehicles for temporary storage

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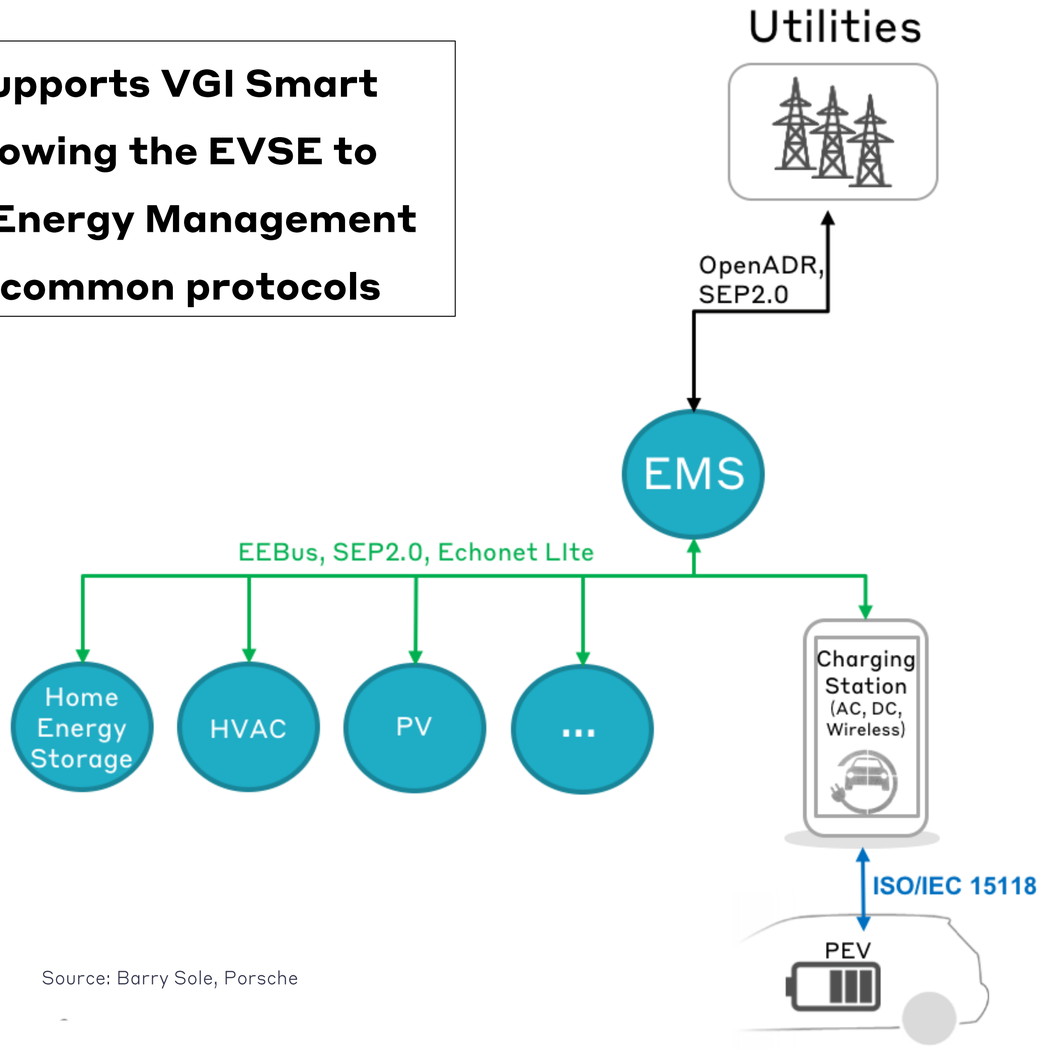
Private charging

