

The ABCs of EVSE

Understanding Electric Vehicles and
EV Charging Infrastructure



Survey

How many of the following EVSE Projects have you completed:

Residential Installation?

Commercial Installation?

Municipal Installation?

Design/Build?

Service & Maintenance?

Startup & Commissioning?

Other EVSE-related work?



A Wee Bit
of History

Industry Impact

Critical Mass!



X P E N G



Office of
ENERGY EFFICIENCY & RENEWABLE ENERGY



TESLA

HUMMER



RIVIAN



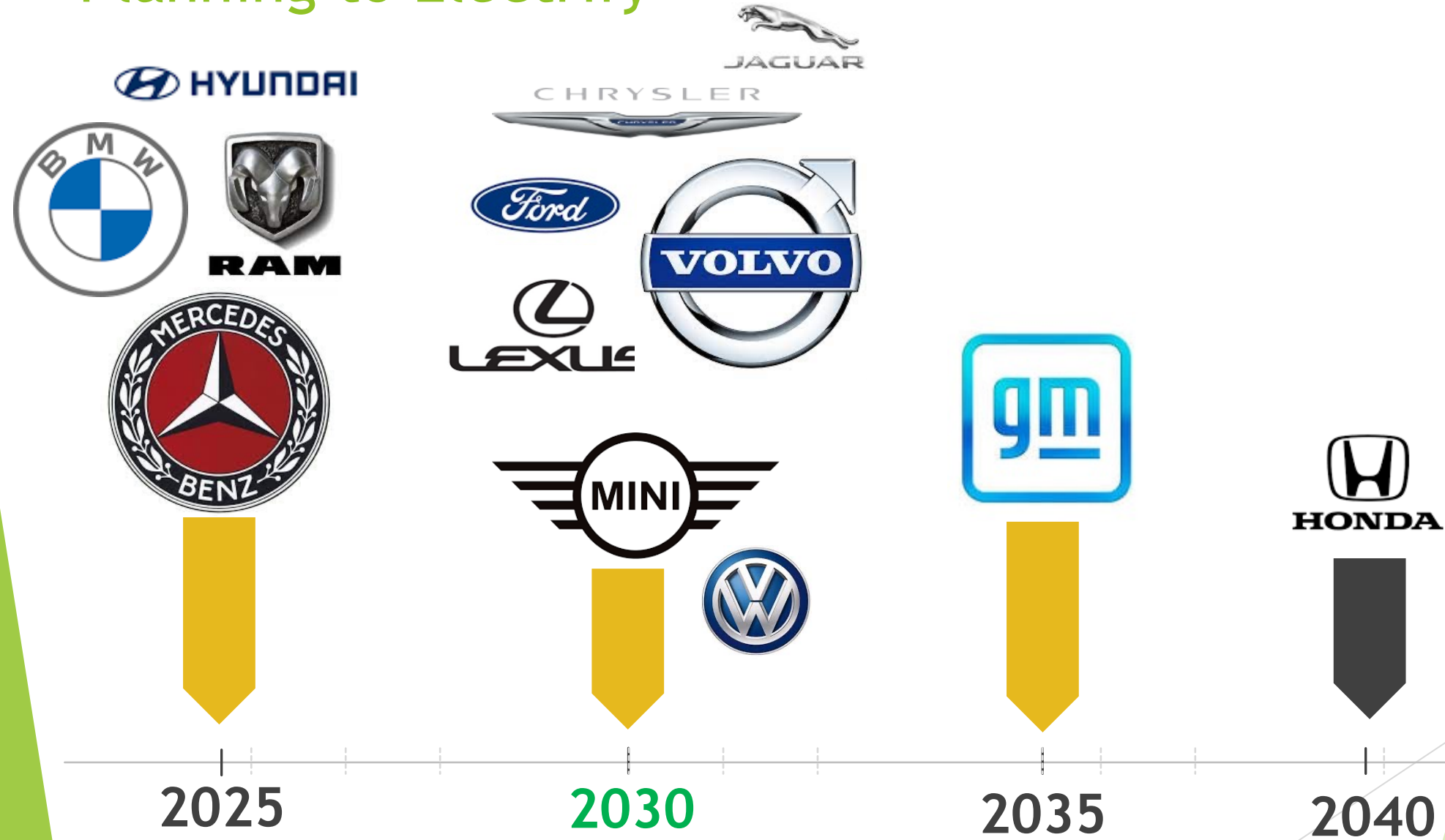
Why is it
Changing?

