

Hurdles and Opportunities For a Reliable Charging Infrastructure Network

The on-going electrification of vehicles puts high demands on the EV charging infrastructure in terms of availability, capacity and reliability. To meet the growth ambitions for the e-Mobility industry, several challenges still need to be overcome. Two industry experts, Claudio Vittori, Associate Manager in E-Mobility and Charging Components Research at S&P Global, and Federica Brambilla, Business Development Manager for the EV Charging Services business at Diebold Nixdorf, dive into this topic and share their perspectives on hurdles and opportunities for a reliable EV charging infrastructure.



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WHAT IS YOUR TAKE ON HOW THE ROLL-OUT OF THE EV CHARGING INFRASTRUCTURE IS PROGRESSING?

The EV charging infrastructure market is growing. We are expecting to see a steep increase in charging infrastructure from \$13B to \$180B global market value by 2030 with about 50% of this value related to services. Numerically the market is expected to grow hand-in-hand with electrification of vehicles, and by 2030 about 80M of charging stations will be installed across all the infrastructure domains. The domestic domain will remain the leading area (with about 60M charging stations installed), public and semi-public infrastructure will also play a pivotal role growing from 2M to 14M in 2030, and DC public/semi growing from 0.5M to 3M in 2030. China is leading public deployment with more than 50% of share, Europe and N.A. following suit.

According to the 2023 State of the Industry report by ChargeUp Europe, the number of EVs are growing by 34% year-on-year. By 2030, almost one quarter of the European Union vehicle stock will be electric. To serve these EVs, we already have over half a million public charging points in Europe, but more are still needed. Also, the distribution of charging stations across countries remains uneven. Moreover, today the majority of public charging stations are AC stations, less suitable for high-power fast charging along public highways. So, even though we made truly great strides forward over the last couple of years, a lot more powerlifting is still needed to establish an adequate and reliable charging infrastructure across all of Europe.

LOOKING AT THE EXPECTED STEEP INCREASE IN NUMBER OF CHARGING STATIONS, WHICH HURDLES DO WE HAVE TO TAKE TO BE ABLE TO RAPIDLY DEPLOY THOUSANDS OF ADDITIONAL CHARGERS?

There are four major challenges the market is now facing:
The distribution grid will be an essential element for charging stations deployment. Already today the lack of programmed investments and available capacity has proven to be a bottleneck.
The current charging infrastructure network is far from being reliable. In most cases, stations available are showing problematic faults that require long intervention timing of up to 1 week in certain areas.
The price of using public and semi-public infrastructure is, in some cases, very high correlated to the low usage rate we have been having in Europe (average between 5% and 10%) discouraging final users.
The low usage rate is, in some cases, causing distortions in the industry not allowing the stakeholders to generate extra profit to be reinvested.

Three topics are important: driver experience, profitability, and availability. Starting with the driver, it is important to not only have more charging stations, but also more reliable stations that offer secure, efficient and convenient ways to charge your EV and pay for. Unhappy drivers will slow down EV adoption, making it harder for charge point operators to find their path to profitability. Profitability is also impacted by cost of energy, duration of permitting processes, possibilities for upsell (e.g., via convenience retail) and efficiency of operating and maintaining stations. Lastly, availability is key: All chargers need to work properly as EV drivers won't accept waiting times beyond the time to charge their vehicle.

ARE GOVERNMENTS AND OTHER PUBLIC BODIES DOING ENOUGH TO OVERCOME THESE HURDLES AND ENSURE A SWIFT ROLLOUT OF THE NEEDED CHARGING INFRASTRUCTURE?

The charging infrastructure is still incentive dependent with some countries investing on the indirect deployment of stations through private incentives rather than directly intervening in the business: Switzerland offers the strongest financial support (\$4k) for domestic charger installations at home, Canton Ticino in Switzerland is currently the only region worldwide offering incentives for DC domestic bidirectional chargers.
Germany (\$10k+) outperforms other EV markets strongly subsidizing AC public and semi-public chargers through their government support scheme; Germany promotes the deployment of new AC charging stations by allocating 70% of the incentive for grid-connection cost covering.
Germany, Italy and the U.S. are the most generous countries supporting DC infrastructure with a range of \$80-100k per station.