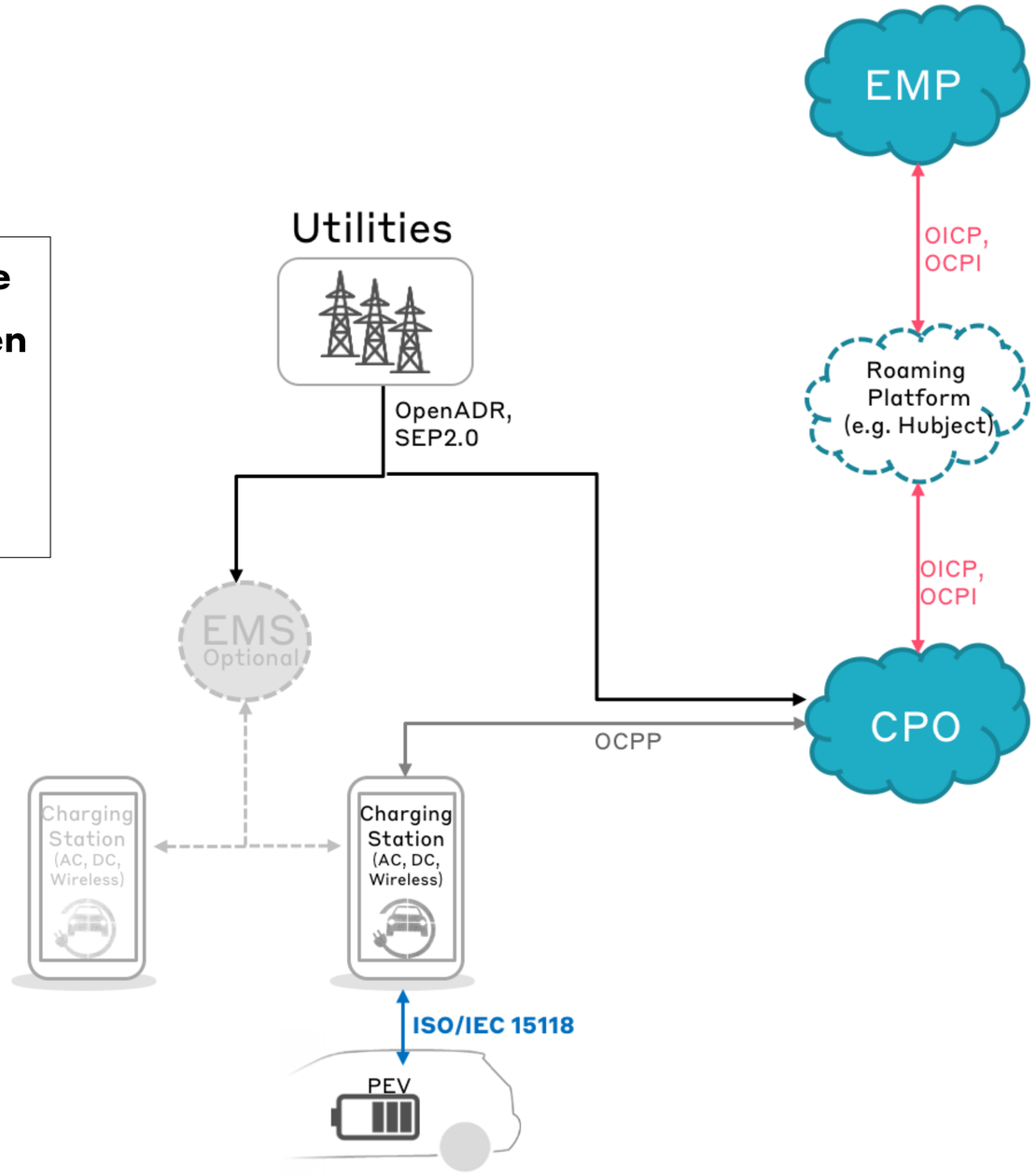
ISO/IEC15118 supports VGI Smart Charging by allowing the EVSE to integrate into Energy Management Systems using common protocols



