

# GREENLOTS

OPEN CHARGING NETWORKS



## ASIA PACIFIC CLEAN ENERGY SUMMIT

North America  
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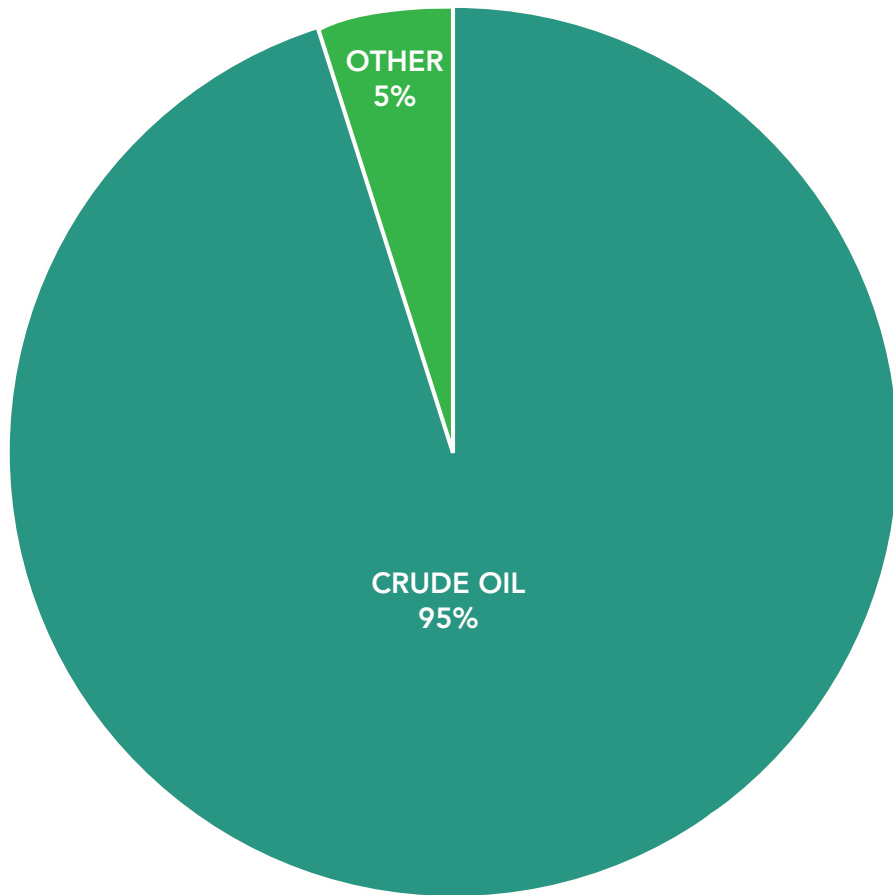
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SEPTEMBER 9, 2013

