

Smart Charging

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Definition

Smart charging of an EV

“is when the charging cycle can be altered by external events, allowing for adaptive charging habits, providing the EV with the ability to integrate into the whole power system in a grid- and user-friendly way. Smart charging must facilitate the security (reliability) of supply and while meeting the mobility constraints and requirements of the user. To achieve those goals in a safe, secure, reliable, sustainable and efficient manner information needs to be exchanged between different stakeholders.”

(Eurelectric)

Charging costs

What if we can reduce this further through **smart charging** ?

Charging costs for an EV

Assumptions:

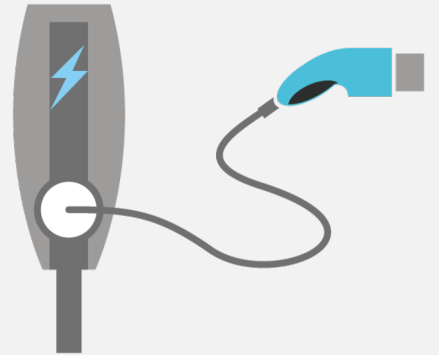
- 15,000 km per year
- 5 km per kWh
- € 0,20 per kWh

Charging cost = €600 per year

Different types of smart charging (recap)

Smart charging can be done by:

- Influencing the charging time/time-slot
- Influencing the charging power
- Powering back to the grid
(bi directional charging)



Different types of smart charging

Many types of smart charging exist. Here we explain the basics:

A. Local load balancing

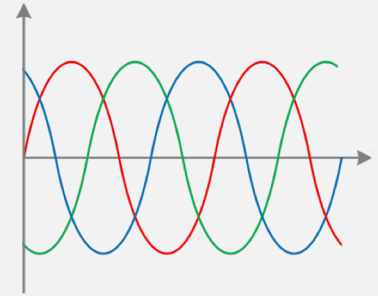
- Smart use of existing grid connection for chargers
-> charge when other loads (non-EV) on the grid connection use less
- Divide power to multiple vehicles in smart way
-> balance multiple charge points with priority system



Different types of smart charging

B. Local grid services (DSO/DNO)

- Congestion management
- Power quality
 - > voltage support, phase balancing and reactive power compensation



C. Energy markets

- Day ahead & intra-day trading
- Renewable energy availability



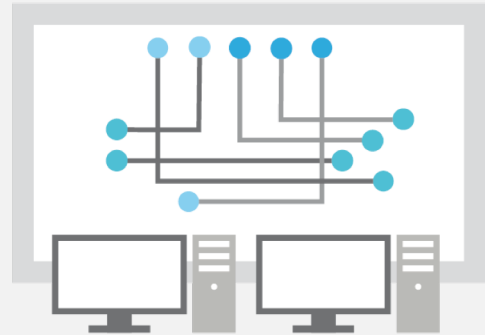
Different types of smart charging

D. Balancing services (TSO)

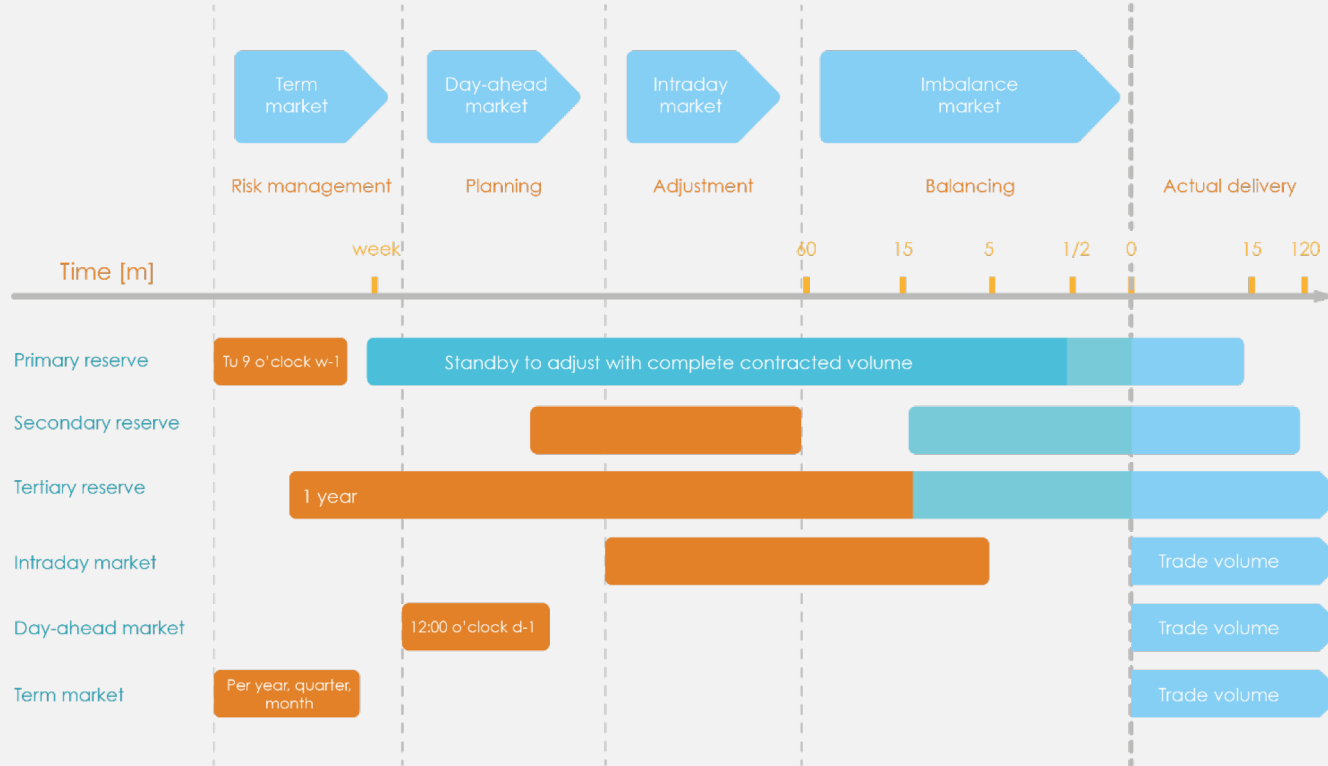
- Primary, secondary and tertiary reserve market
- Congestion management

