



# **Electro-mobility and the electricity sector: challenges and solutions**

**Thursday 7<sup>th</sup> June 2018**

## A favourable situation

EV penetration will increase significantly in the near future thanks to:

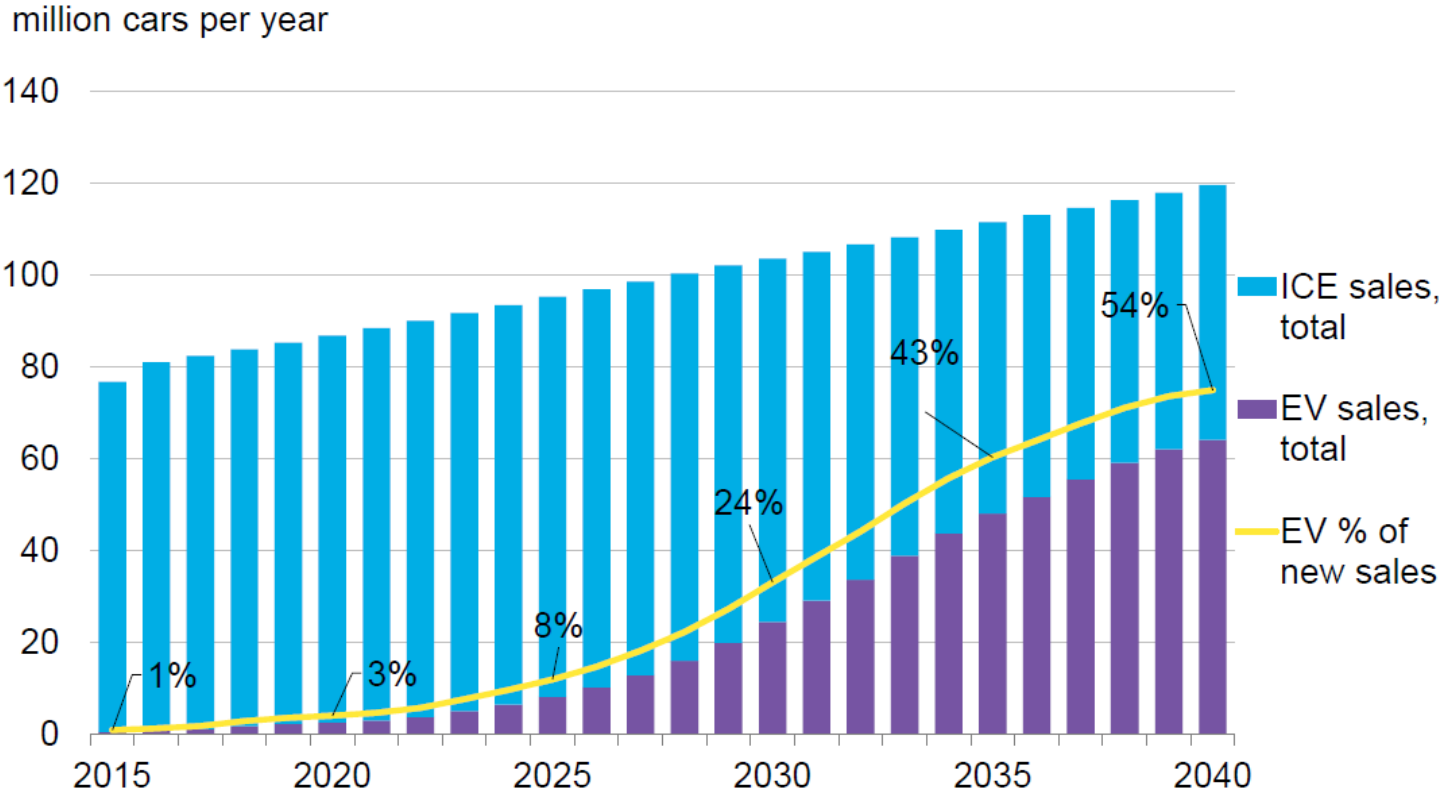
- **Technological improvements**, leading to a convergence in performances & prices between ICE & EV
  
- Critical developments in **power systems** such as:
  - New energy market regulation,
  - Decentralized generation & integration of renewable energy sources
  - Demand-side management,
  
- Increasingly-shared **concern about air quality**, leading to:
  - Local restriction for ICE (Amsterdam, Madrid, Oslo, Paris...)
  - National support schemes (State bonus, low taxes...)
  - European Mobility Package

*ICE: Internal Combustion Engines*

*EV: Electrical Vehicles*

# A promising outlook

## Annual global light duty vehicle sales



Source: BNEF 2017

## The case for smart charging

As the share of EVs grows, the **electricity distribution grids** at local level will be first affected. Even at low market shares, EVs could easily congest local transformers and disrupt voltage levels.

The key enabler for electric vehicles is **smart charging**.