Governments around the globe recognize the importance of e-Mobility as a way to meet sustainability goals and stimulate economic growth. The Biden administration launched the NEVI program, investing billions of dollars to deploy at least 500,000 public chargers across the U.S. In Europe, similar plans have been put in motion like with AFIR, which fosters the installation of fast chargers every 60 km along main roads.
These programs aside, there are also a number of areas for improvement where governments play a key role. Think about softening regulations regarding the use of land for charging stations, improving grid availability and reliability, promoting the adoption of standards, and releasing funds and tax benefits to economically justify the purchase of an electric car or truck.

HAVING MORE PUBLIC CHARGING STATIONS ALONG THE ROADS IS ONLY PART OF THE EQUATION. UPTIME IS THE OTHER PART. HOW DO YOU LOOK AT THE RELIABILITY OF THE CHARGING INFRASTRUCTURE?

As reported by the annual consumer survey conducted on more than eight thousand respondents globally, the charging infrastructure remains within the top three reasons for not buying an electric vehicle. Charging infrastructure need does not mean only faster deployment, but also implies a more accurate and reliable network of charging stations serving the present and future users.

The reliability of charging should be factored in right from the start if we want consumers as well as businesses to adopt electric vehicles and trucks. Reliability is not only about grid capacity, but also charger uptime and spare parts handling. Studies show that hardware issues make up 50% of all failed charging attempts. Proven maintenance programs, smart spare part logistics, and a dense network of trained field engineers will all contribute to less failing equipment and happier drivers.

WHAT MAJOR GLOBAL TRENDS COULD POTENTIALLY IMPACT THE CHARGING INFRASTRUCTURE SYSTEM OVER THE NEXT FEW YEARS?

There are three major elements that might have an influence on the charging infrastructure:
Emerging trend of new technologies on charging (wireless charging and battery swapping for example). According to S&P Global Mobility data, nearly 31,704 EVs produced in 2022 came with wireless charging technology. In total, 7.8 million EVs will get wireless charging technology in 2034, which is a strong 58.3% CAGR between 2022 and 2034. Will remain relatively China related with about 0.5M featuring the tech now and expected to grow up to 4M in 2034.
The number of vehicles being ready of achieving higher power rate in DC is expected to grow with the majority of vehicles being ready to charge between 100 kW and 200 kW.
Bidirectional charging of vehicles. In total, more than 2.7 million of light-duty vehicles with bidirectional on board chargers were produced in 2022. The demand is forecasted to grow at an 11.3% CAGR between 2022 and 2034 to around 44 million units.

To me, customer trust will be the next major thing in e-Mobility. I have a background in banking, where we have been working with customer-facing, self-service equipment like ATMs for decades now. In order to offer a good customer experience and retain customers' trust, these ATMs need to be up and running at all times. For EV chargers, I see this exactly the same: the charger is a customer-facing piece of self-service technology, and simply needs to work 24/7. Moreover, each charging session – be it positive or negative – will reflect on the brand of the store, gas station or hotel the charger belongs to. Customers are loyal, but trust can be easily damaged. So, "always-on" as part of gaining and retaining drivers' trust will be the next major trend for e-Mobility. And what you need for this is a proactive support and maintenance approach, where you constantly monitor what is going on in your charging infrastructure, so you can take action the moment something is about to go wrong. This type of proactive and preventative services approach combined with smart spare parts logistics will decrease the number of charger failures and increase uptimes, resulting in a highly reliable charging infrastructure and happier, loyal EV drivers who trust your brand.

THE TAKEAWAY

While the EV charging infrastructure industry is booming, charging availability and profitability have been identified as the key challenges for the growth of the e-Mobility next to underutilization. To overcome those hurdles, governments are challenged to soften regulations regarding the use of land for charging stations, improving grid availability and reliability, promoting the adoption of standards, and releasing funds and tax benefits to economically justify the purchase of electric vehicles. Additionally, a reliable charging infrastructure is needed based on proactive and preventative services, combined with smart spare parts logistics that will decrease the number of charger failures and increase uptimes, resulting in higher customer satisfaction.