Source: Barry Sole, Porsche

Public charging

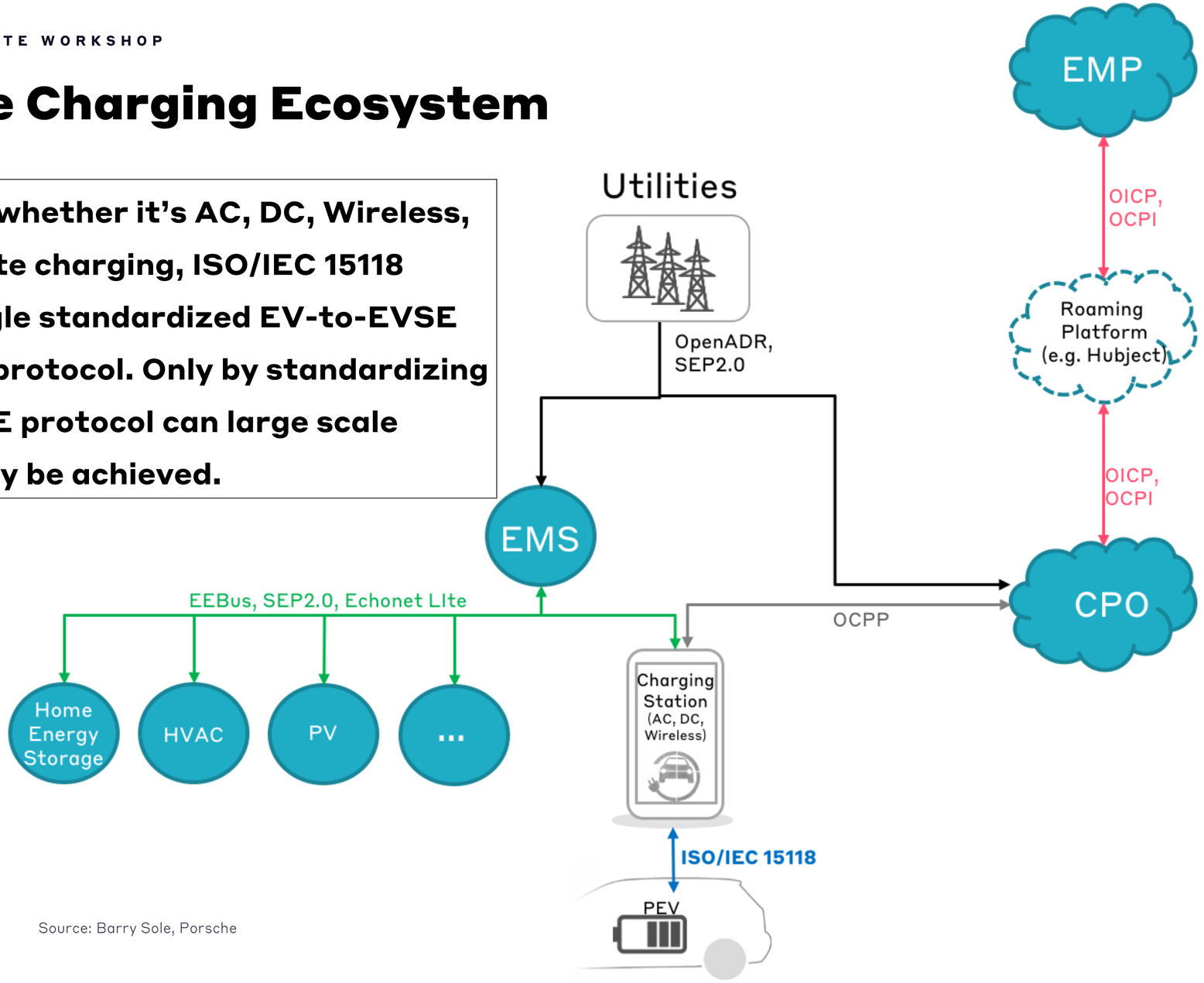
ISO/IEC15118 supports interoperable public charging and roaming between EVSEs of different CPOs connected to different MSPs by using common protocols



Source: Barry Sole, Porsche

Complete Charging Ecosystem

Regardless of whether it's AC, DC, Wireless, public or private charging, ISO/IEC 15118 provides a single standardized EV-to-EVSE interface and protocol. Only by standardizing an EV-to-EVSE protocol can large scale interoperability be achieved.