Regulation

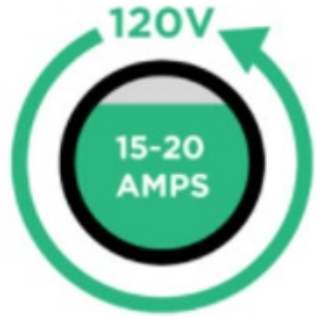
Consumer Behavior

Technology

Planning to Electrify

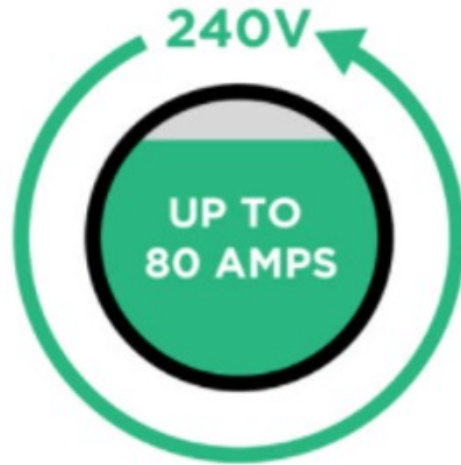


Level 1



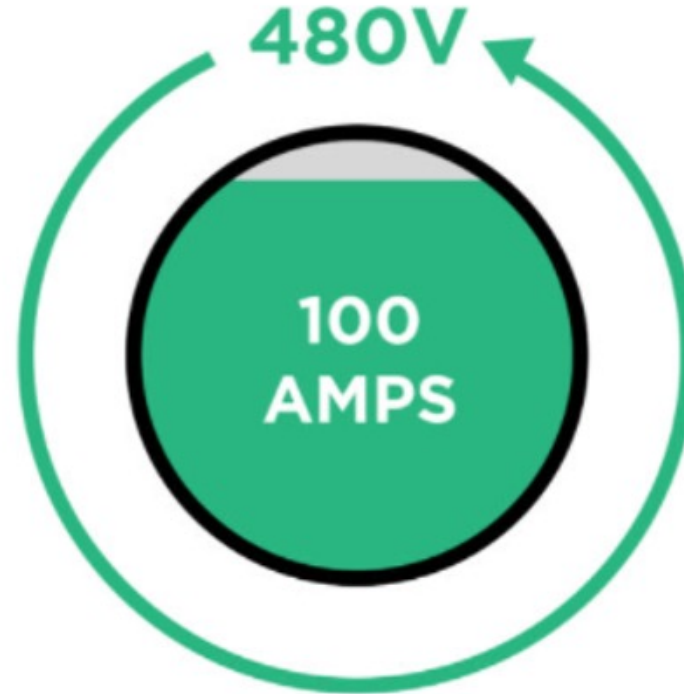
