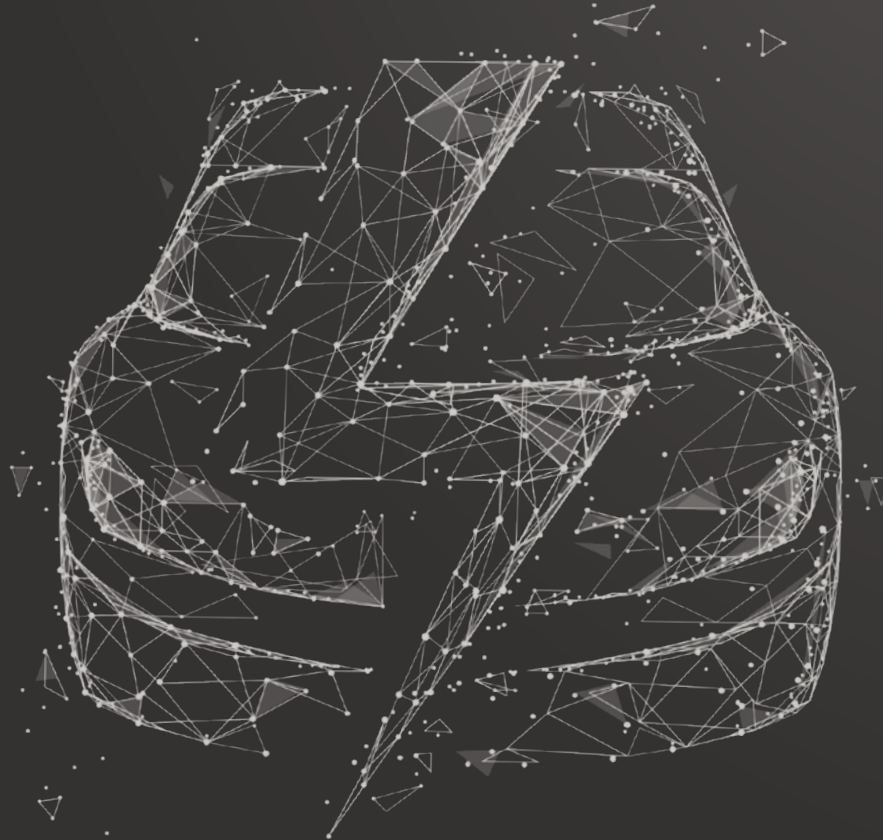


WHITE PAPER

# European EV Charging Forecast 2021–2024

Why this is the last chance to catch a piece  
of the market.



**CURRENT STATUS.** Political landscape and technical advances.

**SECTOR BY SECTOR.** A closer look at key industries.

**MARKET OUTLOOK.** Trends for 2021-2024.

Special thanks to Berg Insight for their research, Graeme Cooper from National Grid UK and Maximilian Huber from has-to-be gmbh for their special contributions.



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## INTRODUCTION.

### Where is the European EV Charging market headed?

Electric vehicle (EV) charging infrastructure is rolling out at record speed to keep up with the enormous revolution in eMobility. Incredible economic advantages can be gained. Independent analysis of the global market for low emission vehicles estimates it to be worth €1 – 2 trillion per year by 2030 and €4 – 8 trillion per year by 2050.

The market is moving so fast that there is a serious lack of whole system thinking. Business, government, and community leaders in all sectors, from SMEs to multi-national corporations, still have an opportunity to ensure widespread and equitable EV Charging access for everyone. This needs to be done in a way that is sustainable and profitable.

This white paper will show you the environments primed for nurturing innovation, new technology, and growth. We will show that you can mitigate the wider lack of forethought and standardization with smart software, cross-market cooperation, and bundled solutions. Those already in the EV Charging infrastructure market will find insights on how to strategically position their efforts. We will look at the status of key industry areas including automotive, real estate, charge point operators, energy utilities, mobility service providers, Oil & Gas, and retail. To close, we will provide a forecast of what to expect in 2021 – 2024.

## ABOUT THIS REPORT

To compile this white paper, has-to-be gmbh relied heavily on Berg Insight's EV Charging Infrastructure in Europe and North America First Edition, 2020. Berg Insight is a market research firm based in Sweden, specializing in M2M/IoT market research since 2004. We also interviewed Graeme Cooper, a leading expert on transport decarbonization in the UK, and automotive expert Maximilian Huber, COO of has-to-be gmbh and a veteran with almost two decades of experience at AUDI AG.

Of course, has-to-be gmbh is also continuously reviewing current legislation, market trends, and policy papers, and is in daily communication with leading EV Charging providers, many of whom are our clients. Our analysis is grounded in first-hand experience of making EV driving in Central Europe a seamless, affordable, and integrated experience for drivers since 2013.

The paper does not cover the additional opportunities to balance the grid and store electricity with vehicle to grid software, as this has been covered in other has-to-be gmbh white papers.

## TERMINOLOGY

**Charge Point Operators (CPOs)** operate charging stations and are legally responsible for compliance with the statutory and technical requirements to ensure that charging sessions are accurately recorded and tamperproof. Their tasks can be separated into technical (deployment, operation, maintenance) and financial (marketing, pricing). All can be fulfilled by different entities using software solutions. Originally formed and dominated by utilities, today there are a high number of small, regional players active in this field. A few have charging operations as their core business, but most come from adjacent markets. Some companies act only as a CPO and build their business idea around installing and maintaining a charging network, but most CPOs build charging networks as a side business.<sup>1</sup>

**Electric Mobility Service Providers (eMSPs)** provide access to charging stations/networks via service contracts and user interfaces (RFID charging cards and apps), so end customers can locate charging stations, manage, and pay for charging sessions. EMSPs can partner with other eMSPs under roaming agreements and therefore offer additional charging stations to their customers. Most CPOs also act as eMSPs. This is a software-intensive business with a competitive focus on developing the widest network.<sup>2</sup>

**Hardware providers** supply the equipment for CPOs. Many specialize in EV Charging and focus exclusively on these products. Several are from adjacent markets that have an interest in the charging industry, such as utility companies, automotive OEMs, and suppliers of electronic products. Hardware manufacturers commonly use a combination of direct sales and distributors.

**Software solutions** vary greatly from hardware-specific to open source and interoperable. By integrating positioning and communications equipment in EV Charging stations and connecting them to back-office solutions, the delivered service and operations improve in multiple ways. Functions allow operators to remotely monitor and manage charging stations and payments. Customers can locate chargers, start a charging process, monitor charging availability, pay, and get an overview of their charging history using a mobile app. Software solutions can take on all administration and carry the branding of the individual client. European countries are beginning to regulate connectivity, partly to protect consumers. An example of this is Germany's calibration law (*Eichrecht*).

<sup>1</sup> Berg Insight Research Team Pg. 16

<sup>2</sup> Alexander Krug, Thomas Knoblinger, Jean Bauer, The Evolution of Public Charging, Jan 2020



## EV CHARGING IN EUROPE.

### An overview

The market for EV Charging stations is made up of CPOs, eMSPs, hardware, and software providers. Many companies focus solely on some parts of the market, while others are active in several areas.

The market is highly fragmented with intense competition for market share and direct customer access. North European countries, in particular, have built up impressive charging infrastructures. The Netherlands alone is operating more than 50,824 public charge points.<sup>3</sup> End customers can select from a wide variety of charging cards that offer access to more than 280,000 charge points all over Europe<sup>4</sup>, over 250,000 of which are on has-to-be's roaming network. Europe has the capacity to produce enough electricity to satisfy demand for full market EV penetration.<sup>5</sup> However, there are still large geographical areas that are undeveloped in terms of EV infrastructure.