Source: Barry Sole, Porsche

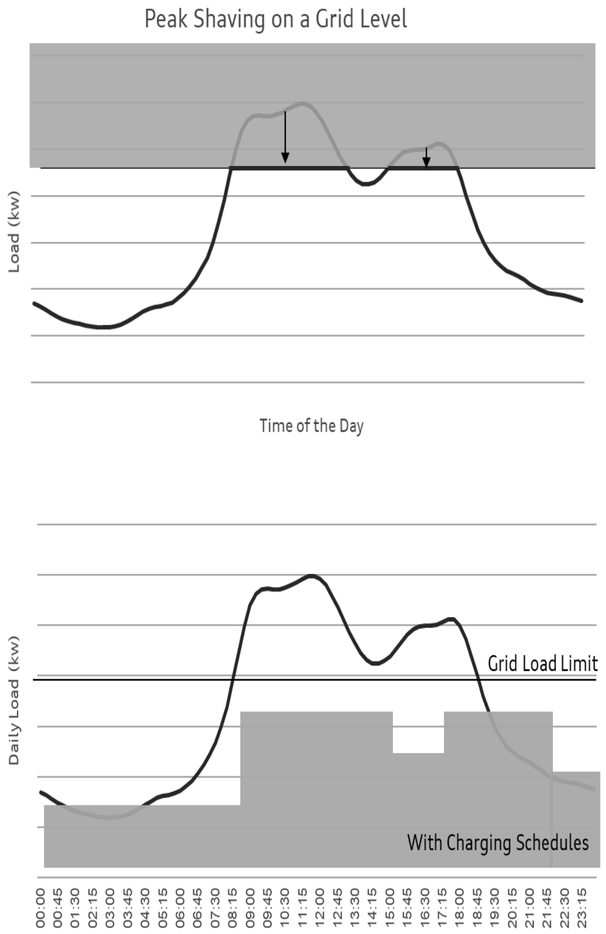
ISO 15118 allows for various technologies to optimize the grid

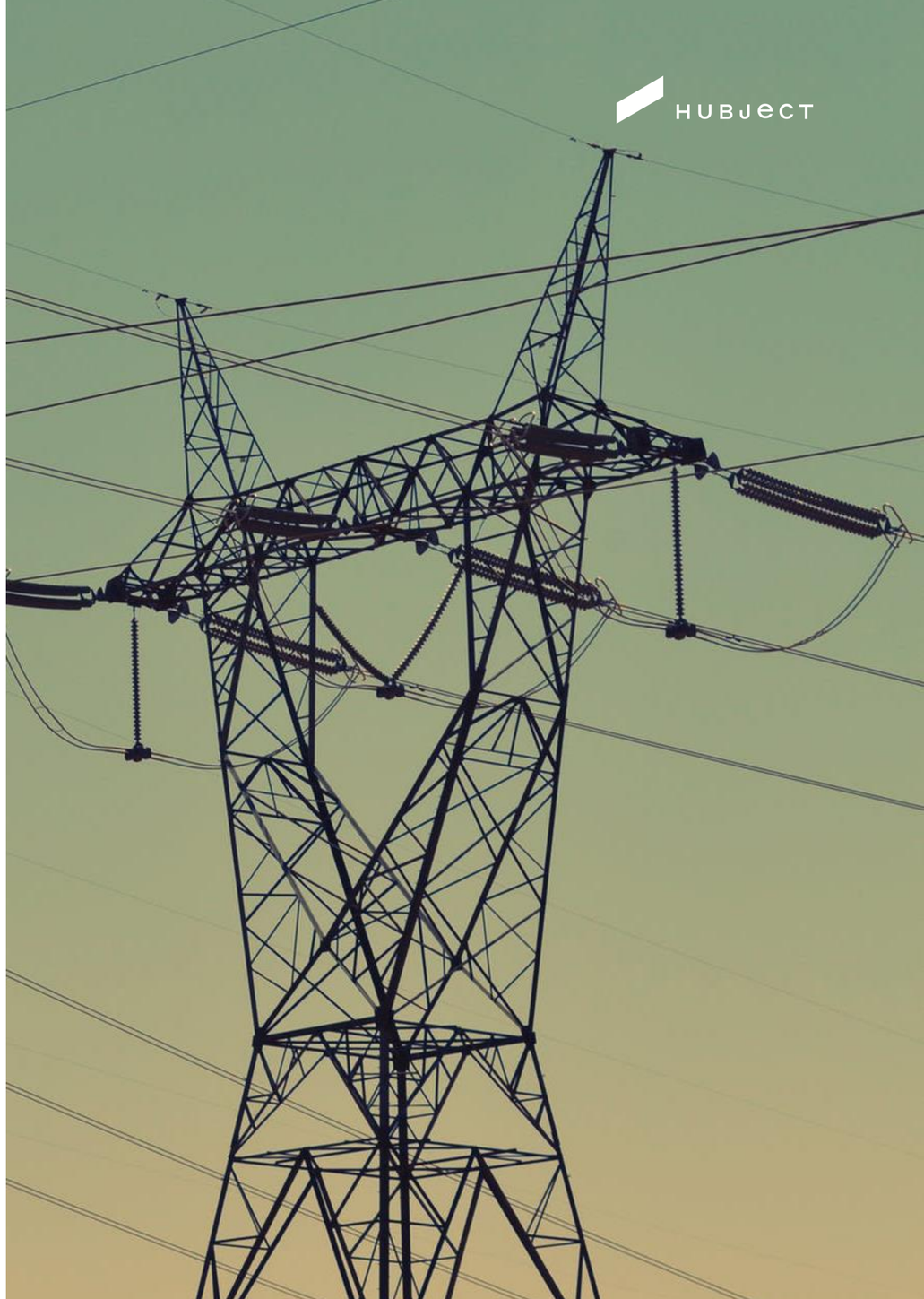
PEAK SHAVING Energy consumption of a charging session is reduced during demand peaks on the grid

