ChargeUp EUROPE

EV CHARGING BUSINESS FUNDAMENTALS & HARDWARE MANUFACTURERS

WHAT DOES THE **EV CHARGING VALUE CHAIN** LOOK LIKE?

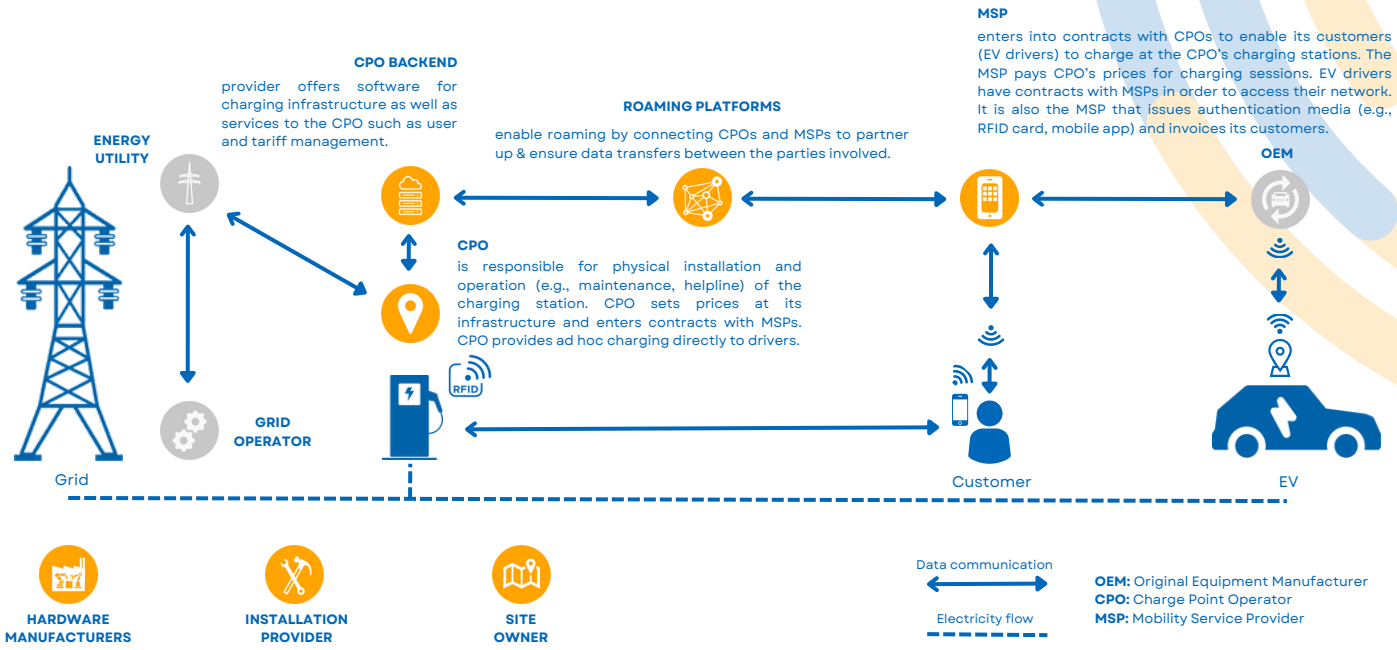
- The main roles in the EV charging ecosystem are hardware manufacturers, Charge Point Operators (CPO) (owners and/or operators of EV charging stations), software providers, mobility service providers (MSP), roaming platforms, and service/maintenance and recycling companies. Companies often combine several roles. The sector is innovating rapidly and new business models and services regularly emerge.
- The EV charging sector is part of a broader value chain, with utilities on one end and car manufacturers on the other end. Utilities, EV charging companies and EVs operate as an ecosystem with high dependencies. The success of the EV charging sector goes hand in hand with EV uptake; they are two sides of the same coin. Ensuring this ecosystem operates with fluidity is one of the top technical and commercial tasks of the sector today.
- EV charging company structures and maturities vary. There is a significant share of start-ups and scale-ups, along with larger companies that are diversifying their historical activities.

WHAT **STAGE OF DEVELOPMENT** IS THE EV CHARGING SECTOR IN TODAY?

- The industry is in a period of significant growth and maturation. Companies are currently investing heavily. Investments into charging Infrastructure will grow from €5 billion in 2021 to over €15 billion in 2030. Of this, private charging infrastructure is estimated to account for 2x the investment costs of public infrastructure.
- The sector is increasingly treated as a classic infrastructure business - high initial investment with returns over a long period, increasing as EV market share increases in each Member State.
- On average, the EV charging industry in Europe will require about 15,000 new positions per year through 2030. This will lead to the creation of more than 118,000 new jobs from 2022 to 2030, i.e. a growth of approximately +270%. The sector currently experiences labour shortages across skill ranges (technical, digital etc.).
- The industry is very dynamic and standards are under development. Standards are expected to play an outsize role in ensuring a seamless experience for EV drivers in coming years and to catalyse system integration along the value chain.

WHAT ARE SOME OF THE MAIN DIFFERENCES BETWEEN CHARGING & **REFUELING**?

- Whereas refueling can only happen at 'petrol stations', EV charging can take place wherever there is electricity – at home, work, destinations like restaurants & shopping malls, along the highway, and for fleets, buses, and trucks, depots. In most of these use cases, users charge where they are already parked, not going somewhere specifically to recharge.
- When an electric vehicle is plugged into a charging station, communication takes place between the battery in the vehicle and the charging station. In this way, the EV charging sector integrates transport and energy by digital means.



HARDWARE MANUFACTURERS

- Hardware manufacturers are the companies that design and produce charging infrastructure equipment for different segments and markets.
- Hardware manufacturing involves a lot of R&D and testing (e.g. resistance to temperature, noise reduction, electro-magnetic compatibility...)
- Hardware manufacturing also includes a strong software component, to be able to work with CPOs and MSPs. At its core, an EV charging station is an Internet of Things (IoT) device. As an IoT device, a station typically works with the Open Charge Point Protocol (OCPP), which is widely used by industry.
- Charging stations must be developed in line with car manufacturers' developments. The charger is built according to specificities of the cars; hardware manufacturers aim for more capacity ("charging power") but the vehicle (battery) cannot always take the available dispensed power. The options and limitations of hardware manufacturers therefore are driven by the grid connection and the vehicles.
- Hardware manufacturers develop different products to meet different customers' needs (buses, passenger cars, trucks...).
- Hardware manufacturers are particularly vulnerable to fragmentation in the EU Single Market: today they must develop different versions of the same product for different markets. National requirements which tend to vary drive up costs and lead to longer production and deployment times, a strong drain from an engineering and resource perspective. There is also extra hard costs involved with engineering to adapt the product to each market.
- Competitive sales pressure from Asia has risen in recent years. There is also a value chain dependency on components produced in Asia (e.g. power modules); many manufacturers today try to be more independent from these third markets. The high value segment (i.e. DC or fast & ultrafast charging) manufacturing remains primarily located in Europe for the moment.

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