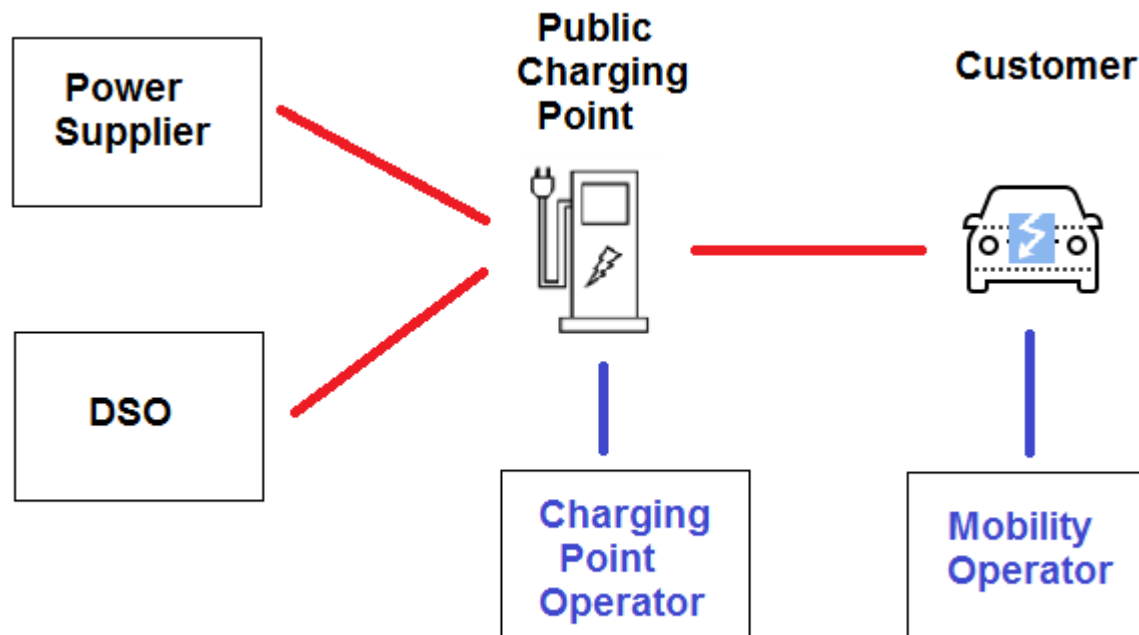
Smart charging involves:

- Charging of the batteries in a way that avoids **spikes** in power demand
- Maximising local integration of **renewable energy sources (RES)**
- Using the batteries as **storage** to deliver services to the electricity system

Smart charging is only possible if customers receive **clear financial benefits** that can lead them to play a more active role.

## New services, new actors

The development of EV implies the deployment of **charging points**, public (motorways, urban streets, parking lots...) as well as private (offices, apartment buildings, detached house..). Smart charging opens the way to **new actors**, able to offer new services, such as management of the charge, interplay with home batteries, vehicle to grid services...



## Some examples

### Charging Points:

- Vattenfall currently operates 9,000 charging points under the brand **"InCharge"** (DE, NL, SE, UK)
- Vattenfall & Volvo: partnership for "InCharge Smart home" (SE)
- ENEDIS, partner in the pilot project BienVEnu (FR) for charging points in apartment buildings

### Smart Charging:

- Renault Group with the subsidiary **Renault Energy Services**, devoted to smart charging, V2G and second life of batteries; experiments with **Jedlix** (NL) to optimize charging costs and with **Connected Energy** to test a new technology for fast charging on motorways (BE, DE)

### In-house Technology & Applications:

- BMW with the Application **ChargeNow** for localization of charging stations, payment (FR) & the technology BMW Wireless Charging

## More examples

Experiment of pilot bidirectional connection (V2G):

- **NewMotion** with ENEL, Mitsubishi, Nuvve & TenneT (NL)
- ENGIE with Hitachi & Mitsubishi (NL)
- E.ON with Nissan (DK) and with Ovo Energy (UK)
- Nissan with Nuvve and ENEL in the **Parker** Project (DK)
- PSA with Nuvve in the **GridMotion** Project (FR)

Fast Charging:

- **Open Fast Charging Alliance**: Fastned (NL), Sodemrel (FR), Smatrics (AU), Grønn Kontakt (NO) and Gotthard Fastcharge (CH). The alliance members own and operate more than 500 fast chargers in six countries.
- BMW with Audi, Daimler, Ford & Porsche, joint-venture **Ionity** to develop high power charging stations up to 350 kW (DE)
- Tesla network of free access "**Tesla Superchargers**" (683 globally)
- EnBW ordered from energy supplier EnBW 117 charging stations in 2017
- Allego with the 21 **Ultra-E** charging stations (DE, NL)



**Comments & Questions are welcome**

**[michel.cruciani@dauphine.fr](mailto:michel.cruciani@dauphine.fr)**