LOAD SHIFTING Charging is shifted to other than peak load periods by establishing time-based charging windows during which energy is delivered to EVs

LOAD SHAPING By integrating real-time signals, CPOs can dynamically control the EV charging to achieve specific objectives or mitigate location specific and system-wide grid stress

OVERLOAD PROTECTION Prevent overload of a distribution transformer through the means of a smart scheduling of charging sessions





ISO 15118-2 edition 2 – Confirmation of Bidirectional and wireless charging

viii

ISO/DIS 15118-2:2018(E)
ISO/DIS 15118-2 ED2

Road vehicles — Vehicle to grid communication interface — Part 2: Network and application protocol requirements

1 Scope

This international standard specifies the communication between the electric vehicle (EV), including battery electric vehicle (BEV) and plug-in hybrid electric vehicle (PHEV), and the EV supply equipment. The application layer message sets defined in this revision of ISO 15118-2 are designed to support the electricity power transfer between an EV and an EV supply equipment.

The bidirectional electricity power transfer, use case of that was already included in edition 1.0 of part 1 but not included in part 2, was officially added to the scope of this standard. Herein edition 2.0 of part 2 defines the communication messages and sequence requirements for bidirectional power transfer.

Also the scope is widely extended in this revision, requirements of wireless communication for both conductive charging and wireless charging are defined. Additionally, requirements of communication for automatic connection device and information services about charging and control status are defined in this revision.

The purpose of this part 2 of ISO 15118 is to detail the communication between an electric vehicle communication controller (EVCC) and supply equipment communication controller (SECC). Aspects are specified to detect a vehicle in a communication network and enable an Internet Protocol (IP) based communication between EVCC and SECC.

"The bidirectional electricity power transfer… was officially added to the scope of this standard."

"Also the scope is widely extended in this version, requirements of wireless communication…."