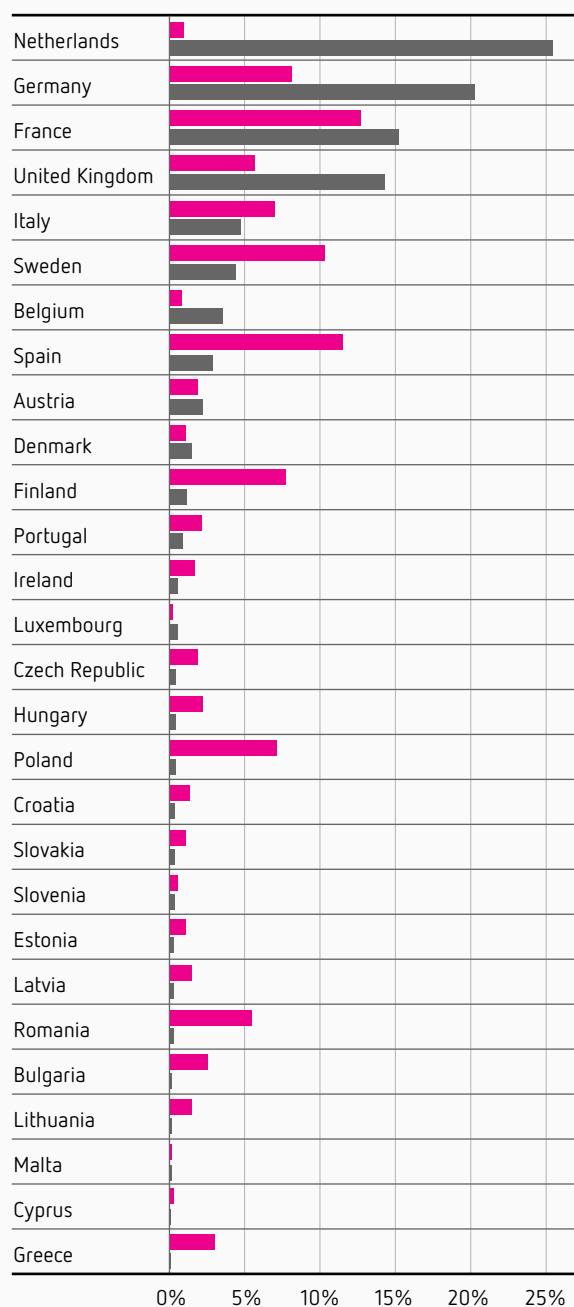
The total number of charge points in Europe is forecast to increase at a compound annual growth rate of 31.1% from 1.3 million in 2019 to 5.2 million by 2024.<sup>6</sup> The EU predicts there will be 13 million zero-and low-emission vehicles by 2025.<sup>7</sup>

Although most charging in Europe is done at home and at work, the demand for publicly accessible charge points will continue to expand as EVs become more mainstream. Convenience, cost-effectiveness, and a variety of support policies (such as preferential rates, equipment purchase incentives, and rebates) are the main incentives for the prevalence of private charging.<sup>8</sup>

Correlation ECV infrastructure and surface area, by country (2019)

### ELECTRIC CAR CHARGING INFRASTRUCTURE VERSUS AREA, PER COUNTRY

■ Area (% of EU total) ■ Charging points (% of EU total)



\* Electric car = electrically chargeable vehicles (battery electric vehicles + plug-in hybrid electric vehicles) Source: ACEA, EAFO

<sup>3</sup> The European Automobile Manufacturers' Association (ACEA)

<sup>4</sup> [https://www.electrive.net/2021/03/04/eafo-studie-wo-europa-beim-ausbau-der-ladeinfrastruktur-steht/#:~:text=Die%20Daten%20des%20EAFO%20stammen,gegen%C3%BCber%202015%20\(67.000%20Ladepunkte\)](https://www.electrive.net/2021/03/04/eafo-studie-wo-europa-beim-ausbau-der-ladeinfrastruktur-steht/#:~:text=Die%20Daten%20des%20EAFO%20stammen,gegen%C3%BCber%202015%20(67.000%20Ladepunkte))

<sup>5</sup> Cooper, G. Interviewed by Russell, has-to-be gmbh (22.12.2020)

<sup>6</sup> Ibid.

<sup>7</sup> European Green Deal, [https://ec.europa.eu/info/sites/info/files/european-green-dealcommunication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-dealcommunication_en.pdf)

<sup>8</sup> IEA (2020), Global EV Outlook 2020, IEA, Paris <https://www.iea.org/reports/global-ev-outlook-2020>

However, public charging is proving an excellent solution for fleet managers and residents of buildings where private charging is not an option. The International Energy Association (IEA) estimates that the efficiency-related stimulus spending could generate the equivalent of 1.8 million full-time jobs between 2021 and 2023, with 20% of these in transport. Over 80% of efficiency jobs are destined to be created in Europe.<sup>9</sup>

Charge points can be separated into two categories: slow and fast charge points. Slow ones charge below 22 kW (kilowatts) and fast ones above 22 kW. Fast chargers decrease the charging time significantly and the availability of such chargers plays a key role for the EV Charging infrastructure.

## THE POLITICAL LANDSCAPE

Ambitious government targets continue to be vital to the overall market. Since 2019, the focus has shifted from direct subsidies to policy approaches that rely on regulatory and other structural measures – including zero-emission vehicle mandates and fuel economy standards. These directives send a clear, long-term signal that widespread government support for the transition to EVs exists at all levels.



“There is no doubt about it, the eMobility market has only begun its growth path in Europe and other markets,” says Maximilian Huber, COO of has-to-be gmbh. “The European vehicle emissions standard EU7 will be the final emission standard for ICE driven passenger and light-duty vehicles and will set the emission bar so low that only cost-intensive technical solutions will allow vehicles to meet the homologation requirements. That will turn the tide in favor of fully electric cars as ICE vehicles become more expensive than their electric variants. And with development times of 4-5 years and life-cycles of 6 – 7 years, we are already in the phase-out period of ICE vehicles. Major OEMs

are lobbying for better charging infrastructure, the right to charge at home with the new EPBD, lower electricity prices and more. All this would eliminate reasons for customers not to buy an EV as their next vehicle. OEMs have no choice but to make a success of EVs, and the rest of the industry can build its business models on that.”

Most countries offer some form of subsidy or tax reduction for the purchase of EVs by individuals or companies. Most also support schemes for deploying charging infrastructure and have largely left the vertical market alone to self-regulate. However, there are substantial overarching policies and directives that aim to expand EV Charging infrastructure and to standardize and regulate the overall market, shaping how we drive in Europe.

These include the following:

**EU policy documents aimed at reaching 30 million zero-emission cars by 2030.** To push industry towards the associated targets, the commission is working on new CO<sub>2</sub> and pollution standards.<sup>10</sup> The CO<sub>2</sub> tax, which is used by governments to achieve the targets, also has a supporting effect here.

**The Energy Performance of Buildings Directive (EPBD),** adopted by the EU in 2018, stipulates that all new or comprehensively renovated residential buildings with more than ten parking spaces must install pre-wiring for future charge points. For commercial buildings, every fifth parking space must be pre-wired, and a minimum of one charge point must be installed.<sup>11</sup>

**The Alternative Fuels Infrastructure Directive (AFID)** has applied to new and existing EV charge point infrastructure since 2018, and mandates that all CPOs offer customers ad hoc access. This means all new and existing public charge points must be accessible without entering a contract.