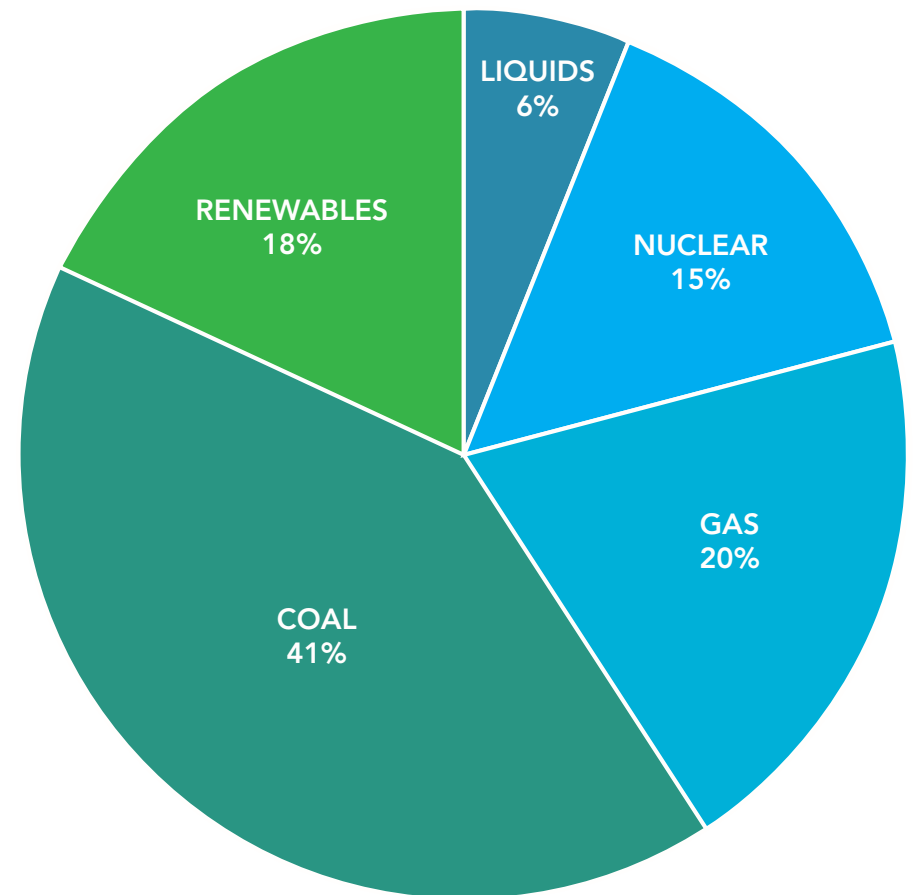
# DEPENDENCE

## Transportation



Source: IEA World Energy Outlook

