

FROM THE EV REVOLUTION TO THE NEXT CHARGING EXPERIENCE

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Introduction

Setting the EV Revolution in Motion

Transportation is the least diversified and most carbon-intensive sector of human activity in terms of energy demand. In 2010, over 90% of its energy use came from oil and 10 years later it was still the case. However, **multiple factors are aligning to set the electric mobility revolution in motion, including shrinking battery costs, increased range, government net-zero ambitions, automaker commitments and consumer attention to their carbon footprint.** These are turning what was a niche demand for zero-emissions mobility only a couple of years ago into a mass market and will soon lead to an explosion in the number of EVs on our roads.

With the cost of battery packs expected to drop by more than 85% to around \$100/kWh in the decade ending in 2023, **in two to five years many markets will reach unsubsidized price parity between electric and internal combustion engine (ICE) vehicles.** This is true not only for light-duty vehicles but also for medium and heavy-duty transport in urban and regional settings. In particular, the predicted timing of cost parity is similar in Europe, the US and China, three of the four largest car markets with over 70% of global sales in 2020.

Despite the COVID-19 crisis, 2020 was the strongest year on record for EV sales, with about 3 million new electric cars registered globally, a 5.6% market share. **Government action is expected to significantly boost EV sales in the years to come as low-emission vehicles are incentivized and vehicle CO₂ standards are raised further.** In advanced markets like Norway, a decade of tax incentives and public investment in charging infrastructure pushed the market share of fully electric vehicles beyond 50% in 2020. In recent months, EV sales have accelerated past the 80% mark as the country seeks to become the first nation to ban the sale of new fossil fuel cars by 2025. Similar policies are driving sales in Sweden and the Netherlands, where respectively one in three and one in four cars sold in 2020 was an EV. Larger car markets are accelerating too. By the time gas and diesel car sales are phased out in the UK in 2030, an estimated 11 million EVs will be circulating on British roads, up from 450,000 today, growing to 36 million by 2040.

Globally, IDC Energy Insights expects up to 57 million electric cars to be sharing roads in 2025, 21 million of them in Europe.

If you Build it, they will Come: Developing the Enabling Infrastructure

As these factors align, **the speed of development of the charging infrastructure will be the real pace setter of the EV revolution.** While most charging tends to occur between home and work, the rollout of public and semipublic chargers will be a critical enabler of convenience, range, and autonomy for EV drivers. In fact, with consumer demand reaching critical mass, EV

charging is set to become an essential service in urban and suburban environments, like parking itself, and a required amenity for commercial spaces, much like WiFi.

Charging infrastructure is growing at pace globally, with an estimated 1.3 million publicly accessible chargers at the end of 2020 (one-third of which are fast chargers), up 45% compared to 2019. However, there are wide differences between regions and countries. At the end of 2020, Europe accounted for about one-third of the global EV stock, but only 22% of the global public charger tally, with most countries lagging the targets set by the EU's Alternative Fuel Infrastructure Directive (AFID) of one public charger per 10 EVs in 2020. Interestingly, some of the countries where the EV market is picking up speed or has already entered its exponential phase are struggling to keep up. According to the IEA, five of Europe's seven fastest growing EV markets in 2020 (Iceland, Norway, Denmark, Portugal, and Sweden) rank at the bottom of the public charger ratio ranking.

According to the European Automobile Manufacturers' Association (ACEA), **for the EU to stick to its carbon neutrality plans, public EV charging infrastructure needs to more than triple from an estimated 290,000 points at the end of 2020 to more than 1 million in 2024.** By 2029, this figure needs to increase ten-fold to 3 million. Luckily, the investment tap is now fully open in the form of direct public funding, tax incentives and subsidies, public-private partnerships, and innovative business models (e.g., landlord-operator partnership) and private investment (from utilities, automotive manufacturers, and specialized companies). This will support the development of personal, municipal, and regional charging infrastructure, including electric motorways and highways, as well as commercial and destination charging points.

"Democratization" of Mobility Services and Expansion of the Driver Experience

The shift to electric mobility has already brought significant change to the automotive industry and will have profound effects on the environment, consumer behavior, the livability of cities, and numerous other aspects of human life. **Two trends that are particularly significant for the charging segment of the mobility value chain.**

The first trend is an expansion from an ecosystem dominated by the auto and fuel retail industries to one that includes, as a minimum, utilities, municipalities, commercial space owners, and fuel retailers. You do not have to be an oil company to develop a charging point network or start an EV charging service. And you do not have to master the complex logistics of fuel retail to offer customers the convenience of recharging when shopping or going to a movie, a restaurant, or staying at a hotel. This is one of the most significant commercial shifts since the invention of the automobile more than a century ago.