<sup>9</sup> <https://www.iea.org/reports/energy-efficiency-2020> accessed 06.12.2020

<sup>10</sup> <https://www.argusmedia.com/en/news/2167371-eu-wants-30mn-zeroemission-vehicles-by-2030>

<sup>11</sup> The European Commission [https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive\\_en](https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en)

## WHAT WE KNOW ABOUT EV DRIVERS IN EUROPE

Privately owned and leased EVs continue to be driven primarily by well-educated, middle-aged men with above average earnings, 92% of whom own their own property.<sup>12</sup> This is rapidly changing with increasingly varied driver demographics. Top drivers for owning an EV range significantly and include<sup>13</sup>:

- Lower maintenance and operating costs.
- The convenience of gear-free and noise-free driving.
- Environmental concerns.
- Tax benefits owning EVs and company cars.

Additional factors pushing EV adoption are as follows:

- UK and some EU countries banning passenger vehicles and vans with combustion engines by 2030 and 2035 respectively raises concerns about being able to resell internal combustion engine (ICE) vehicles.
- Commuters who work in city centers, particularly mid-career professionals, and fleet operators, often choose EVs to avoid paying inner city charges or parking fees that many European municipalities use to curb congestion and public transportation problems.
- Interconnected digital interfaces are particular incentives for fleet efficiency as they provide the most advanced digital solutions not available in ICE vehicles.
- In future, the option of bi-directional charging could bring more economic incentive. Vehicle-to-grid technology gives commercial operations the means to offload and charge large facilities, saving hundreds of thousands on their annual fuel bills. In some locations, it is possible to sell energy back to the grid, thus generating income and reducing dependency on the national grid.
- There is a fundamental change taking place in transportation, with a move away from private ownership towards increasingly popular EV car sharing cooperatives/ car sharing programs.

The number of EVs on offer has mushroomed: over a hundred different models are available in 2021, ranging from €7,350 for a Renault Twingo to €187,000 for a Porsche Taycan Turbo S Gran Turismo. The top purchasers of EVs continue to be companies using leasing contracts for fleets. On average, the most frequent car trip in Europe is 20 km, with limited variability across countries.<sup>14</sup> Only 2% of drivers cover more than 160 km per day, reinforcing that battery range is not a decisive factor for the majority.

## EV TECHNICAL ADVANCES

Today, practically all new charging stations installed in public and semi-public contexts feature IoT connectivity. In some European countries this is even mandated. Operators remotely manage the charging stations or outsource the management to white-label solution providers like has-to-be gmbh. Customers can locate chargers, start a charging process, monitor progress, and pay through online portals. Networked charging stations are crucial to enabling widespread charging and accelerate the mass adoption of EVs.

The enormous progress in battery technology is expected to continue in the years to come. In addition to determining the vehicle's range, battery capacity also influences the required charging time. A battery with a larger capacity takes more time to charge, and vice versa. This capacity differs depending on the type and size of the car. For smaller battery electric vehicles (BEVs), the capacity typically ranges from 20 – 40 kWh (kilowatt-hours), while the capacity for larger cars will exceed 100kWh in the near future.

<sup>12</sup> ICONS Research Ibid

<sup>13</sup> Michael Zdanowski, 'Five things you should know about EV Drivers' Feb 2021

<sup>14</sup> Mobility data across the EU 28 member states: results from an extensive CAWI survey Pg. 1108

Charging times are becoming less of a concern for long distance travel, with chargers of 250 – 500 kW for cars being deployed or announced. This is a significant gain on the 50 – 120 kW capacity of most current models.<sup>15</sup> By 2030, battery EVs are expected to reach an average driving range of 350 – 400 km, corresponding to battery sizes of 70 – 80 kWh.<sup>16</sup>

### CHARGE POINTS FOR EVs PER COUNTRY, PLUS PERCENTAGE OF EU TOTAL (2019)

Austria	4,443	2.2 %
Belgium	6,551	3.3 %
Bulgaria	135	0.1 %
Croatia	629	0.3 %
Cyprus	38	0.0 %
Czech Republic	808	0.4 %
Denmark	2,817	1.4 %
Estonia	391	0.2 %
Finland	2,145	1.1 %
France	30,367	15.2 %
Germany	40,517	20.3 %
Greece	61	0.0 %
Hungary	735	0.4 %
Ireland	1,076	0.5 %
Italy	9,370	4.7 %
Latvia	306	0.2 %
Lithuania	202	0.1 %
Luxembourg	913	0.5 %
Malta	102	0.1 %
Netherlands	50,824	25.4 %
Poland	884	0.4 %
Portugal	1,791	0.9 %
Romania	344	0.2 %
Slovakia	649	0.3 %
Slovenia	628	0.3 %
Spain	5,769	2.9 %
Sweden	8,792	4.4 %
United Kingdom	28,538	14.3 %
<b>EU total</b>	<b>199,825</b>	

Source: EAFO

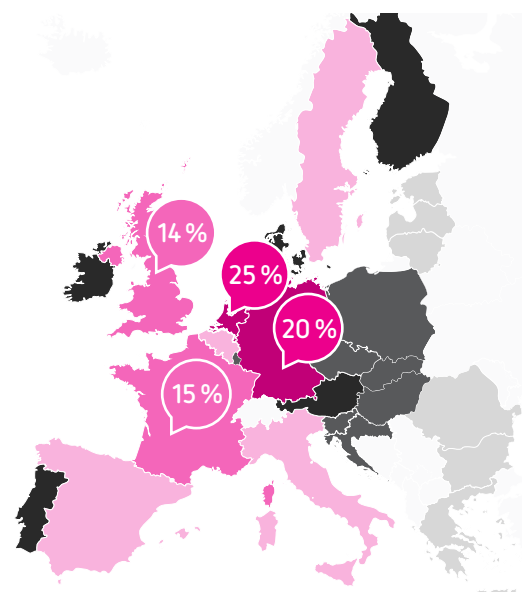
Please note these do not include figures for Norway (a world leader in EV Charging) as Norway is not a member of the EU. has-to-be gmbh was giving EV charging service providers access to more than 200,000 roaming points as of May 2021. Some graphics use the term ECV (electrically-chargeable vehicle) which we have referred to as EV throughout this document.

The Volkswagen Group is investing around €73 billion in electrification, hybrid powertrains, and digital technology over the next five years. Approximately €35 billion will be spent on EV batteries. A further approximately €11 billion has been earmarked for the development of hybrid versions of existing models.<sup>17</sup> An incredible amount of development work is being done to optimize lithium and cobalt usage in EV batteries, which is linked to environmental and geo-political concerns. Building a cobalt-free battery remains a particularly important challenge.

### DISTRIBUTION OF ELECTRIC CAR CHARGE POINTS ACROSS THE EU (2019)

**75 % of all charge points are located in just 4 EU countries:**  
25.4 % Netherlands | 20.3 % Germany | 15.2 % France | 14.3 % UK

**Top 5 fewest charge points:** Cyprus 38 | Greece 61 | Malta 102 | Bulgaria 135 | Lithuania 202



#### Number of charging points



\* Electric car = electrically chargeable vehicles (battery electric vehicles + plug-in hybrid electric vehicles) Source: ACEA. EAFO

<sup>15</sup> IEA (2020), Global EV Outlook 2020, IEA, Paris <https://www.iea.org/reports/global-ev-outlook-2020>

<sup>16</sup> Ibid

<sup>17</sup> <https://www.volkswagen-newsroom.com/en/press-releases/volkswagen-group-raises-investments-in-future-technologies-to-eur-73-billion-6607>





## SECTOR BY SECTOR.

### EV Charging in different industries

## Automotive

Building a network of charging stations can be a successful way for automotive OEMs to improve EV sales. Tesla is the most prominent example. It introduced its first EV in 2006 and has since become one of the leaders in the industry. Apart from selling EVs, Tesla builds and operates a network of charging stations in North America, Europe, Asia, and Australia. The Tesla Supercharger Network has more than 17,000 active DC (direct current) charging stations and the Tesla Destination Network has more than 25,500 destination chargers.