E. V2G services (out of scope)

- combination of the above but bi-directional so higher value per car



Different types of smart charging



Barriers that affect business case

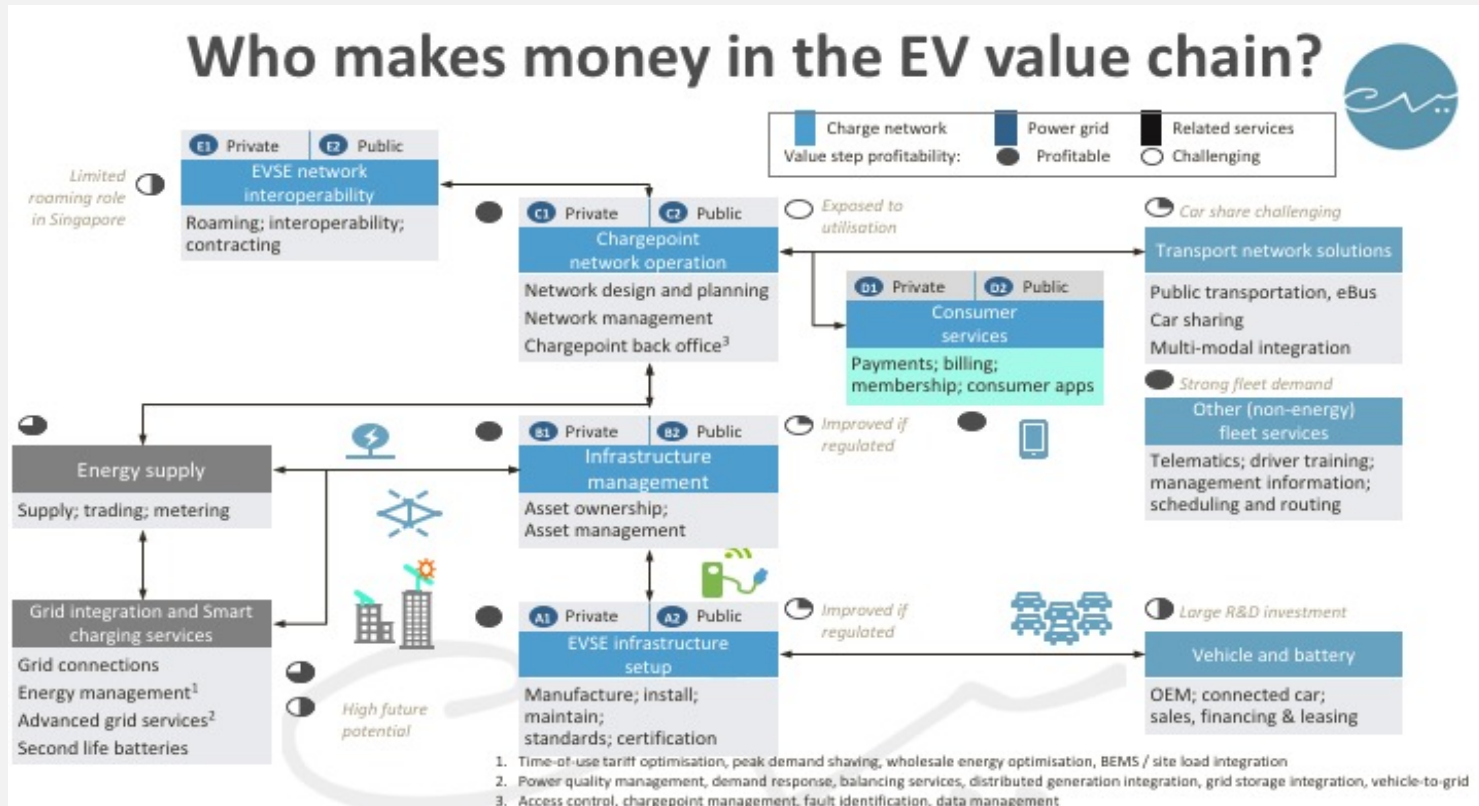
General:

- For DSO services there currently is no market structure (B)
- Strict regulations to enter energy and balancing markets (C&D)

Specific:

- Net-metering and feed-in tariffs minimize the value of local use and storage of locally generated (solar) power

Overview of key stakeholders



Overview of key stakeholders

Mapping case examples to the value chain