1.4kW

Level 2



3.7kW - 20kW

Level 3

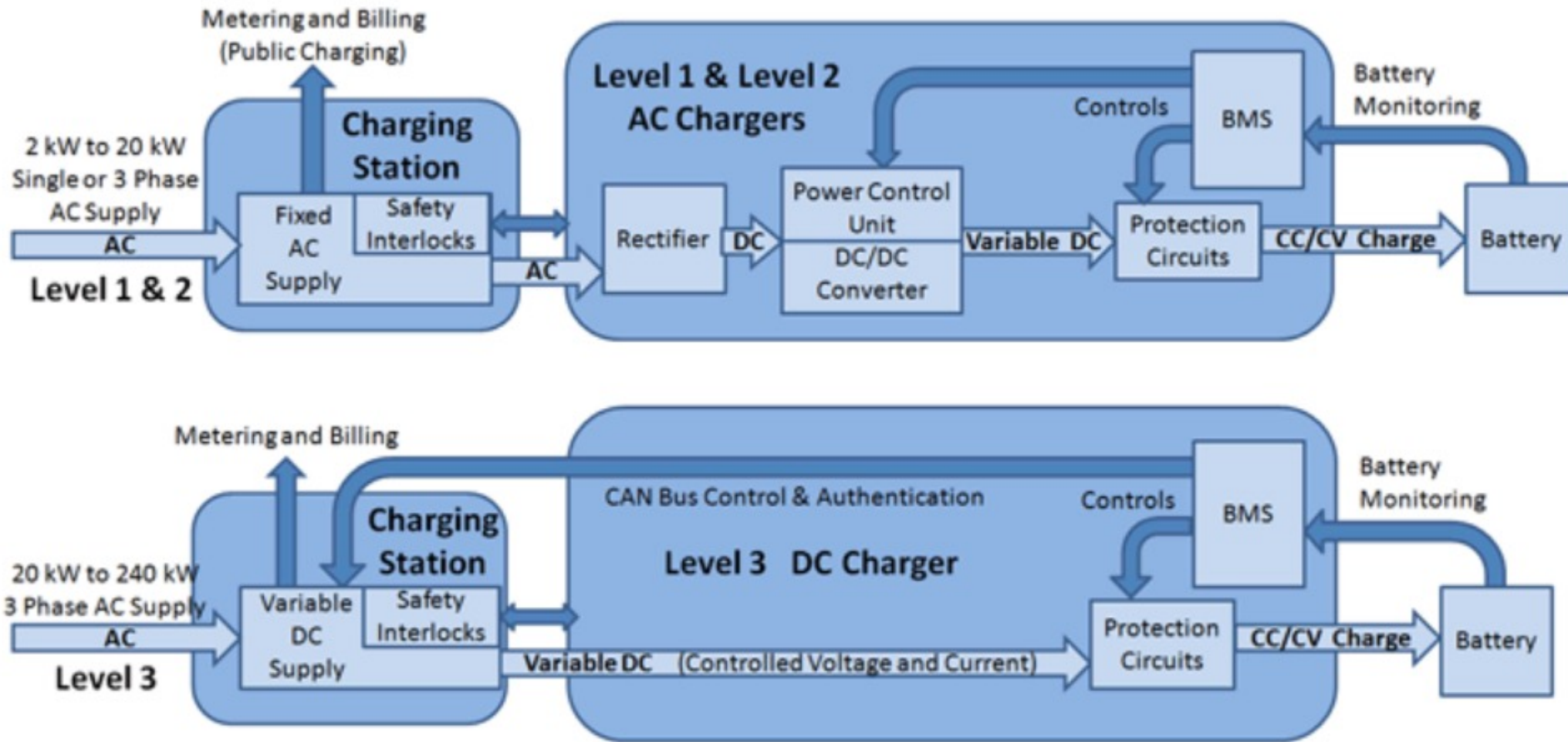


Up to 50kW

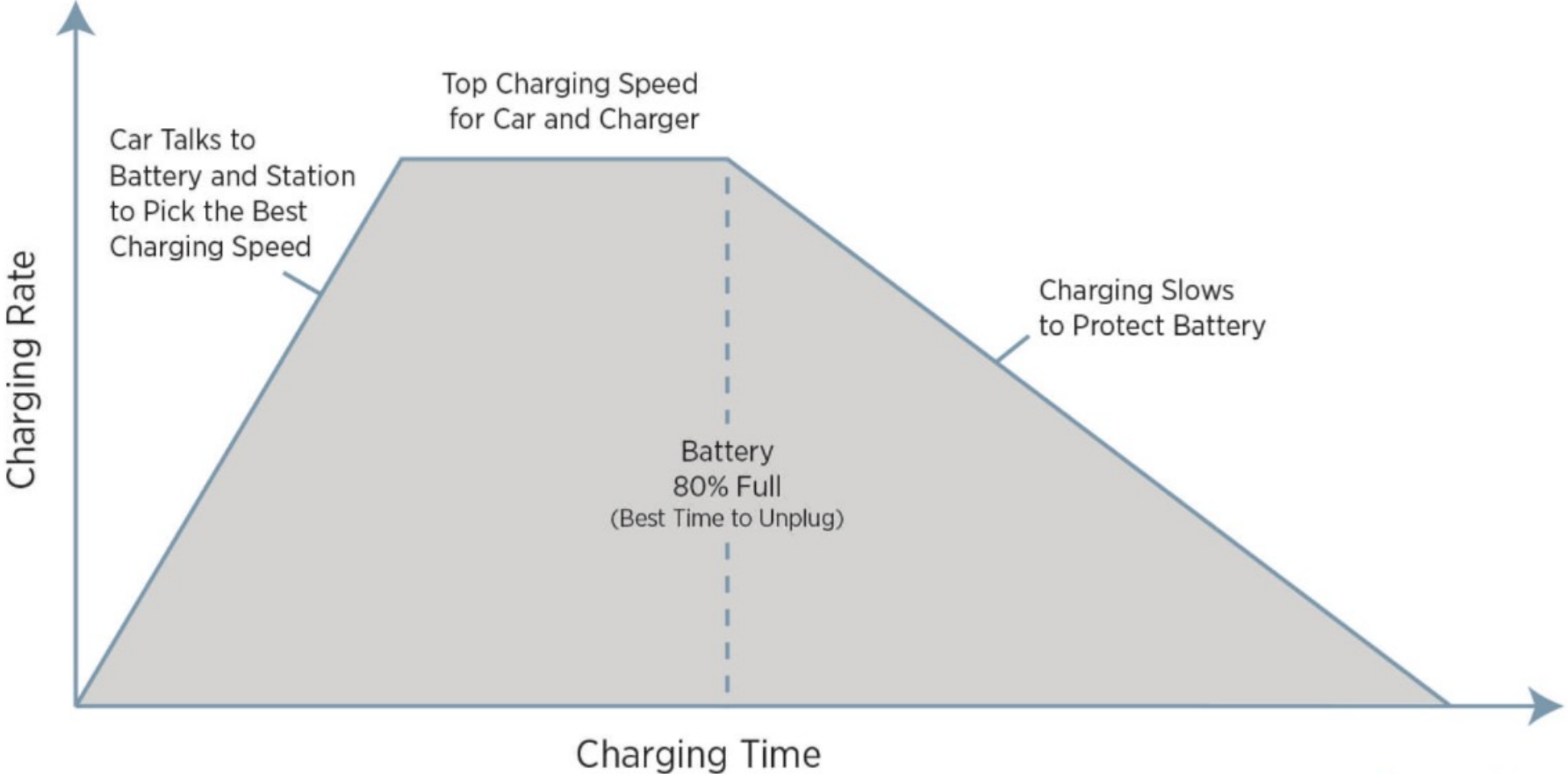
Different Charging Levels

EV Charging Basics

EV Chargers