Maximilian Huber, COO of has-to-be gmbh sees the future of the automotive industry as follows:



“eMobility isn’t just a disruption for the automotive sector. It disrupts the electricity and Oil & Gas sectors too. Selling EV Charging energy is a chance for OEMs to gain access to their customers beyond the initial sale and occasional service. By offering bundled charging solutions not only for vehicle-to-home bi-directional charging but also smart homes, OEMs can be ‘present’ in their customers’ homes. The concept of ‘refueling’ at home is a new one and thus a huge opportunity to offer and connect additional services.”

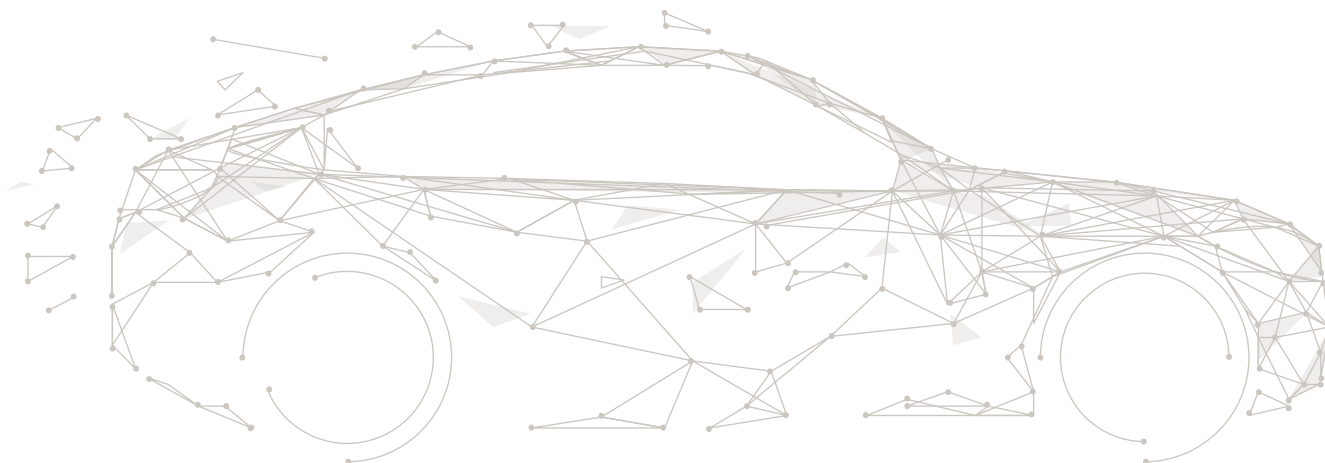
Here’s what he sees as an opportunity that’s not being taken advantage of:

“While ICE vehicles are stand-alone products except for refueling, EVs are not. EVs are only one – although the most important part of an ecosystem. I have yet to see an OEM fully committed to using this advantage. Not even Tesla, which is still missing out on the vehicle-to-home/-grid use case. However, for bi-directional charging the regulation authorities are far behind the technical development and quickly have to set the guidelines to not further delay the market introduction of this technology.”

Another example of a European charging station network run by OEMs is IONITY. In 2017, the BMW Group, Ford Motor Company, Daimler (Mercedes-Benz), and the Volkswagen Group (Volkswagen, AUDI, and Porsche) founded this joint venture, which operates with has-to-be’s be.ENERGISED software. Korea’s Hyundai Motor Group (Hyundai and Kia) joined IONITY in 2019. As of January 2021, IONITY has 332 live charging sites that consist of 1549 charge points.

Many automotive OEMs on the market today offer a wallbox suitable for home charging. Examples include the BMW Wallbox, the Ford Connected Wallbox, the Wall Connector from Tesla, easyWallbox from Fiat, ID Charger from Volkswagen, and Wallbox Home from Mercedes-Benz.

<sup>18</sup> Berg Insight Research Team Pg.10



Automotive OEMs also establish partnerships with players from different parts of the value chain. Volvo Cars has a partnership with the Swedish utility Vattenfall and offers the 'InCharge Smart Home from Vattenfall' charging solution. The package includes a wallbox from CTEK and access to Vattenfall's network of public chargers. In Germany, Volvo Cars collaborates with the Dutch operator New Motion. French OEMs Renault and Groupe PSA partner with BP Chargemaster in the UK.

Some automotive OEMs have invested in EV Charging solution vendors. Volkswagen owns 25% of has-to-be gmbh. Porsche offers not only wallboxes for home installation but also destination and public chargers; they have also developed the DC Porsche Turbo Charger installed in the IONITY charging network. In collaboration with the German utility company E.ON, Volkswagen Group Components is developing the E.ON Drive Booster DC charger.<sup>18</sup>

The next big step in EV Charging is Plug and Charge – a technology made possible with ISO 15118, the international standard for communication between an EV's onboard charger and the charge point. The only action required by the driver is to plug the charging cable into the EV. Once plugged in, the EV automatically identifies itself to the charge point and the charging process begins. Entering a credit card, opening an app to scan a QR code, or finding that easy-to-lose RFID card will no longer be required.<sup>19</sup>

Not all OEMs and software companies can keep up with this huge technological advance, particularly when hardware specific systems are involved. has-to-be gmbh has ensured that its be.ENERGISED platform is OCPP 2.0.1 ready so it can move with this new trend in charging, maintaining its position as the market leader.

<sup>19</sup> <https://v2g-clarity.com/knowledgebase/basics-of-plug-and-charge/> accessed 30.12.2020

## Commercial and Domestic Real Estate

The real estate sector in Europe is made up of smaller regional companies and a few very large players. Many real estate developers have adapted as EVs become mainstream and are reaping enormous financial benefits by providing charge points as an additional USP for their properties. Consequently, developers and estate agents are benefiting from reduced costs and new revenue streams.

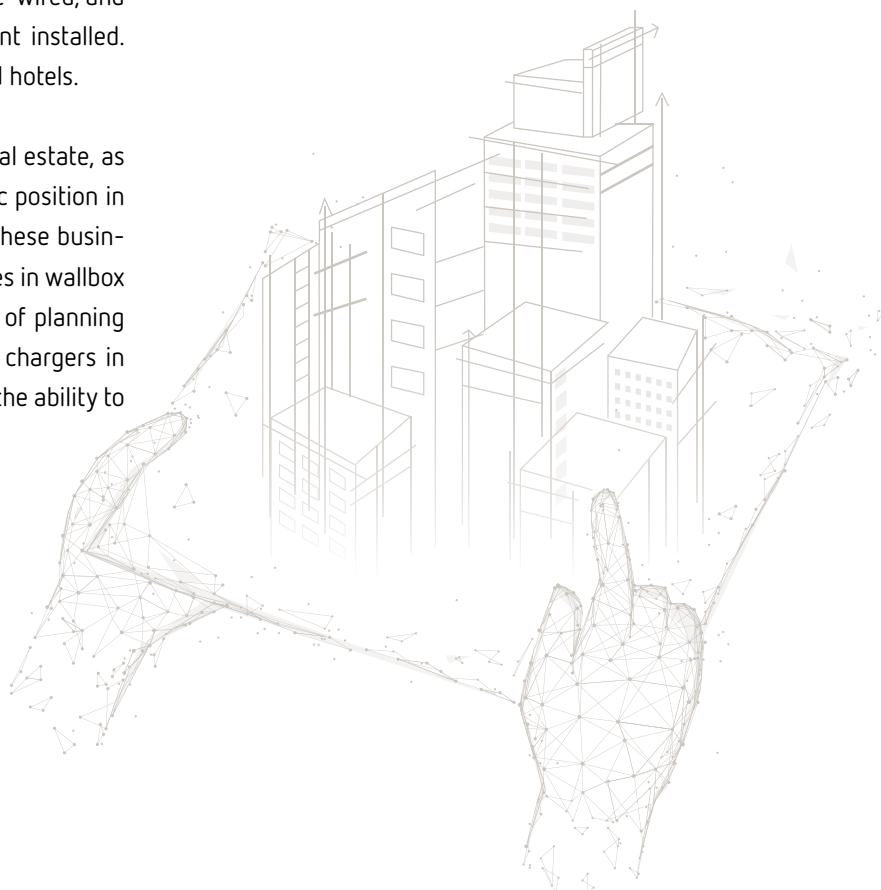
The Energy Performance of Buildings Directive is a critical piece of EU legislation adopted in 2018. The directive stipulates that all new or comprehensively renovated residential buildings with more than ten parking spaces must install pre-wiring for future charge points. For commercial buildings, every fifth parking space must be pre-wired, and there must be a minimum of one charge point installed. This has had a dramatic effect on retailers and hotels.

