

# Accelerating fleet electrification in Europe

When does reinventing the wheel make perfect sense?

A collaboration between



# About this report

This report examines the challenges in tackling the electric mobility (e-mobility) agenda as Europe pushes towards decarbonisation. We consider the urgent need to accelerate electrification of transport and to roll out charging infrastructure while unlocking investment.

We focus on the fleet transport segment as the most likely early catalyst in the e-mobility transition. 'Fleet', in this report, relates to company leased or owned vehicles that are predominantly for business use and which may vary in scale, from one or two vehicles to several thousand. And we explore key opportunity areas where e-mobility players can participate in the fleet value chain.

The report is informed by experts at European energy industry body Eurelectric and its Working Group e-Mobility. It is curated and augmented by EY professionals with extensive experience in transformation in energy, automotive, government and technology. It includes outputs from discussions with European industry leaders across automotive, utilities, oil and gas, battery manufacture, fleet management, leasing and charging infrastructure businesses. It collates insights and opinion, identifying key behaviours to accelerate and build out e-mobility solutions in Europe at scale.

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# Foreword

We stand, right now, at the brink of a massive evolution in the future of transport. As of November 2020, every 10<sup>th</sup> new passenger car sold in Europe was either a pure electric or plug-in hybrid. A landmark one million electric vehicles (EVs) were sold. This is a decisive turning point in achieving 30%–40% EV sales volumes by 2030, putting Europe’s carbon-reduction targets within reach.

Environmental benefits are the biggest prize. But significant rewards are also available for the first and fastest movers in the ecosystem that underpins e-mobility. There is money to be made not only in delivering but also in accelerating the transition, in reducing emissions, in cutting costs of EV ownership and in delivering a much-improved EV-user experience.

Evident across the 20+ in-depth interviews we undertook with leaders from diverse industry segments is an overwhelming surge of optimism. Businesses are forging ahead by translating e-mobility opportunity into commercial reality. Among them, a utility aims to electrify its entire 10,000-vehicle commercial fleet by 2026. A battery manufacturer is committing significant investment to bring low-carbon, lithium-ion battery production to Europe. And power system operators are pursuing value in the mass electrification of transport by harnessing smart-charging and vehicle-to-grid technologies.

There are so many more examples we could cite, but our interviewees’ actions and ambitions are woven throughout this report. They recognise that accelerating e-mobility and achieving decarbonisation targets sooner depends upon partnerships and solving problems together.

There are hurdles to overcome – not least the automotive supply challenge, interoperable charging infrastructure, lack of funding for charge points and regulatory cohesiveness. But in testing the hypothesis that fleets will be the earliest adopters of e-mobility, and that the benefits will cascade across the ecosystem, we take great confidence from industry-wide backing for the transition.

We applaud the industry for its leadership and for shaping European policy on e-mobility. And we extend our thanks to the businesses that contributed to this report. They are extracting opportunity from the upheaval of the transition and forging the way. But, most importantly, they are creating value by enabling a decarbonised energy future for all.



**Serge Colle**

Global Power &  
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## CHAPTER 1

# Executive summary

Road transportation accounts for almost one-quarter of Europe's total greenhouse gas (GHG) emissions. Cut those by 10% year on year, and Europe stands a very good chance of meeting its 2030 GHG emissions target, paving the way to a 90% reduction in transport-related GHG emissions by 2050.

E-mobility, fed by carbon-neutral and renewable energy, can get us there. Customers, whether private or corporate, can begin to understand the value of an EV over an internal combustion engine (ICE) equivalent. But there are strings attached:

- **More vehicles needed:** automakers must scale up EV production, reduce upfront costs and improve vehicle availability, choice and range. The European Commission is calling for at least 30 million zero-emission cars and 80,000 zero-emission trucks in operation by 2030.<sup>1</sup>
- **Agreed common standards:** to incentivise infrastructure investment so that plug-in vehicles can become a success, both hardware (connector and cables) and communication software standards are needed. Common standards for recharging solutions will further enhance the driver experience, removing the need for an assortment of cables and adaptors.
- **Transition fleet first:** prioritising the fleet segment will secure the biggest and fastest overall impact. Fleet accounts for 20% of total vehicles in Europe<sup>2</sup> but travels disproportionately more kilometres and emits disproportionately more carbon dioxide (CO<sub>2</sub>). Learnings from fleet, and the value they deliver, are transferable to other segments in transition.
- **Decarbonise and commercialise:** a supporting ecosystem will grow up alongside EV rollout. It will unlock significant commercial value for the earliest movers that participate in e-mobility and actively facilitate the customer transition to electric.
- **Greater connectivity:** digitisation will become an indispensable driver for the modernisation of the entire system, making it seamless and more efficient while further reducing emissions.
- **The need for speed:** the faster we embrace e-mobility, the sooner we harness the synergies between the power and transport sectors. The greater the environmental and societal value that is unlocked, the sooner we achieve our long-term decarbonisation goals.