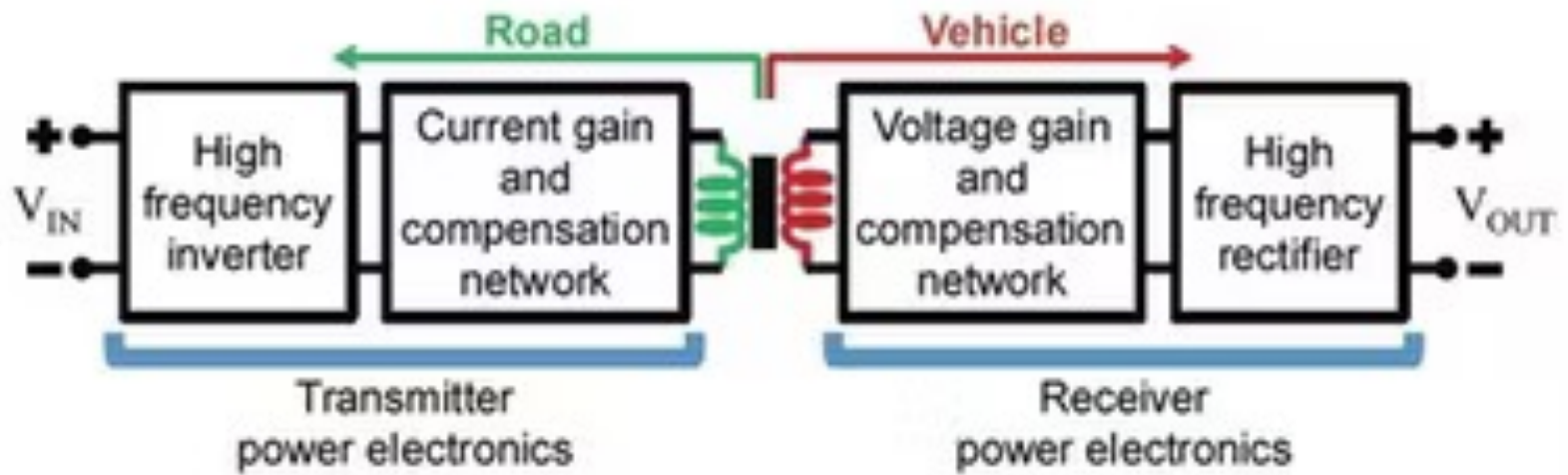


Typical DC Fast Charging Curve

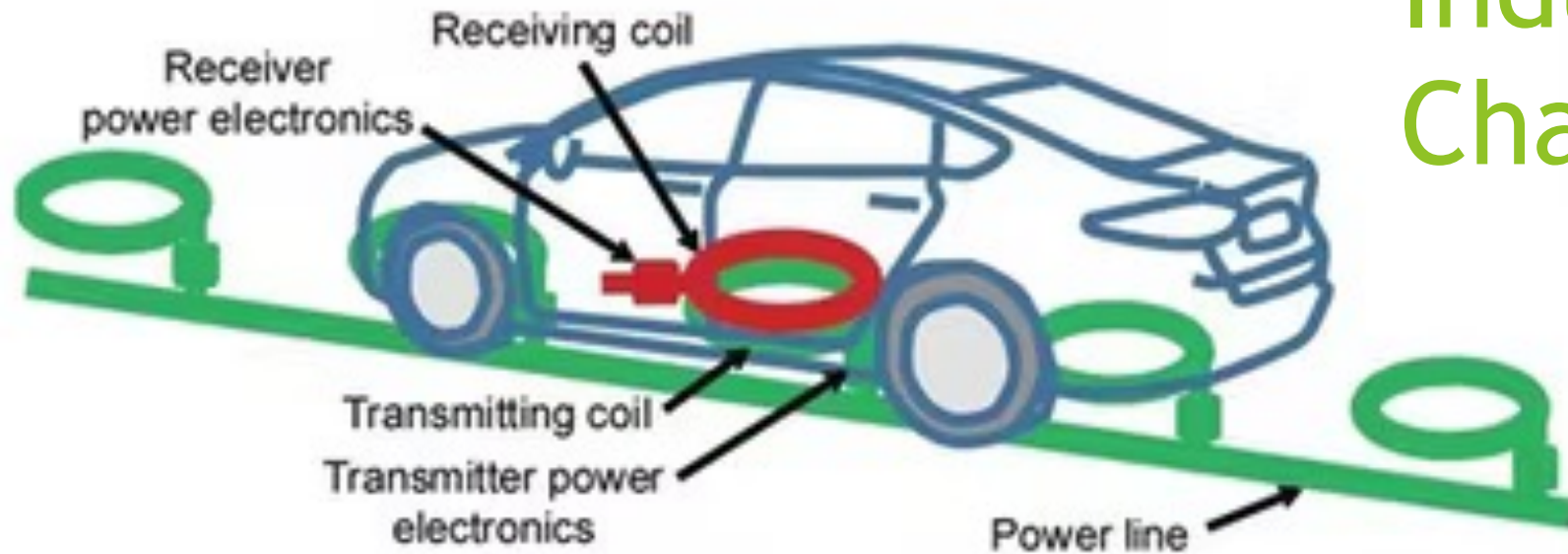


-chargepoint+

Different Charging Levels



Inductive Charging



Inductive Charging Lane?