These entities often occupy premium urban real estate, as do their parking lots. Because of their strategic position in the public eye, there are many incentives for these businesses to provide EV Charging services. Advances in wallbox technology, reduced costs, and the relaxation of planning permission and strata requirements to install chargers in multiple-family buildings has vastly increased the ability to charge at home, work, or both.

In addition to the convenience of charging at home or work, there is exciting new technology coming that will allow energy stored in car batteries to be used to power properties.



“It’s important to future-proof because in the zero-carbon era vehicles could well become mini power stations in their own right, integrating with the building to help power properties and put clean energy back into the grid,” says Antony Crovella of Meyer Homes, UK.



## Retail

The EV Charging industry is adapting to human behavior. It's becoming possible to charge your vehicle in places where it is convenient and where the time required to charge is taken into consideration.

While some have the luxury of charging at home, increasing numbers of EV drivers do not. They need to charge in a place where they expect to spend between 20 minutes and an hour. Forward thinking retailers have moved to provide EV Charging services and discovered that in doing so, the time customers spend in their stores has increased, resulting in additional revenue.

For most retailers, EV Charging is a secondary market that enhances their customers' experience and from which they derive indirect benefits. Many have seen new customers choose to shop with them because of the charging services available. They have also taken the opportunity to brand and market themselves as environmentally friendly.



"If you have a retail or leisure outlet, a rapid charge point in the car park makes perfect sense. As do chargers next to supermarkets, restaurants, and workspaces – anywhere people might spend a bit of time," says Thomas McMillan of Savills Energy.<sup>20</sup>

Most retailers lack the capacity to operate charging infrastructure, so they outsource these services to white-label solution providers like has-to-be gmbh. As of January 2021, has-to-be's be.ENERGISED platform processed over 200,000 retail sector charging sessions per month at 3000 different charge points across Europe.<sup>21</sup> Because be.ENERGISED is a full-service solution, it can provide 24/7 customer support and billing, making EV Charging an effortless business for retailers.

Even small retailers or hotels with just one charge point require 24-hour monitoring and assistance in case their station has maintenance issues. National retailers need to be able to define customers as separate user groups requiring access to the stations. Those with an international presence additionally require more complex VAT billing systems. With its sophisticated tariff management system, be.ENERGISED accommodates any client offering charging services, no matter how big or small. One of the most profitable features of the software for retailers is the option to enable inbound roaming without having to sign contracts with roaming providers. This means they can simply define when they want to have their station made available on EV driver maps.

<sup>20</sup> [https://www.savills.co.uk/research\\_articles/229130/278514-0](https://www.savills.co.uk/research_articles/229130/278514-0)

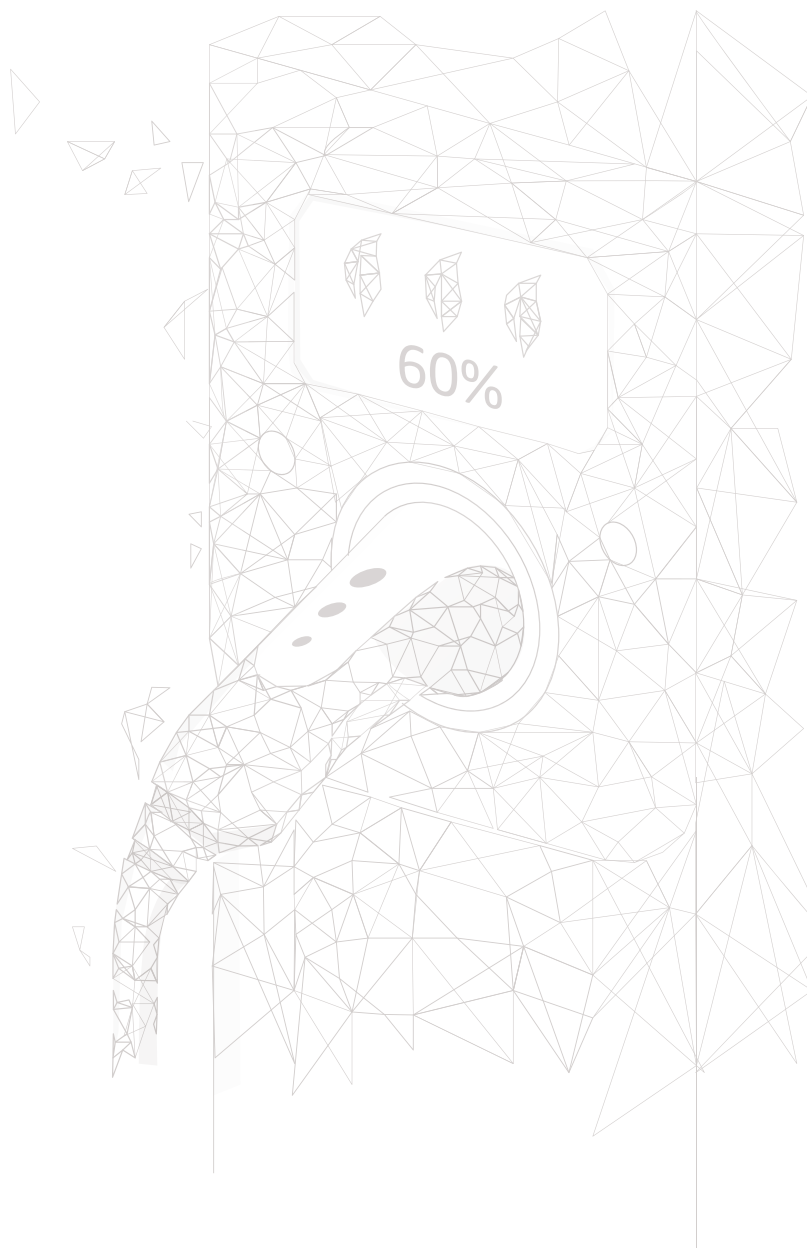
<sup>21</sup> be.ENERGISED Dashboard correct as of May 2021

## Charge Point Operators

Europe has many CPOs from a variety of industries. A few have charging operations as their core business, but many come from adjacent markets. Businesses and joint ventures that focus on the CPO space include Allego and Fastned in the Netherlands, Freshmile in France, and InstaVolt in Britain. Then there is IONITY, founded in 2017 by the BMW Group, Ford Motor Company, Daimler (Mercedes-Benz), and the Volkswagen Group (Volkswagen, AUDI, and Porsche).

Most CPOs in Europe are energy utility companies such as the CEZ Group (Czech Republic), EnBW (Germany), ESB Group (Ireland), Iberdrola Group (Spain), Innogy (Germany), Statkraft (Norway), and Vattenfall (Sweden). Izivia is a subsidiary of the French utility EDF, while Eneco eMobility and Enel X are subsidiaries of Eneco (Netherlands) and Enel (Italy) respectively. Fortum Recharge used to be owned by Fortum, but the Finnish utility sold its majority stake in the CPO business in 2020.