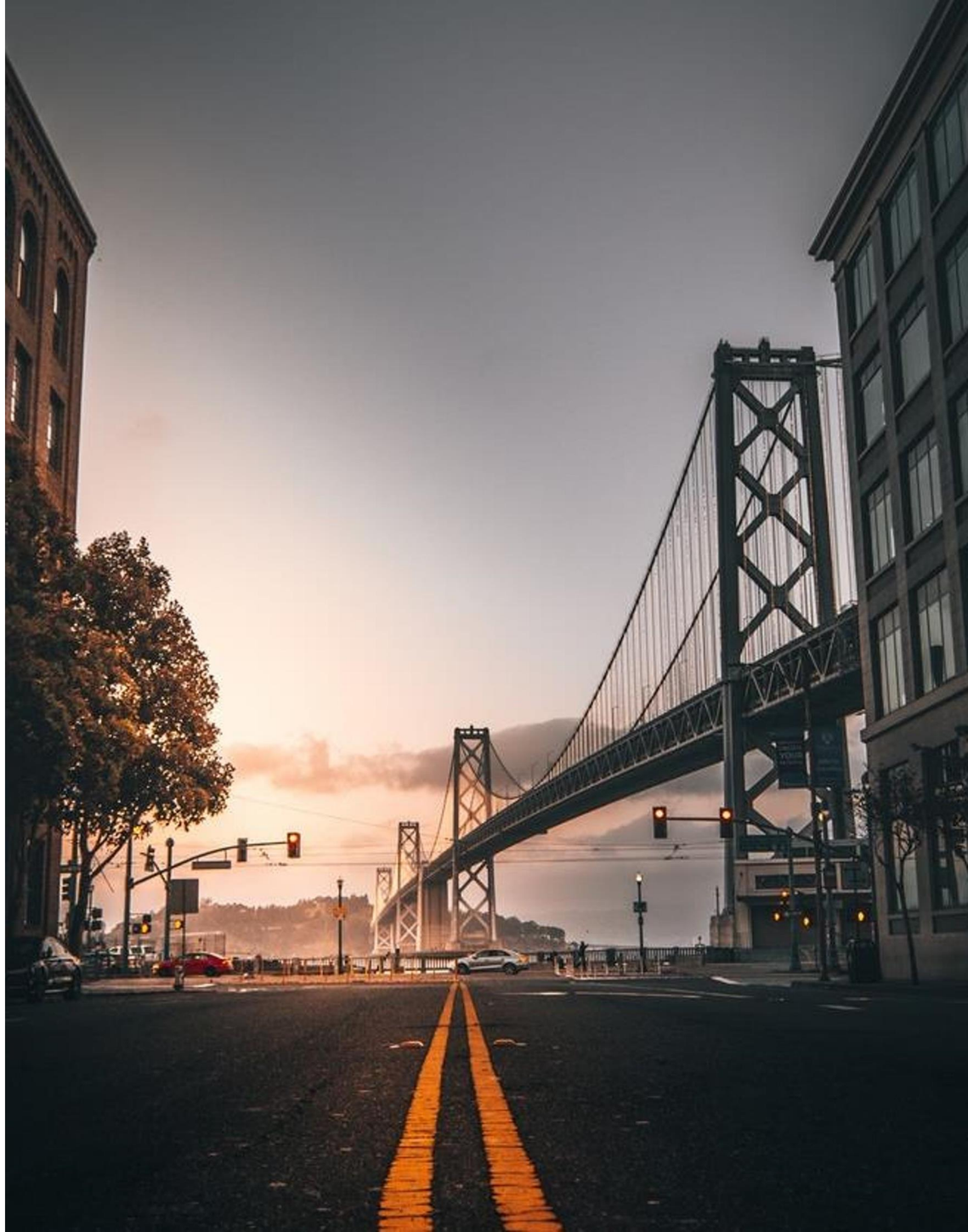
VGI take aways:

- ✓ Interoperable
- ✓ Home charging with connection to an energy management system and handle load management
- ✓ Connection to public charger, speaking to CPO backend and hub
- ✓ AC and DC, High power (transit, freight, nautical)
- ✓ Bidirectional
- ✓ Wireless
- ✓ Optimization of the grid, ease CapEx

Common denominator is the last mile interface: ISO 15118

Next

IMPLEMENTATION

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Commitment

VGI ROADMAP UPDATE WORKSHOP

ISO 15118 is the future of EV charging: secure, scalable and global

Industry supporters

Volkswagen
BMW
Ford
Audi
DAIMLER
Honda
PORSCHE
Volvo
DIGITAL CHARGING SOLUTIONS
GM
Hyundai
KIA MOTORS
KARMA
LUCID
BYTON
FIAT CHRYSLER

ultra E ULTRA CHARGING STUDY EUROPE
electrify america
CHARIN
innogy
Schneider Electric
IoTecha
ebee SMART TECHNOLOGIES
greenlots
eMotorWerks An Enel Group Company
SIEMENS
BTCPower
evconnect
SIGNET
efacec
chargepoint
SemaConnect
VIRTA
ABB
ies
TRITIUM