The commercial opportunity around EV charging — whether it is business expansion, diversification, or outright portfolio transformation — is sizeable and multifaceted.

- "Electric cars are a good idea for an electric company," the CEO of Enel famously said in 2017, adding that utilities that trail the EV revolution do so at their own risk. For power utilities and electricity suppliers, EVs not only bring a healthy expansion of the core

business, but also an opportunity to integrate downstream into mobility services. **Utilities are actively becoming charge point operator (CPOs) for cities and towns, commercial spaces, and private companies as well as emobility service providers (EMSP) for individuals and fleet operators.** Finnish utility Fortum, with its Charge & Drive and PlugSurfing brands, is a perfect case in point.

- For municipalities, offering EV charging means promoting modern, sustainable mobility and improving air quality and livability standards while generating new income for citizens. **Regulators and city planners are already integrating EV infrastructure development in building-design and urban-planning standards to make public EV charging more scalable, accessible, and affordable.** In addition to national incentives, a “Right to Plug” is being proposed in the EU allowing citizens to request the installation of charging points in or near their building of residence or workplace. In addition, the Energy Performance of Buildings Directive (EPBD III) contains provisions to ensure that buildings with more than 10 parking spaces are progressively equipped with EV chargers.
- For **commercial space owners**, EV charging can be a tool for diversifying, enhancing the brand image and customer experience for EV owners. Gradually, **it will become a driver for loyalty, increased footfall, and new revenue streams, as well as a strategy for future-proofing operations.** In fact, to meet consumer demand, on-site commercial charging will become a must-have within the decade. The Climate Group’s EV100 Initiative is a great example of corporates getting ahead of the emobility curve. It brings together 110 companies in 80 markets committed to switching their fleets to EVs and installing EV chargers for staff and customers by 2030. IKEA, one of the EV100's most prominent members, recently reached its goal of providing access to EV charging at all its stores' car parks as it looks to become climate positive by the end of the decade.
- For fuel retailers, forecourt electrification is quickly turning from a necessary portfolio diversification strategy to one of survival, as it becomes a core source of revenue substitution. In fact, **mass-market rollout of EV charging stations now sits at the very core of oil companies' energy transition vision.** To put the sheer scale of the investment in context, Europe's largest oil companies — BP, Shell, and Total — have announced plans to deploy a combined 700,000 chargers globally by the middle of the decade.

The second trend is one of shifting consumer demand and customer experience. As people move from driving ICE cars to EVs some elements of their "journey" will be different. **This is particularly true of EV charging, where drivers will move from a spot refueling transaction to a more expanded recharging experience.**

Building a Convenient and Enjoyable Future Charging Experience

New technology-driven ecosystems and commercial innovation are opening opportunities to expand this driver transaction to an all-round consumer experience with **different equipment, solutions, and services offered by different players for different uses and types of EV drivers.**

- **Utilities will increasingly offer smart charging, EV load aggregation, vehicle-to-grid, and even behind-the-meter energy optimization services.** These will allow individual EV owners, as well as parking and fleet operators, to minimize the cost of charging by optimizing their charging schedule, using self-generated electricity whenever possible, and offering balancing and flexibility services to the grid. All this can potentially sum up to several hundred euros per EV per year in value. EV roaming will also be a growing area of focus. EMSP will increasingly offer seamless access to a growing number of charge point networks both domestically and abroad. Real-time charging station information, cardless or touchless charging, and consolidated billing across networks through a single subscription are just some of the features that will be available to EV drivers soon.
- **Municipalities will use public EV charging not only to support their citizens but also to implement their broader urban mobility strategies.** Services that could soon be offered include automatic EMSP recognition and touchless charging at parking gates and self-service onward journey planning directly at the charging point. For example, cities could offer free or discounted charging to drivers opting for public transit or electric micro-mobility for their onward journey.
- **While EV charging itself will soon be table stakes, commercial space owners will also start to use EV charging tactically to support their core customer experience.** A supermarket could offer contextual advertising and in-store promotions as soon as the customer plugs in via interactive screens at the charging point. Or it could use number plate recognition to automate anything from loyalty programs to parking access. A bank or a post office could use similar capabilities to offer customer self-service, remote concierge, or queue management functionality and support seamless digital and in-store experiences.
- **Many of the same capabilities will be used by fuel retailers to transform their operations.** On the one hand, intelligent interfaces on and around EV charging units can be used to digitize service area operations through enhanced safety, automatic customer recognition and touchless charging, automated "fuel card" management, and self-service convenience store operations. On the other, digital technologies will be used to transform the traditional forecourt into a multi-service point of presence, offering anything from vehicle owner services to car sharing, electric micro-mobility and postal services, and ecommerce lockers. Some energy retailers are already gearing up for the EV revolution by developing their "forecourt of the future" concepts.