Some CPOs in Europe have a background in the petroleum industry. NewMotion and BP Chargemaster are owned by the Shell Group and British Petroleum respectively. The French Oil & Gas company Total also runs a CPO business. BP Chargemaster, NewMotion, and Total can also provide hardware, as can Enel X and Innogy. Other notable CPOs in Europe include the hardware providers EVBox and Pod Point.<sup>22</sup>



<sup>22</sup> Berg Insight Research Team Pg.145

## Electric Mobility Service Providers

EMSPs are increasingly diversifying outside the public charging value chain. EMSPs have begun to expand their customer base from B2C to B2B customers by offering customized B2B fleet solutions that integrate billing for home, work, and public charging. This is particularly attractive for fleet managers.

EMSPs understand that offering basic charging services will soon be a commodity, and that they need to distinguish themselves from competitors. Differentiation is achieved by offering charging as part of an integrated mobility platform e.g., the NOW family by BMW and Daimler, or adding intelligent energy services that help the end customer save money. OEMs, especially BMW and Volkswagen (via subsidiaries Digital Energy Solutions and Elli), have tried to conquer this market. IT players such as NewMotion, Virta, and eMotorWerks (Enel X), are currently frontrunners in developing V2G/V2X solutions. The advance of eMSPs is challenging traditional models of roaming platforms.<sup>23</sup>

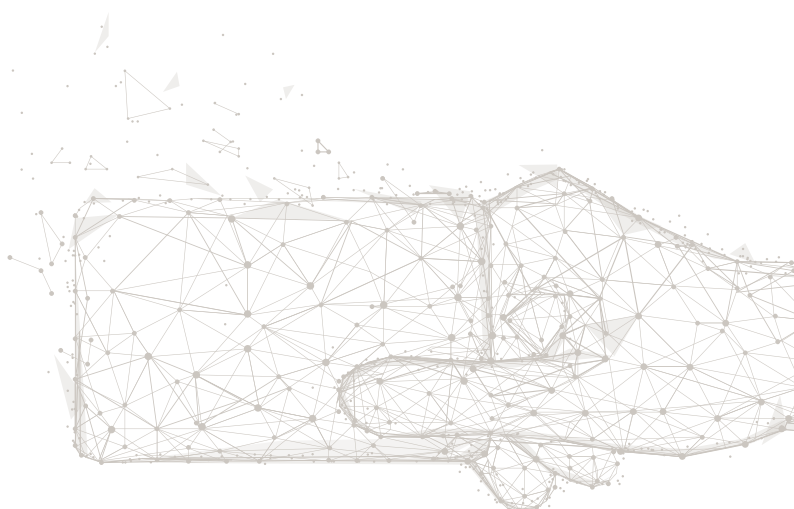
Another key trend is for big players, such as Digital Charging Solutions, NewMotion, Plugsurfing, and Virta to offer their charging networks as full-service, white-label solutions to third parties, e.g., DCS to AUDI & PSA, and NewMotion to Opel. This is being made possible by software solutions such as be.ENERGISED.

EMSPs face some resistance in the industry from those that insist Tap & Go should eliminate the need for eMSPs, although this seems to be a losing argument as EV drivers insist upon a seamless charging experience.



“You don’t tolerate having to tap a credit card each time you want to make a phone call,” says Graeme Cooper, National Grid UK. “You just want to be able to pick up your phone and make a call. It’s the same with charging. EV drivers want to know how much it costs to drive up front and not be surprised by extortionate rates at some stations.”<sup>24</sup>

has-to-be gmbh’s 24-hour customer support center for over 500 eMSPs and CPOs gets similar feedback. EV drivers find checking the rates at each station (and figuring out if the charge is time-based or kWh based) an inconvenience. Many prefer to sign with an eMSP where they know the terms in advance and pay for charging in a consolidated bill with no upfront deposit required.



<sup>23</sup> Berg Insight Research Team Pg. 145

<sup>24</sup> Cooper, G. Interviewed by Russell, has-to-be gmbh (22.12.2020)

## Energy Utilities

In Europe, 79% of the charging infrastructure is operated by Oil & Gas and utility companies. Most are national players that have a large customer base with strong, well-established customer service and regular billing cycles, positioning them well to operate EV Charging. Many provide charging options to their customers directly and cut out intermediary companies.

This secure and significant market is not their core business, so it is hard for them to keep up with the pace of technological advances. Some utility companies have found ways to create very successful regional monopolies using software solutions such as be.ENERGISED. For example, Tyrol Hydro Power Stations (TIWAG), an energy supplier and infrastructure operator, now operates charging infrastructures throughout the region of Tyrol, Austria with a modern, customer-friendly, and reliable system. Using be.ENERGISED, it is able to provide energy to multiple types of commercial businesses requiring individually customized tariff management, e.g., free or discounted charging for employees, rates for government or corporate accounts and individuals, or smart charging options when the energy grid is in low demand. They can integrate their billing into their existing customer portal without managing the charge points. They can also facilitate inbound and outbound roaming, making their infrastructure available to EV drivers outside of their network and when their customers travel long distance.

Retail energy providers (REPs) are another important player in the EV Charging market. REPs provide energy users with options for purchasing power wholesale from generating facilities beyond what is offered by their existing utility company. By switching from your standard electric utili-



ty to an REP, you can change the supply portion of your electricity bill (i.e., where your electricity comes from), but you will still pay your existing electric utility for the transmission and distribution (T&D) portion of your bill.

One standout REP that moved into the EV market is the Octopus Group, a shining example of innovation and cooperation. They gained unicorn status as a start-up company with a value in excess of €1 billion. Octopus EV assists business and individual customers with leasing an EV. By providing them with an energy tariff and charging in one monthly payment, they have made charging hassle-free. The business has skyrocketed—as of May 2020, the company provided 100% renewable energy to over 1.5 million homes and 12,000 businesses. The value for the energy company is not in the EV lease, as charging a car requires only a small amount of relatively cheap electricity. The real advantage is acquiring new customers whose homes or businesses Octopus can power. In turn, their customers have a new way to promote themselves as sustainable. IONITY, an Octopus customer, now proudly promotes itself as fueled with 100% renewable energy.