<sup>1</sup> <https://ec.europa.eu/transport/sites/transport/files/legislation/com20200789.pdf>.

<sup>2</sup> EY research analysis on fleet electrification, November 2020.



Starting from a low base, EV sales, year on year, are nearing inflection point. Of the 308 million motor vehicles on Europe's roads today, 3 million<sup>3</sup> – including cars, buses and trucks – are electric. The potential is vast. We can expect at least 1,200% growth to 40 million EVs in Europe by 2030.<sup>4</sup>

As CO<sub>2</sub> emissions from passenger cars and light commercial vehicles (LCVs) rose for the third straight year in 2019, to an EU-wide average of 123g CO<sub>2</sub>/km<sup>5</sup>, regulators clamped down.

## Regulation forces the pace of electrification

New CO<sub>2</sub> regulations are becoming progressively more stringent. They stipulate that:

- By 2030, cars must emit 37.5% less CO<sub>2</sub> compared with 2021, and vans 31% less.
- For every gram that every vehicle exceeds the emissions limits, a €95 fine applies.<sup>6</sup>
- By 2030, EVs must make up 35%–40% of total vehicle sales, up from just 3% in 2019.<sup>7</sup>

So, automakers are obliged to switch diesel and petrol powertrains to electric or alternative fuels. That means significant investment and innovation, as well as disruption to long-standing supply chains, in order to deliver cleaner vehicles with lower lifetime emissions. Major upheaval and opportunity lie ahead.

## Public infrastructure to allow all EV drivers to charge and go

EVs are going nowhere without an interoperable charging network. By 2030, 3 million public charge points will be needed for 40 million EVs, at an estimated cost of €20bn. At just 213,000 today, we are way off target.<sup>9,10</sup>

Major hurdles include:

- A lack of public sector funding and a failure to attract private investors due to infrastructure's high-risk, low-return profile in emerging markets
- A lack of interoperability, meaning drivers, used to seamless experiences at the fuel pump, find the 'right to charge' complicated by the range of EV platforms, technologies, provider contracts and payment protocols



Bringing charging infrastructure into the public domain is still not a sustainable stand-alone business model! To encourage growth and investments, we need to be more courageous and radical in finding a different mechanism so that companies can create business and value.

Mathias Wiecher, Global Head of eMobility, E.ON

<sup>3</sup> Includes the one million EV sales recorded in 2020 <https://www.schmidmatthias.de/post/exclusive-western-europe-s-plug-in-electric-car-market-surpasses-1m-landmark>.

<sup>4</sup> <https://cdn.eurelectric.org/media/3805/charging-infrastructure-factsheet-2019-h-1BC6E8C5.pdf>.

<sup>5</sup> [https://www.acea.be/uploads/publications/ACEA\\_progress\\_report\\_2020.pdf](https://www.acea.be/uploads/publications/ACEA_progress_report_2020.pdf).

<sup>6</sup> [https://ec.europa.eu/clima/policies/transport/vehicles/cars\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/cars_en).

<sup>7</sup> [https://www.transportenvironment.org/sites/te/files/publications/2020\\_02\\_TE\\_EGD\\_vision\\_How\\_EU\\_transport\\_can\\_contribute\\_minus\\_55.pdf](https://www.transportenvironment.org/sites/te/files/publications/2020_02_TE_EGD_vision_How_EU_transport_can_contribute_minus_55.pdf).

<sup>8</sup> <https://www.transportenvironment.org/sites/te/files/publications/01%202020%20Draft%20TE%20Infrastructure%20Report%20Final.pdf>.

<sup>9</sup> <https://www.eafo.eu/alternative-fuels/electricity/charging-infra-stats>.

<sup>10</sup> [https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/co2\\_cars\\_vans\\_non\\_paper\\_technical\\_update\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/co2_cars_vans_non_paper_technical_update_en.pdf).

## Energy and transport collaborate

Part of the solution is in the progressive coming together of the European power and transport sectors. A joint approach<sup>11</sup> will ensure there is adequate grid capacity and that charging infrastructure is sited wherever the need is greatest, tackling installation bottlenecks and improving the investment case.