Considering Avnet Embedded

Avnet Embedded brings together its rugged **compute, display, and software technology to become a dependable partner for the design and manufacture of EV charging solutions worldwide.**

With a solid track record in delivering human/machine interface (HMI) devices that combine compute and display for a range of different organizations, Avnet Embedded is ideally positioned to help with EV charging across a wide range of use case requirements. Working with original equipment manufacturers (OEMs), power companies, governments, and local authorities as well

as commercial and private space owners, Avnet Embedded has the experience and capabilities to deliver EV charging technology solutions at scale.

Helping Customers Develop Future Charging Experiences

Avnet Embedded's experience in display, compute, and software means the development and building of EV charging solutions can be supported and fulfilled across existing and emerging needs. **From the forecourt to the cloud, experienced teams can complement the customers' skillset and supply chain, optimizing development and shortening the time to market of their EV charging requirements.** Avnet Embedded's partnership with other Avnet businesses means it can also provide comprehensive hardware support as well as interconnect, passive, and electro-mechanical (IP&E) components, bringing the whole solution together.

Avnet Embedded helps customers balance cost with capability by identifying the right embedded and display technologies for their needs, as well as working with them through manufacturing, support, and product lifecycle planning. This tailored approach to embedded and display technologies is more flexible and often faster, reducing risk and improving the user experience.

Figure 1

Examples of Next-Generation Charging Stations from Efacec, Supported by Avnet Embedded Hardware



Source: Efacec Power Solutions SA, 2021

Specifically, **Avnet Embedded offers integrated solutions across:**

- **Commercial** — Ideal for businesses offering parking as a service, commercial units feature all the benefits of a public EV point, but charge at a significantly higher speed.

Avnet Embedded can also support a wide range of display capabilities that build in the potential for advertising and wider engagement with users and partners. In this segment, Avnet Embedded provides compute and display solutions to Efacec for its range of commercial EV chargers (Figure 1).

- **Public** — Robust, paid charging units suitable for public facilities, with large display areas for advertising, payment systems, LTE, and WiFi connectivity.
- **Home & Office** — Personal/business use charge points with simple functionality. Ideal for installation alongside new home and office builds, they can also be added to existing constructions.

Challenges

As the market for EV charging solutions develops and becomes more complex, **some of the market challenges inherent to Avnet Embedded's value proposition include:**

- Competition from **full-scope OEMs, designing and building end-to-end solutions** supporting specific future charging experiences such as those described above.
- Solutions from **large electronics and industrial equipment manufacturers** that could become de facto universal standards in certain segments or geographies.
- Competition from **manufacturers or integrators offering charging solutions as a service**, including installation, aftermarket, and maintenance in addition to the equipment itself as in a single service contract to charging point operators.

Conclusion

The EV revolution is upon us. Companies that choose to ignore it do so at their own risk.

Organizations that understand its scale, strategic significance, and commercial potential may only have a few years before adoption enters the exponential phase in their markets.

As they plan their future positioning in the new expanded mobility services ecosystem, organizations should consider the following advice:

- **Plan your EV charging point deployment with "hands in the now."** Align your minimum viable charging service to your customers' immediate needs in terms of charging behavior, equipment type, and payment options.
- **Think of your EV charging experience with "eyes on the future."** Align it with your brand prerogatives and business strategy. Plan to leverage intelligent technology to transform operations and expand on your core customer experience.
- **Integrate EV charging into your capital and urban planning process.** Standardize and build out the enabling infrastructure during greenfield and renovation projects to avoid expensive retrofits in the future.
- **Become an EV charging advisor to your customers.** Help large public and commercial clients electrify their fleets and host EV charging capacity in the most cost-effective manner, focusing on open-charging protocols and charger interoperability. Provide private customers with standard, easy to use solutions to support their transition.

- **Think of solutions that integrate onsite generation, storage, and active energy and load management** technology to keep up with demand and use flexibility to minimize the cost of owning an EV and providing charging services.

About the Analysts

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Jean-François Segalotto is the associate research director for IDC Energy Insights in Europe. In this role, he is responsible for conducting region-focused research providing full coverage of the utilities industry value chain. Segalotto leads the European Utility IT and Operational Technologies Strategies advisory service, in which he covers a wide range of industry-specific themes, including smart grids, digital asset management, e-mobility, IoT, connectivity and networks, and business systems supporting smart customer operations and digital transformation. He is based at the IDC Italy office in Milan.

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