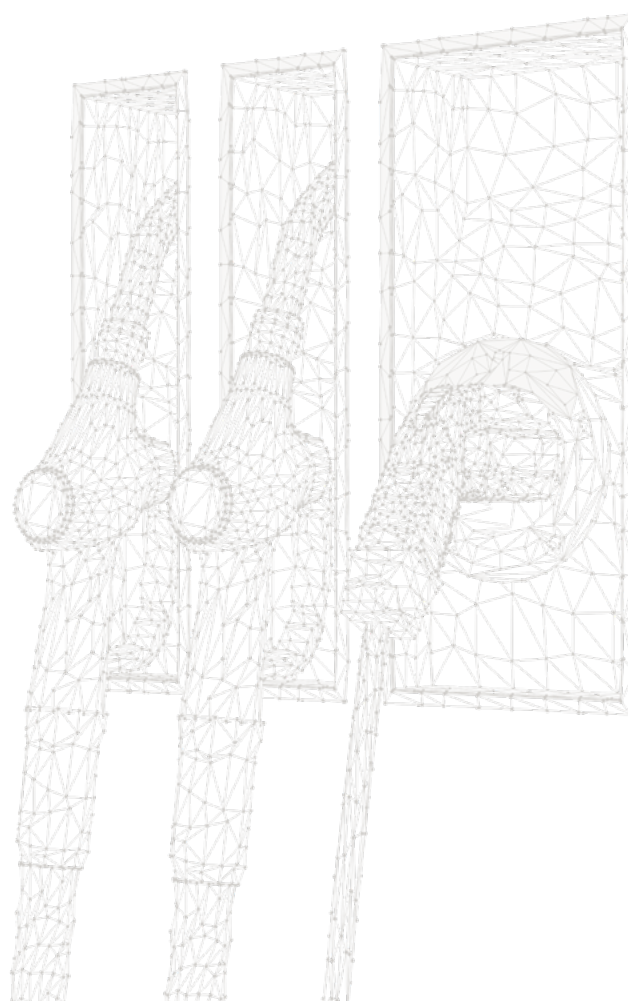
## Oil & Gas

Significant cooperation from governments is helping Oil & Gas companies make the transition to EV Charging. In Germany, gas stations are required by law to offer EV Charging.<sup>25</sup> Elsewhere, many Oil & Gas companies have already installed EV chargers at their stations. One example is French giant Total. In 2017, the company acquired the Dutch alternative fuels operator Pitpoint and in 2018, acquired G2mobility, a French hardware and software provider.

The Shell Group and BP are another two Oil & Gas companies that have entered the market. The former acquired the Dutch operator NewMotion in 2018 and the North American software provider Greenlots in 2019. In 2018 BP acquired Chargemaster, a manufacturer and operator of charging stations.<sup>26</sup>

Aral, BP's market leading fuel retail brand in Germany, is expanding its charging network of ultra-fast electric charging stations – operating under the 'Aral pulse' brand. By the end of 2021, Aral pulse will have 500 ultra-fast charge points with a charging capacity of up to 350 kW each at more than 120 Aral filling stations. These will run on the be.ENERGISED platform.

Oil & Gas companies have customer-facing infrastructure in place, with branded credit cards, billing, apps, and the ability to implement special offers, making them well positioned to transition to EV Charging. They have strong, well-established brands, thousands of fueling stations, and customer loyalty bases. Gas stations are in a prime posi-



tion to reassure drivers of their range anxiety and provide nationwide availability. A recent study suggested some EV drivers would prefer charging at gas stations if they could.<sup>27</sup>

Furthermore, companies in this sector have an additional profit center built in—convenience stores. These enhance the EV driver charging experience with easily accessible, safe sites including food & beverage options and restrooms. Electricity is relatively cheap for the driving force that it provides, which means a lot must be sold to make a profit. With 'refueling' time effectively extended, Oil & Gas companies are finding ways to capture the revenue from customers making purchases while waiting for their vehicle to charge in gas station convenience stores or cafes.

<sup>25</sup> [https://europe.autonews.com/automakers/germany-require-ev-chargers-fuel-stations-stimulus-plan?hss\\_channel=lcp-10793483](https://europe.autonews.com/automakers/germany-require-ev-chargers-fuel-stations-stimulus-plan?hss_channel=lcp-10793483)

<sup>26</sup> Berg Insight Research Team

<sup>27</sup> <https://www.gilbarco.com/us/blog/study-ev-drivers-would-prefer-charging-gas-stations-if-they-could> accessed 06.12.2020





## MARKET OUTLOOK.

### Trends for 2021-2024

Across Europe, the market varies significantly within each geographical region and industry sector. There are exceptions, but for the most part Europe is entering the consolidation phase. Many previously independent niche players have been acquired, and EV Charging is beginning to hit a larger scale. We expect to see a small number of pan-European companies dominate the market, a trend that will become increasingly apparent by 2026.

“EV Charging is about to become a [major] commodity and players need to innovate in several directions to stay in business. Some are still hesitating, while others are already investing in collaborations or acquisitions to secure their future market positions,” reported a recent paper.<sup>28</sup>

Many acquisitions have taken place among commercial enterprises active in the EV Charging space in recent years. The strategies behind these acquisitions differ. Some utility and Oil & Gas companies who are already CPOs and eMSPs want to expand their charging networks, while others aim to internalize some part of the value chain by acquiring either a hardware or software provider. Many acquisitions aim to strengthen positions in specific regional markets.<sup>29</sup>

Those involved in developing the infrastructure will continue to compete for the best equipment and widest network, but “this strategy alone will likely not be enough to succeed in this market,” warns Graeme Cooper, National Grid UK. “EV drivers have little to no incentive to stay with one particular network provider. Their primary relationship

is with their car, not the charger. To attract and retain customers, the industry will need to find ways to partner across markets and bundle solutions for eDrivers. For example, utility companies working with automotive and leasing companies can partner to provide their customers with an EV, lease agreement, and pre-agreed charging time or kWh in one monthly payment similar to mobile phone contracts.”<sup>30</sup>

Software solutions will continue to play a critical role in such initiatives to protect consumer data and work across various platforms and CRMs.

For automotive companies, it will no longer be enough to focus purely on the production and sale of vehicles. Manufacturers and suppliers are already rethinking their business models in such a way that the automotive value chain no longer finishes at the factory door but extends across all types of use over the entire lifetime of the vehicle until its eventual recycling. Software-based, direct interaction with every user – supported by the brand experience that is already such a key feature – will lead to higher revenues over the customer relationship lifecycle.<sup>31</sup>

Within the real estate sector, every property will experience exponential increases in charging station supply requirements.<sup>32</sup> Retailers offering EV Charging stand to increase their visibility and customer base dramatically.

For CPOs, EV Charging is all about the ability to scale up

<sup>28</sup> Alexander Krug, Thomas Knoblinger, Jean Bauer, The Evolution of Public Charging, Jan 2020

<sup>29</sup> Berg Insight Research Team Pg. 145

<sup>30</sup> Cooper, G. Interviewed by Russell, has-to-be gmbh (22.12.2020)

<sup>31</sup> Berg Insight Research Team Pg. 152

<sup>32</sup> Real Estate Advisors RCLCO White Paper EV Charging Strategies for Real Estate

in size and have the largest network. CPOs need to secure the most attractive charging locations in 2021 – 2024 to be successful. CPOs that embrace interoperability using software systems that are scalable and handle flexible tariffs are the ones most likely to succeed. Energy companies that partner with other eMobility players to deliver charging solutions have much to gain. Typically, EV Charging is not an area of expertise for utility companies as it is not their core business. To make the transition, energy companies will need to have top-notch software solutions. These must be hardware agnostic and capable of adapting to the latest technology and huge increases in demand.

CPO aggregators will continue to take more and more responsibility from eRoaming platforms, as eMSPs aim for direct connections to avoid fees. But blockchain solutions could make the aggregator business model obsolete. Smart software solutions such as be.ENERGISED seamlessly expand beyond international borders and the restrictions that come with individual eMSPs.

A small number of mostly integrated players are already dominating the market, making it harder for new eMSPs to enter. EMSPs must either have the most intelligent energy services or offer charging as part of integrated mobility platforms. OEM-related eMSPs have the additional advantage of locking in EV customers as technology such as Plug & Charge becomes the market standard.

The Oil & Gas sector can already be considered an entirely disrupted market. Long-term, all that will be left of the value chain for companies in this sector is branding and location. Sourcing of crude oil, refining it, the logistics of transporting fuel to stations and selling it will be gone.

All they will have left to do is source electricity and sell it, putting them on the same playing field as retailers. Fueling stations will compete directly with retailers and supermarkets for EV drivers' business, which is a monumental shift.

Oil & Gas companies have invested relatively conservative amounts of their overall operating budgets into charging infrastructure and networks. Their approach appears to be to "test the market and involve themselves enough to see how it operates," says Graeme Cooper, National Grid UK. History will tell if this caution was strategic. Kodak's similar approach to the introduction of digital photography turned out to be catastrophic and is a stark reminder that even multinational corporations with a huge market share can vanish if they do not move with the times.