Charging needs to be smart so consumers can, for instance, optimise the cost of a charging session and provide flexibility to the grid while the battery is getting charged for the next journey. This will be enabled by traditional and new service providers, and by system operators sending signals that incentivise smart charging behaviour.

Josephine Delmote, Strategy Analyst, Elia Group



As customers' charging behaviours become better understood, and as the ability to forecast load becomes more sophisticated, network operators will make more informed investment decisions on future grid capacity. In turn, the EVs themselves will become part of a virtuous energy circle, providing flexibility via smart-charging vehicle-to-grid (V2G) energy exchange.

## Fleet first

Fleet is the quick win that will make the biggest and fastest contribution to the decarbonisation of road transport.

At 63 million vehicles, fleet accounts for 20% of the total European vehicle parc, travels more than 40% of total vehicle kilometres and contributes half of total emissions from road transport.<sup>12</sup>

Fleet electrification is being hurried along by the CO<sub>2</sub> emission standards. Added to that are 300+ low- and zero-emission zones to keep polluting vehicles out of cities. For logistics and last-mile delivery companies, there is a choice: electrify or pay a penalty.

## Five enablers of the energy transition

1. **Cohesive regulation:** a strong mandate for electrification will set a clear direction so that every participant in the value chain can engage in joined-up planning and investment.
2. **Funding models:** new funding models must deliver €80bn of investment in public and private charging infrastructure by 2030.
3. **Supply chain:** beyond getting the right products to the right markets at the right time, the supply chain must satisfy battery and vehicle demand, and enable end-of-life battery recycling and the acquisition or transition of skills and resources.
4. **Physical infrastructure:** optimally sited public charging points (a mix of fast and slow chargers), aligned with EV take-up and grid capabilities, will encourage customer confidence.
5. **Digital interface:** the open exchange of data from vehicle to charge point to grid is critical, along with a simplified and seamless customer experience, irrespective of vehicle, payment and contract type.

<sup>11</sup> <https://www.acea.be/press-releases/article/auto-makers-and-electricity-sector-call-for-rapid-action-on-charging-points>

<sup>12</sup> EY research analysis on fleet electrification, November 2020 and [https://cdn.eurelectric.org/media/5018/2020\\_11\\_letter\\_setting\\_eu-wide\\_requirements\\_electrify\\_fleets-2020-oth-0006-01-e-h-E3300C86.pdf](https://cdn.eurelectric.org/media/5018/2020_11_letter_setting_eu-wide_requirements_electrify_fleets-2020-oth-0006-01-e-h-E3300C86.pdf).



By 2022, at least 20% of our light-vehicle fleet will be electric. Our goal is for 100% to be electrified by 2030, delivering a 70% reduction in our carbon dioxide emissions. We expect, by 2026, that EDP fleet cars will be cheaper to run as EVs than as ICE vehicles.