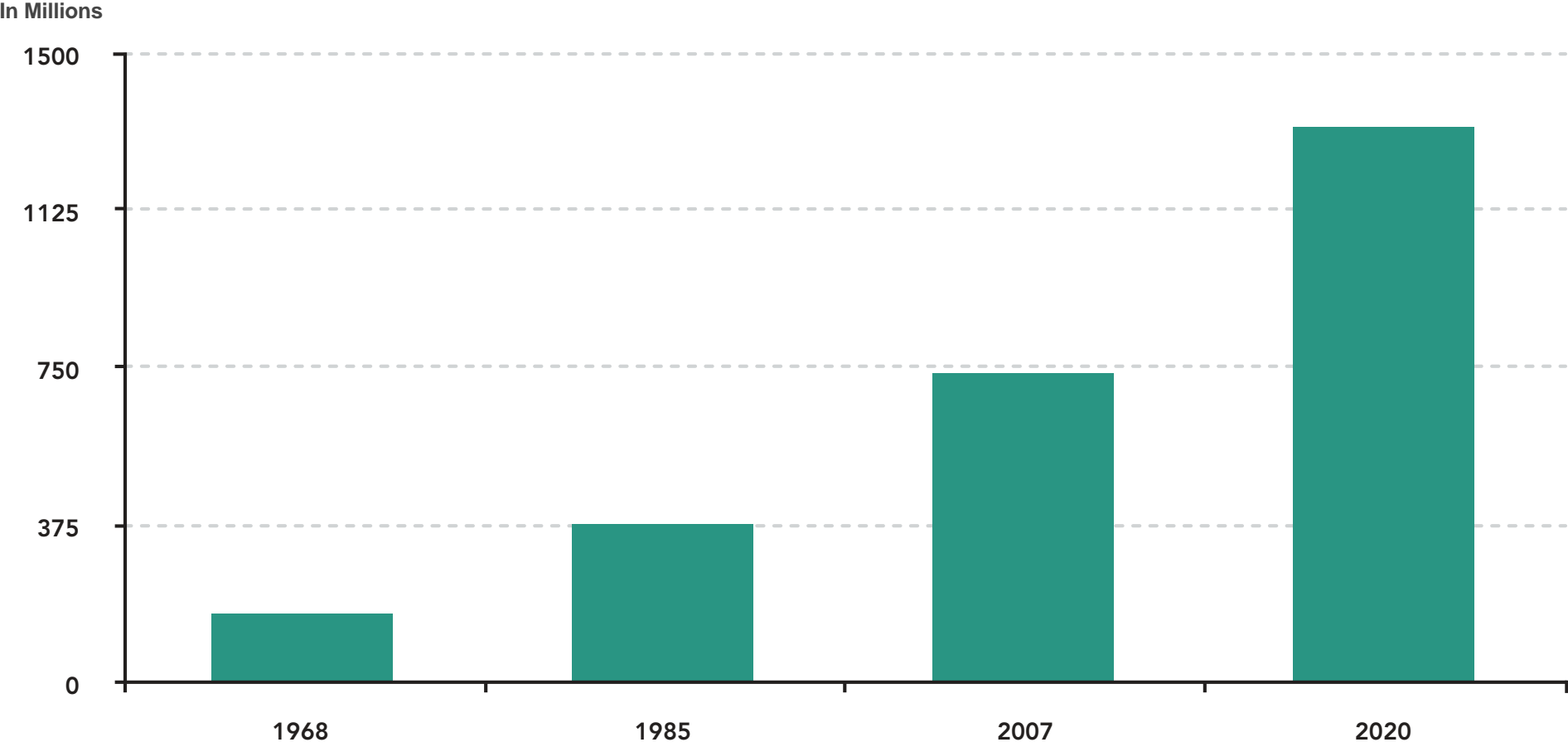
## Electricity



Source: U.S. Energy Information Administration