Battery Swaps



N. America

Japan

EU
and the rest of markets

China

All Markets
except EU

AC



J1772 (Type 1)



J1772 (Type 1)



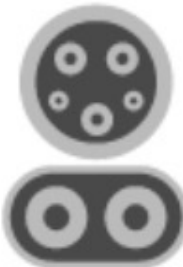
Mennekes (Type 2)



GB/T



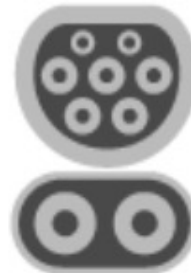
DC



CCS1



CHAdeMO



CCS2



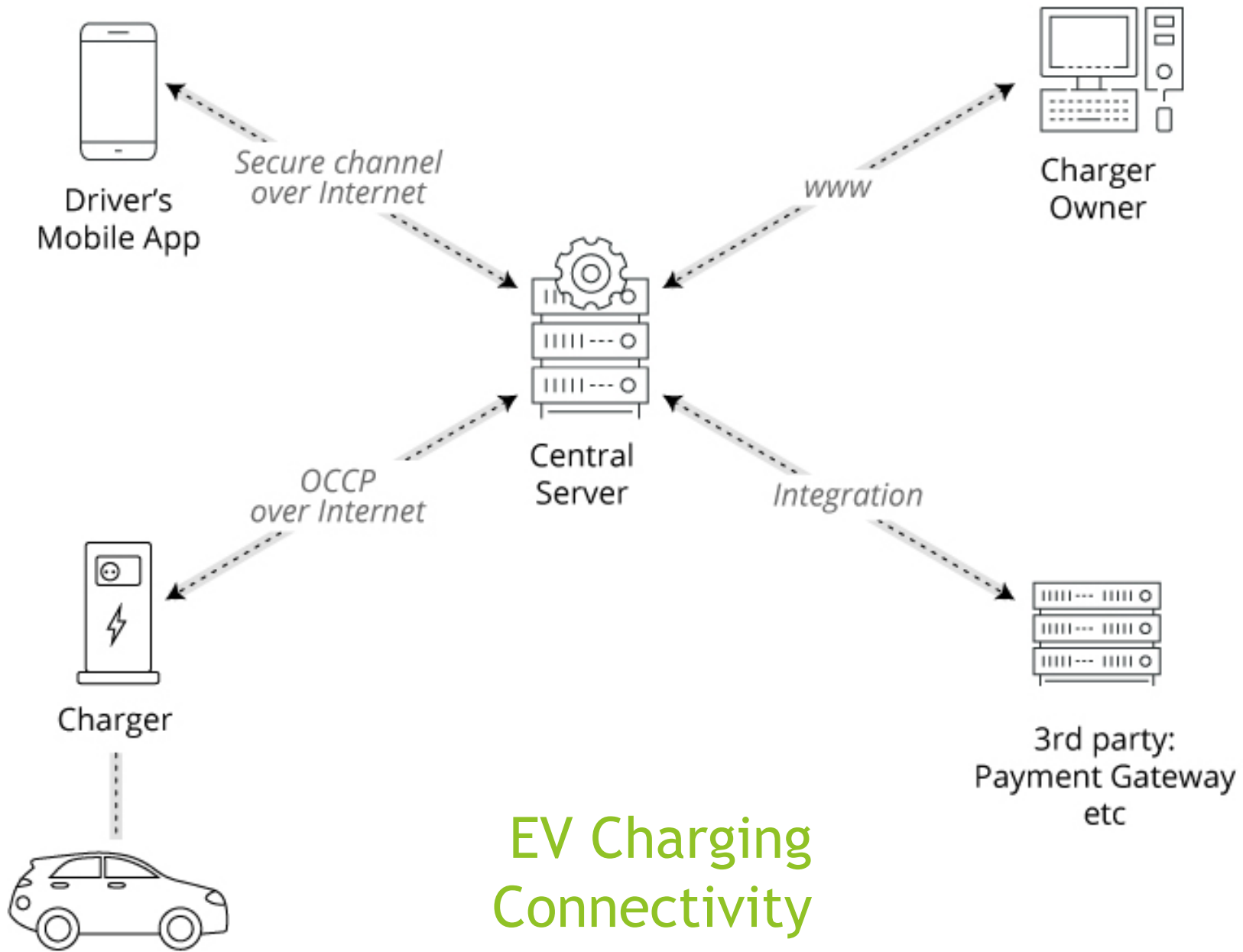
GB/T

Tesla

Charging Connectors

V2G - Vehicle to Grid





EV Charging Connectivity



Installation Considerations



1725 WV Ave NE
(20 Chargers)

1725 WV Ave NE
(20 Chargers)





1725 WV Ave NE
(20 Chargers)

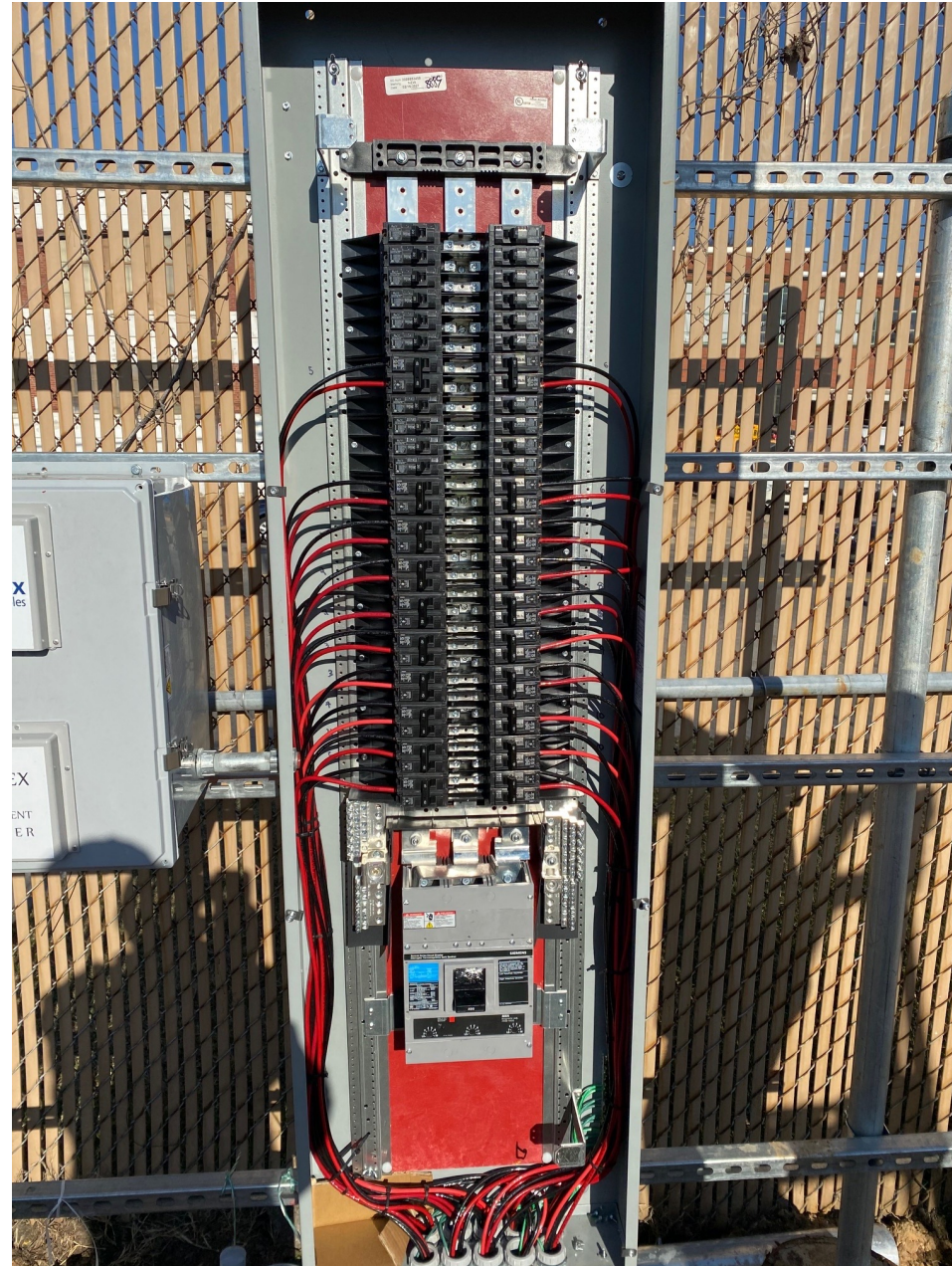


1735 15th St NE



1735 15th St NE

Powerflex/Webasto





Powerflex/Webasto

Powerflex/Webasto



Installation Considerations



45 Calvert St, Annapolis



EVGo

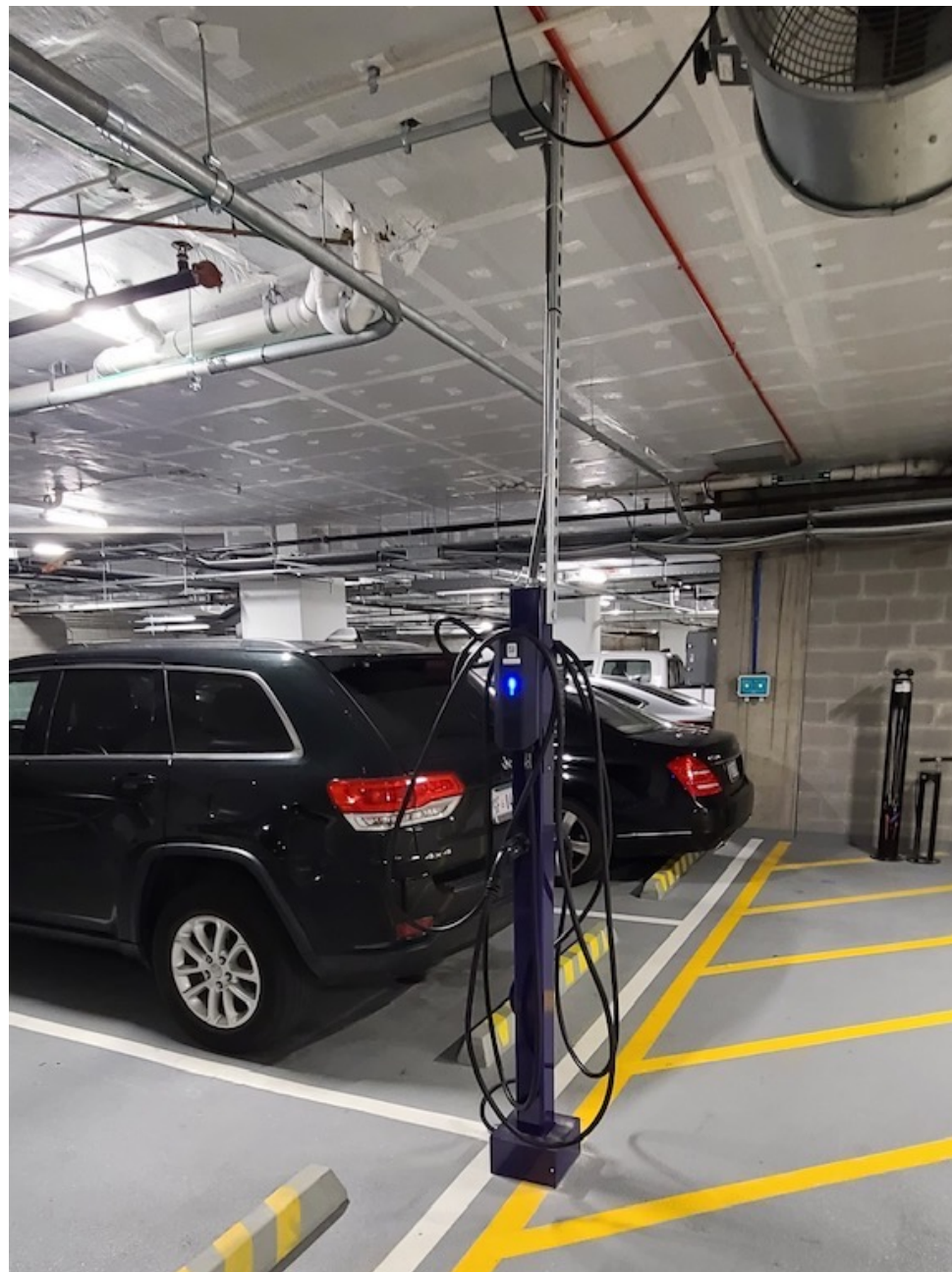


White Plains MD Health Dept



250 M Street, NW

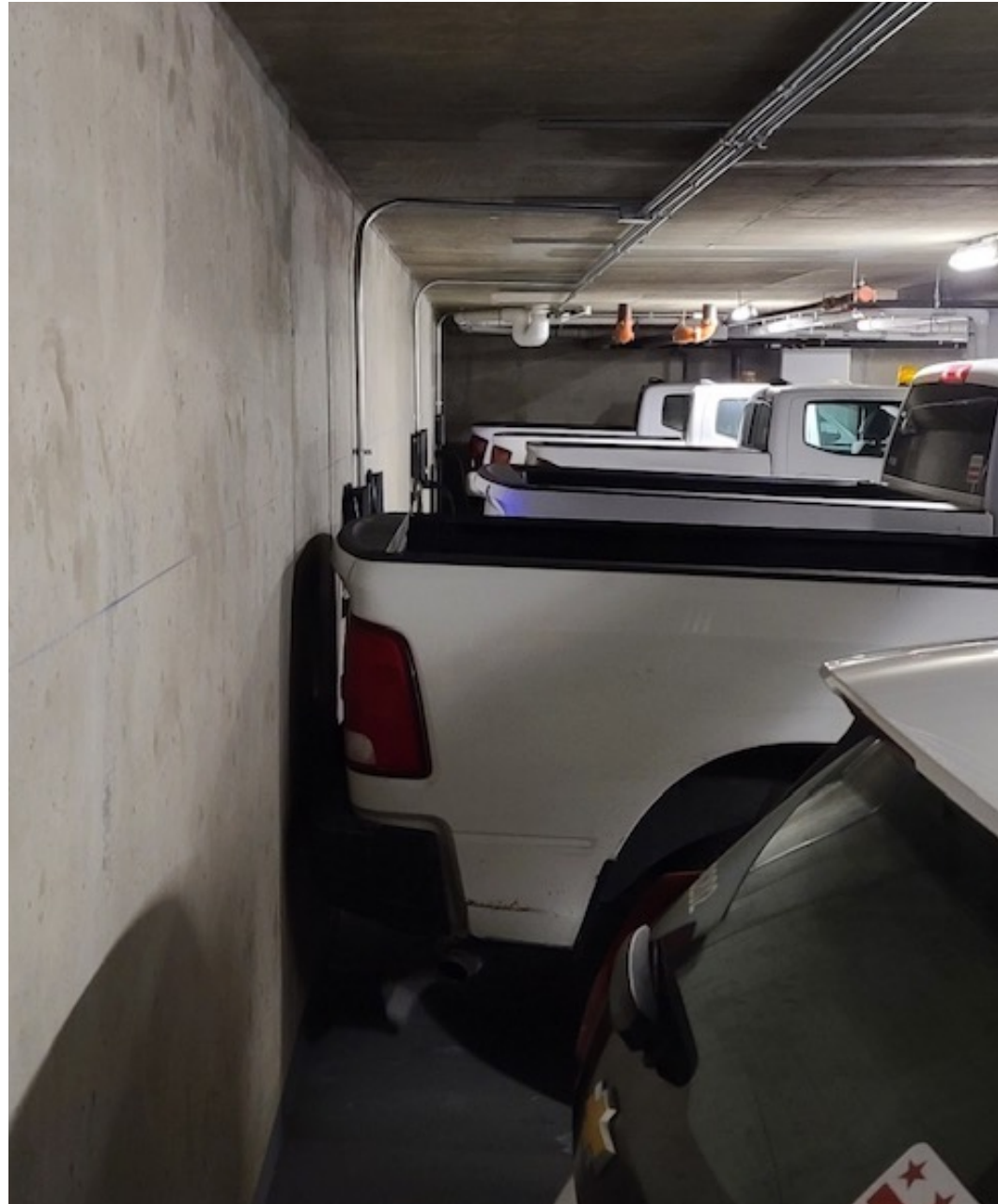