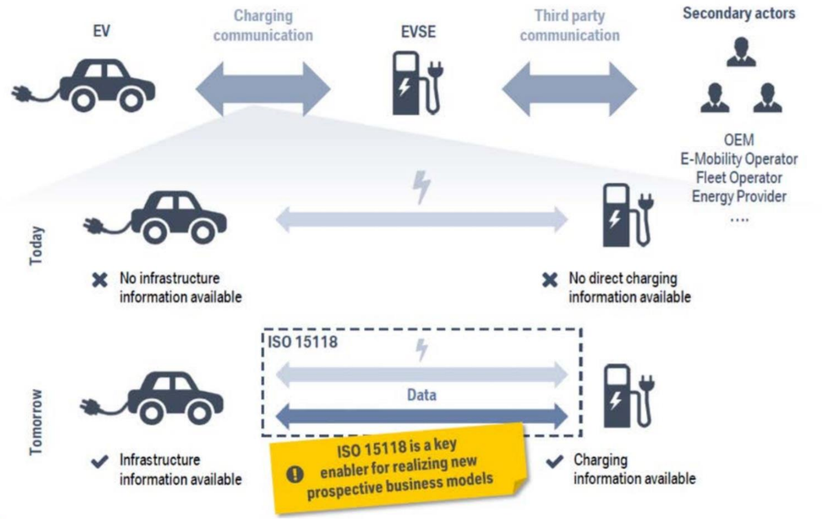
Electrify America will invest $2 billion in ZEV infrastructure and education programs in the US

Technology

Electrify America will offer:

- Public AC charging
- DC Charging from 50kW to 350kW
- Support CCS and CHAdeMO
- Support Smart Charging (ISO 15118)

Smart Charging Communication. Based on ISO 15118.



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Moving from technology to implementation: Reference projects

DAIMLER

Plug&Charge implementation for the first ISO 15118 enabled EV: Smart EQ

ultra E
ULTRA CHARGING STUDY EUROPE

Enable ultra-fast charging network (up to 350 kW/connector) with Plug&Charge functionalities

DIGITAL CHARGING SOLUTIONS

Plug&Charge implementation for Audi preparing the market launch of the Audi e-Tron Model, the first EV car including all Plug&Charge functionalities

CHARIN

Step by step Plug&Charge Implementation guide for all ISO 15118 roles for CharIN members

Schneider Electric

Strategy discussion for involved directors, product manager, IT architects and lead developer

NTT DATA

Strategic consultancy to include NTT Data as Austrian CPO backend provider in the Plug&Charge Ecosystem

PORSCHE

Full MO and OEM implementation for Porsche AG for integration PnC to the next EV model

Practical Approaches in Various Pilot Projects

DAIMLER

Global Media Site

START / COMPANY / BRANDS & PRODUCTS / TECHNOLOGY / CLASSIC / MOTORSPORTS / SALES GERMANY

Convenient charging of electric vehicles without the need for a card or app: Hubject and Daimler pilot a solution for Plug&Charge that is ready for production

Source: Media Center Daimler, April 17th 2018

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Q2 and Q3. Security and Protocols

Suggestions:

1. Inclusion of ISO 15118 as the standardized protocol
2. Encourage business opportunities
3. Act as a catalyst – help market take next step
4. Pilot Projects
5. Encourage additional sectors: fleet, transit, marine/nautical, air

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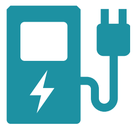
Q5. How can policymakers, researchers and industry foster advanced technologies into a global competitive e-mobility market to more quickly deliver on the promise of VGI?

Suggestions:

1. Encourage having a worldwide standard to enable the global competitive electric vehicle market



2. Government agency grant money from programs like ARFVTP should focus on supporting publicly-funded EV charging stations to be ISO/IEC 15118 enabled.

3. Programs like EPIC should continue to be used to validate the additional use cases of ISO/IEC 15118 (e.g. Smart charging, bi-directional charging, wireless and inductive charging).

Thank you!

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www.hubject.com/iso15118/plugcharge