# DEMAND

## Global Car Population



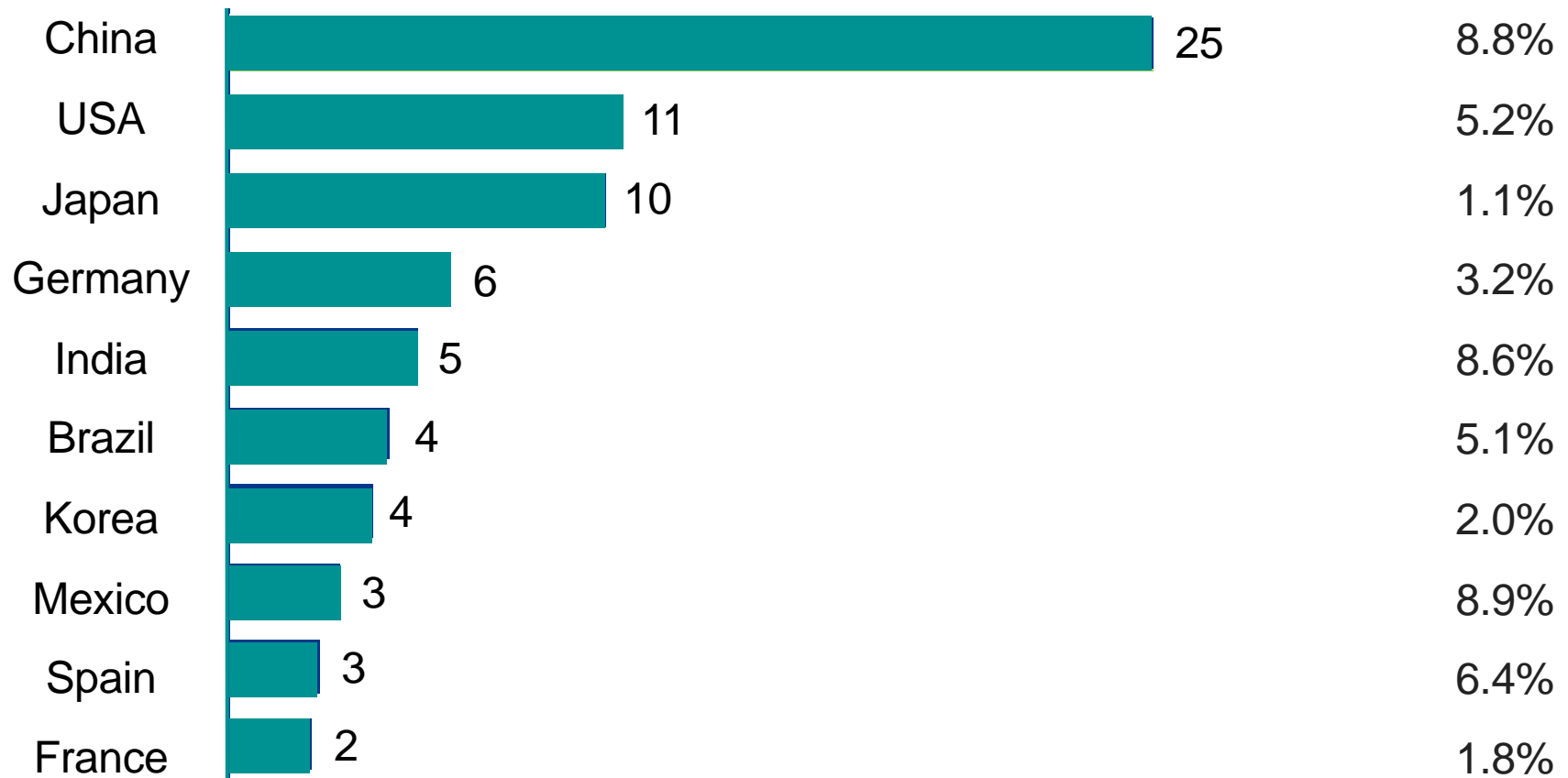
Source: IEA, World Energy Outlook