250 M Street, NW





250 M Street, NW

250 M Street, NW





Commissioning by Installer?



NEW

COMEMSO



TESCO TS400

Service & Maintenance



Service & Maintenance



Service & Maintenance



Beyond Consumer EVs





Camping, anyone?

Swarm Farming



▶ Questions?

Resources

- ▶ <https://www.nrel.gov> - National Renewable Energy Laboratory
 - ▶ <https://www.nrel.gov/docs/fy17osti/66980.pdf> - National Economic Value Assessment of Plug-In Electric Vehicles, Volume 1
- ▶ <https://www.energy.gov/science-innovation/vehicles> - US Dept of Energy
- ▶ [Electrek Digital Magazine](#) - all-around great source for EV news
 - ▶ [EV charging standards and how they differ](#)
- ▶ [McKinsey & Company Report](#) - Why the automotive future is electric
- ▶ [Tran-SET - Smart Charging of Future Electric Vehicles Using Roadway Infrastructure](#)
- ▶ [Electrical Training Alliance](#) - NECA/IBEW - EVCS Training toward EVITP
- ▶ [Electric Vehicle Infrastructure Training Program \(EVITP\)](#) - Certifying organization for installers

Resources

- ▶ [IEC 61851](#) - international standard for electric vehicle conductive charging systems
- ▶ [Open Charge Alliance](#) - a group dedicated to development and proliferation of Open Charging protocols in EV charging (OCPP and OSCP)
- ▶ [Communications Protocols & Security](#) - article on www.incibe-cert.es about use of OCPP to allow greater security in charging transactions
- ▶ [National EV Charging Initiative](#) - partnership for a national charging network

Charging Suppliers

Alternative
Fuels Data
Center (AFDC)

AmpUp

ChargeHub

Chargemap

ChargePoint

Chargeway

Electrify
America

EVgo

Google Maps -
Search "EV
chargers"

Greenlots

Open Charge
Map

PlugShare

Tesla
Supercharger
Map

Tesla App

Charging Equipment Resources

BTC Power

Gilbarco
Veeder/Root

Eaton

Schneider
Electric

ChargePoint

Juicebox

Electrify
America

EVgo

Sema
Connect

Greenlots
Shell RS

Powerflex

Webasto

EV Connect

EVBOX

blink

Talk the Talk



EV - Electric Vehicle



EVSE - Electric Vehicle Supply Equipment



EVCS - Electric Vehicle Charging System

Talk the Talk



EV - Electric Vehicle



BEV - Battery Electric Vehicle



PEV - Plug-In Electric Vehicle



PHEV - Uses Plug-In Electric and an additional technology for propulsion (Plug-In Hybrid EV)

Talk the Talk



Level 1 Charging - 120V



Level 2 Charging - 240V



DC Fast Charging - 480V

Sometimes called Level 3 charging

Talk the Talk



OCPP - Open Charge Point Protocol



OSCP - Open Smart Charging Protocol



WEVCS - Wireless EV Charging System