Advances in the application of OCPP and the trend toward standardization will increasingly see companies specializing in one particular part of the value chain. Hardware providers will focus on developing competitive charging stations for the market, while other companies will focus on back-office software for managing them. Current providers of complete charging solutions – including hardware, software, and operational services – can expect to face a choice of business focuses in the next few years.<sup>33</sup>

Infrastructure based on interoperable software is much

<sup>33</sup> Berg Insight Research Team Pg. 152

more likely to survive as technology advances quickly, standards are introduced, and trends in driving and transport evolve. In one recent example, when Germany issued calibrations laws to protect consumers, charging stations using be.ENERGISED were able to become compliant simply through compatible transparency software developed by has-to-be gmbh. Systems operating on out-of-the-box solutions or that are hardware-specific are unlikely to survive the inevitable changes to come.

Smart software solutions will continue to facilitate the fundamental trend of moving away from private car ownership to mobility as a service and car sharing initiatives. Efforts to balance the grid with the electricity stored in EVs will also rely heavily on software solutions.

Price Waterhouse Coopers advises investing 25 % in software solutions for strong growth. Investor research and experts in the field anticipate three major trends in 2021 – 2024:

- Focus on mobility services instead of products.
- Clear and intuitive mobility packages linking hardware with software.
- Manufacturers as fleet, service, or product providers.<sup>34</sup>

<sup>34</sup> PwC, Five Trends Transforming the Automotive Industry, [https://www.pwc.at/de/publikationen/branchen-und-wirtschaftsstudien/eascy-five-trends-transforming-the-automotive-industry\\_2018.pdf](https://www.pwc.at/de/publikationen/branchen-und-wirtschaftsstudien/eascy-five-trends-transforming-the-automotive-industry_2018.pdf) Pg.11



## CONCLUSION.

Europe will continue to experience tremendous growth in the EV industry in 2021 – 2024, with double-digit percentage increases in most countries. Continent-wide and in the UK, markets will see significant sales growth thanks to purchase subsidies, emission directives, improved battery technology, and the overall heightened appeal of EVs.

Currently, the European market is highly fragmented both regionally and across market sectors. EVs and charging stations are not yet widespread in all areas of Europe and intense competition exists for market share, direct customer access, and premium locations.

This will dramatically change as charge points in Europe are forecast to grow at a compound annual rate of 31.1% from 1.3 million in 2019 to 5.2 million by 2024<sup>35</sup> and 13 million zero-and low-emission vehicles hit EU streets by 2025.<sup>36</sup> European governments pledging to achieve net zero greenhouse gas emissions within our driving lifetimes, and stimulus packages to mitigate the negative impact of the COVID-19 pandemic, will accelerate EV Charging development.

This means a small window of opportunity to enter the European EV Charging market still exists for SMEs and larger commercial enterprises.

The last chance to enter the EV Charging market in Europe is in the next three years. By 2024–2026 the market will be dominated by a small number of exceptionally large players, making it hard to penetrate. Those considering entering the market are advised not to hesitate – but also to consider business strategies wisely as innovative new business models with unique service offerings are quickly making traditional business use-cases obsolete.

Market players that utilize hardware neutral and scalable software solutions such as be.ENERGISED are much more likely to keep up with the speed of technological development and adapt to regulations as governments race to catch up and implement consumer protections. Such software solutions have already proven their ability to evolve with industry standardization and the changing trends in transport and logistics.

SMEs will need to integrate along the value chain or diversify into adjacent business models to expand their scale, reach, and service offerings to maintain their market position.<sup>37</sup> Larger commercial enterprises, particularly those in the Oil & Gas sector, will need to pivot hard in the next three years to incorporate EV Charging to secure their market positions and avoid extinction.

<sup>35</sup> Ibid, Pg. 121

<sup>36</sup> European Green Deal, [https://ec.europa.eu/info/sites/info/files/european-green-dealcommunication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-dealcommunication_en.pdf)

<sup>37</sup> Alexander Krug, Thomas Knoblinger, Jean Bauer Ibid.

## ABOUT HAS-TO-BE GMBH

has-to-be paves the way to sustainable mobility. Between has-to-be's be.ENERGISED cloud software and range of cutting edge eMobility services, it offers everything companies need to be successful when it comes to EV Charging. That means anything from operating scalable charging infrastructure to managing global mobility services. has-to-be gmbh CEO Martin Klässner has been a key driver in the eMobility field since as long ago as 2008, developing the sector with a series of innovations. be.ENERGISED is thus the result of knowledge and expertise built up over more than a decade. It's been validated and deployed by top European eMobility service providers such as IONITY, EWE Go and Volkswagen, as well as market leaders in the petroleum, retail, energy, telecommunications and automobile industries. Over 40,000 directly connected charging stations currently run on the software, which handles both infrastructure operation and customer interfaces for EV Charging. 15 million charging sessions have already been carried out via the software. 1,000 clients in more than 45 countries now rely on be.ENERGISED.

Their team is made of more than 100 employees from 10 countries. They're spread across has-to-be headquarters in Austria's Salzburg province and the company's other locations in Vienna and Munich.



### be.ENERGISED: The cloud software solution from has-to-be gmbh



**40,000+**

Directly connected charge points



**20+**

certified Hardware Partners



**250,000+**

Roaming charge points



**45+**

Countries



**15,000,000+**

Charging sessions completed



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has-to-be gmbh

Salzburger Straße 26

5550 Radstadt, Austria

Telefon: +43 6452 21200-80

Telefax: +43 6452 21200-22

<https://has-to-be.com>

Legal representative: Martin Klässner

### Identification Numbers

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ATU68066335

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Occupational Group: IT Service Provider

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(Wirtschaftskammer Salzburg)

Professional Group: Consulting and IT

### CONTACT DETAILS

E-Mail: [sales@has-to-be.com](mailto:sales@has-to-be.com)

Website: [https://has-to-be.com/en/contactsection/  
contact-overview/](https://has-to-be.com/en/contactsection/contact-overview/)

### Authors

Louisa Russell, has-to-be gmbh

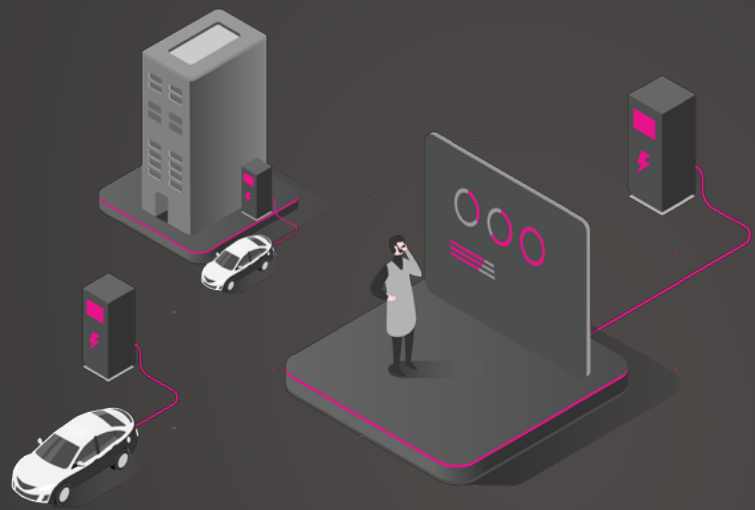
Richard Asher

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## eMobility powered by technology

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Sales  
[sales@has-to-be.com](mailto:sales@has-to-be.com)

has-to-be gmbh  
Salzburger Straße 26  
A-5550 Radstadt

[has-to-be.com](http://has-to-be.com)