# GROWTH

## Top 10 LPV Production Countries

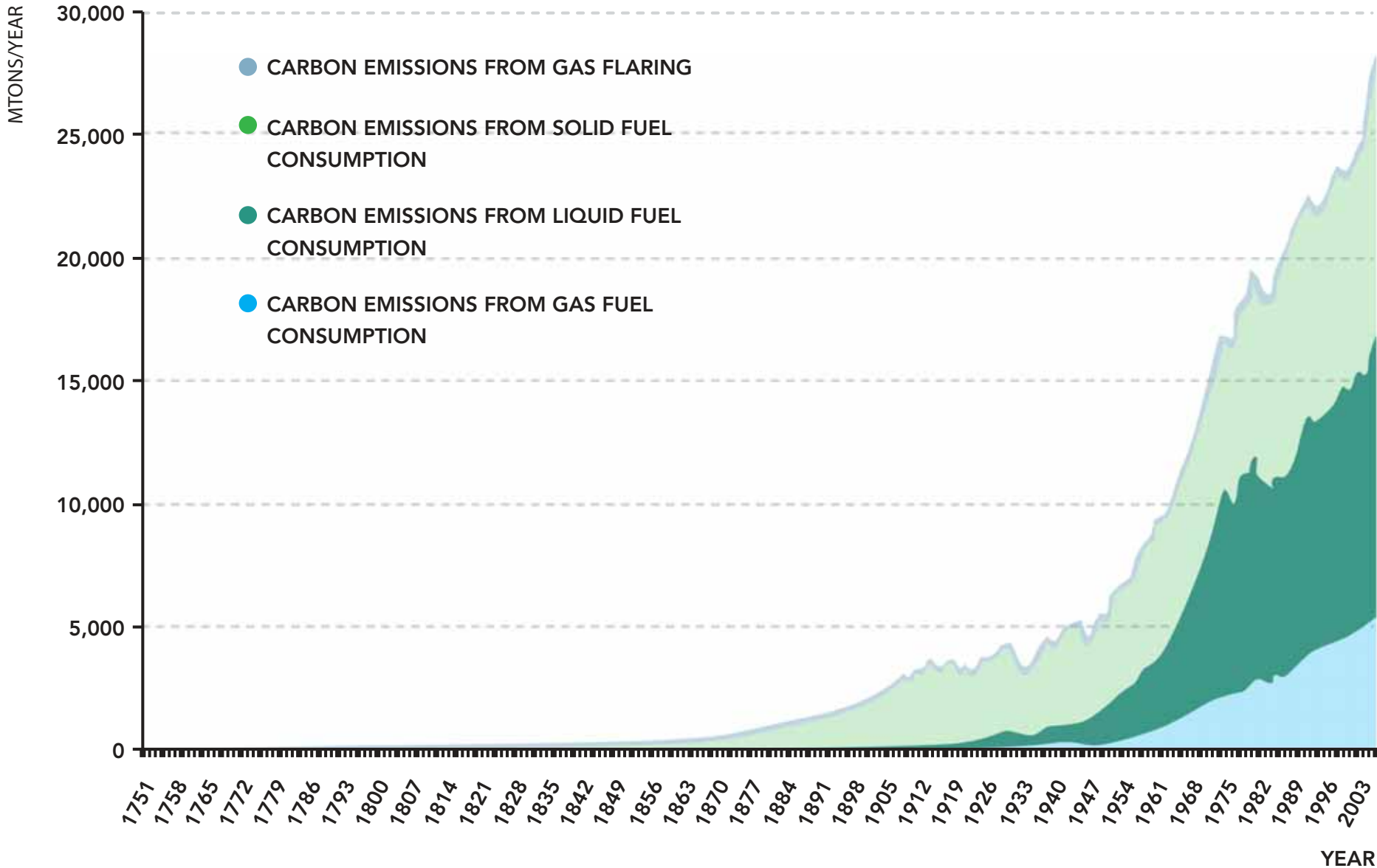
(2016F, Million units)

CAGR %  
2011-2016



Source: JD Power (2010), Global Insight, Goldman Sachs Research

# EMISSIONS



Source: Deutsche Bank.

YEAR





# EVs = GRID EFFICIENCY

Infrastructure largely in place



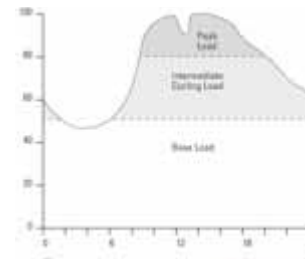
Technology improving



Reduced emissions



***Requires smart network***







**EVs**



**INSTALLATION**



**EVSE / CHARGERS**

# WHAT'S NECESSARY?

DC Fast Charging

3-pin

5-pin

Inductive charging

Level 1



Level 2



7-pin

CE standard



Access control

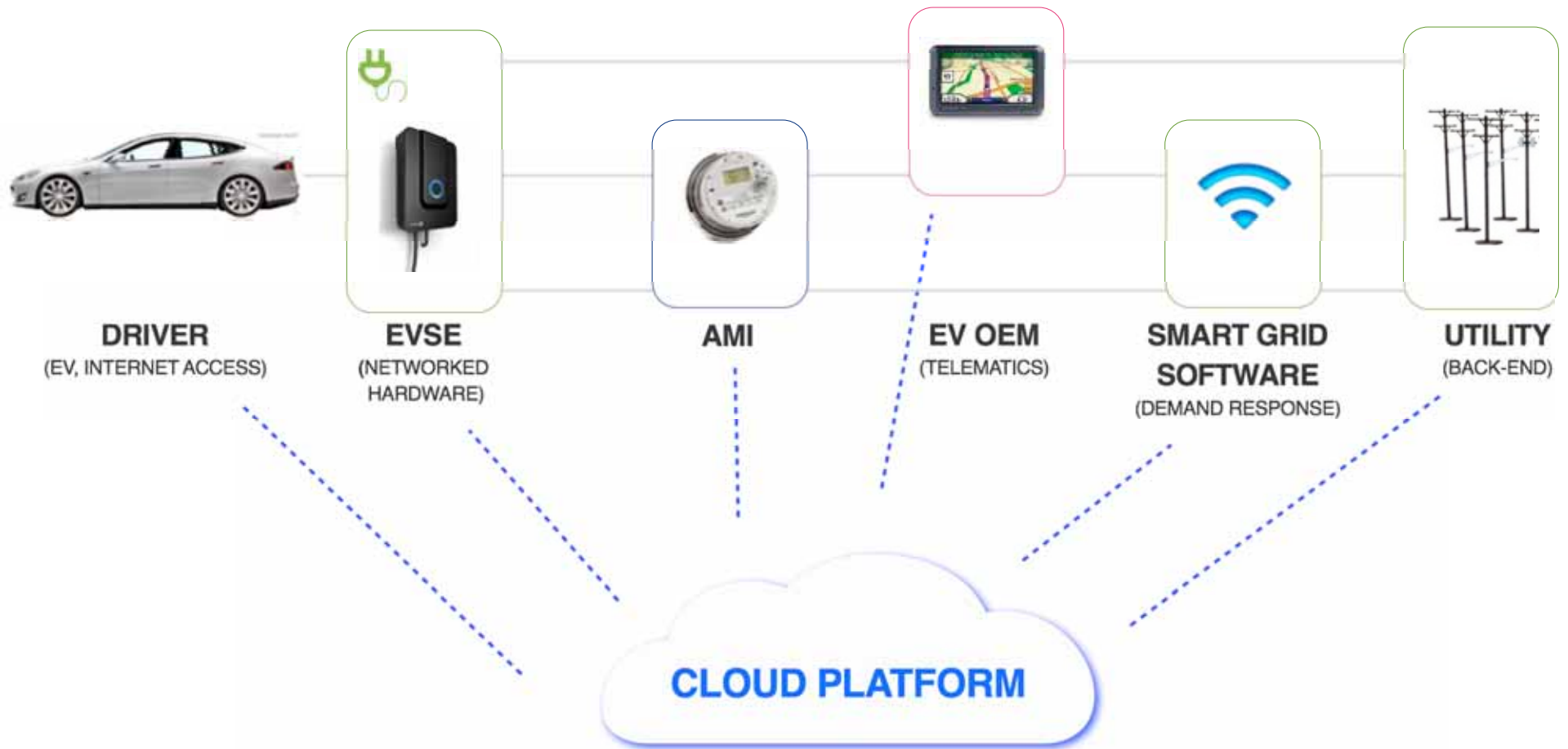


SAE standard

Battery swapping

UL standard

# TO BE SMART



# RECENT HISTORY

## **Charging infrastructure funded mostly by government**

- High cost of charging stations, installation
- Artificial market dynamics (free software, charging stations, & electricity)

## **Small number of proprietary networks**

- No driver roaming capabilities
- No backend interoperability (vendor lock-in w/ no ability to switch backend or add 3rd party hardware)
- Limited choice of technology and business models for site hosts and consumers

## **Largely public and residential infrastructure investment**

- Much of it is Level 2 (medium fast charging)

# EVOLUTION

## **Transition from government > private sector**

- More EVs on road, yet infrastructure investment slowing
- Limited ROI for infrastructure
- Drivers charge at home and work, public charging only when necessary
- Demand for Charging-as-a-Service

## **Open standards**

- Roaming (pay-per-use vs. CollaboratEV)
- Backend interoperability (OCPP<sup>1</sup> vs. closed networks)
- CHAdeMO, SAE Combo, Tesla

## **Emerging applications**

- Workplace, EV fleets, L1, DC fast chargers
- Smart grid evolving (SEP, OpenADR, HomePlug GP, V2G)

1. Open Charge Point Protocol,

# THANK YOU!

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