Gonçalo Castelo Branco, Director of Smart Mobility, EDP

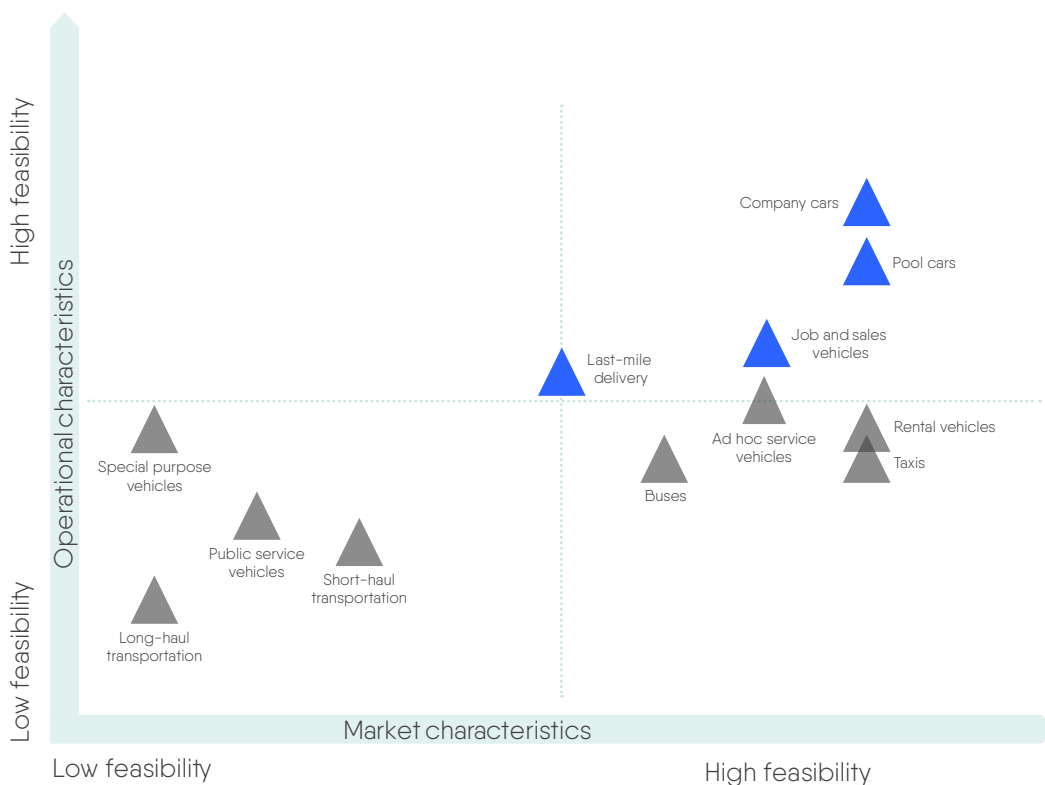


Then there are characteristics unique to fleets – predictability of journeys, the constancy of daily kilometres travelled, fixed destinations and stopovers – which make it easy to incorporate charging into the working day.

Cost is persuasive too. The total cost of ownership (TCO) for EVs is fast reaching par with ICE vehicles. Incentives and grants bridge the upfront cost gap. Reduced servicing, maintenance and fuel costs mean EVs are cheaper to run. Together, these factors make the case for electrifying fleets first.

The total number of fleet vehicles – both EVs and ICE – is expected to grow by around 15% by 2030, to 73 million vehicles. However, taking solely the electrified segment of fleet vehicles, then an anticipated 24-fold increase will bring actual numbers to 10.5 million by 2030, up from 420,000 vehicles today. Company cars, last-mile delivery vehicles, pool cars, and work-related light commercial vehicles will electrify fastest.

Figure 1: Why fleet is a good first mover in the electrification of transport



- **Market characteristics** consist of two parameters – vehicle availability, and vehicle price suitability.
- **Operational characteristics** consist of four parameters: daily running suitability, route stability, ease of charging and energy requirement feasibility.
- Blue colour triangles represent the most feasible fleet electrification use cases.

Source: EY analysis.



## Commercial opportunity in e-mobility

Out of disruption comes an interconnected ecosystem that will underpin the nascent industry, innovating solutions to known and unknown needs. There is real opportunity to secure value in making the e-mobility transition seamless for customers.



No company can single-handedly provide all the services needed to facilitate the transition to electric mobility.

Harald Kroon, Head of Business Development & Marketing, Athlon

Partnerships are being formed, across and within sectors, with established and new market participants. Utilities are partnering with charge point operators and leasing companies. Automakers are teaming up with utilities and their own captive leasing companies. We see solutions emerging, both centrally and at the fringes of the ecosystem, to address the hurdles to transition and redefine the future of road transport.

Commercial value, for the earliest and most agile market movers, will be found in reinventing the wheel to put at least 40 million EVs on our roads by 2030, and in the associated rewards that come from a progressively carbon-neutral Europe. The opportunity is now. We have come so far that there is no way back.

## CHAPTER 2

# The decarbonisation vision

- To achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050.<sup>13</sup>
- Emissions from passenger vehicles rose for three consecutive years to 2019.
- Just 3 million of Europe's 308 million vehicles are electric, but the number is expected to rise to 40 million by 2030.
- New and progressively stringent limits on CO<sub>2</sub> emissions are already having an impact on the passenger car and LCV segment.
- Availability and location of charging infrastructure must keep pace with the number of EVs on the roads.



The European Union, in its Green Deal strategy, vows carbon-neutrality by 2050. Shaping that climate ambition are pledges for a 'resource-efficient' and sustainable economy through a combination of green technology, sustainable industry and transport, and reduced pollution.<sup>14</sup>

Road transport accounts for slightly less than one-quarter of Europe's total emissions.<sup>15</sup> To achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050.<sup>16</sup> Electrification, using low-carbon renewable energy sources and phasing out petrol and diesel vehicles, will make a hugely significant contribution to the overall decarbonisation goal.<sup>17</sup>

Though we are making progress, we are not going fast enough. Without urgent action now, the consequences of climate change could be catastrophic.

<sup>13</sup> [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf).

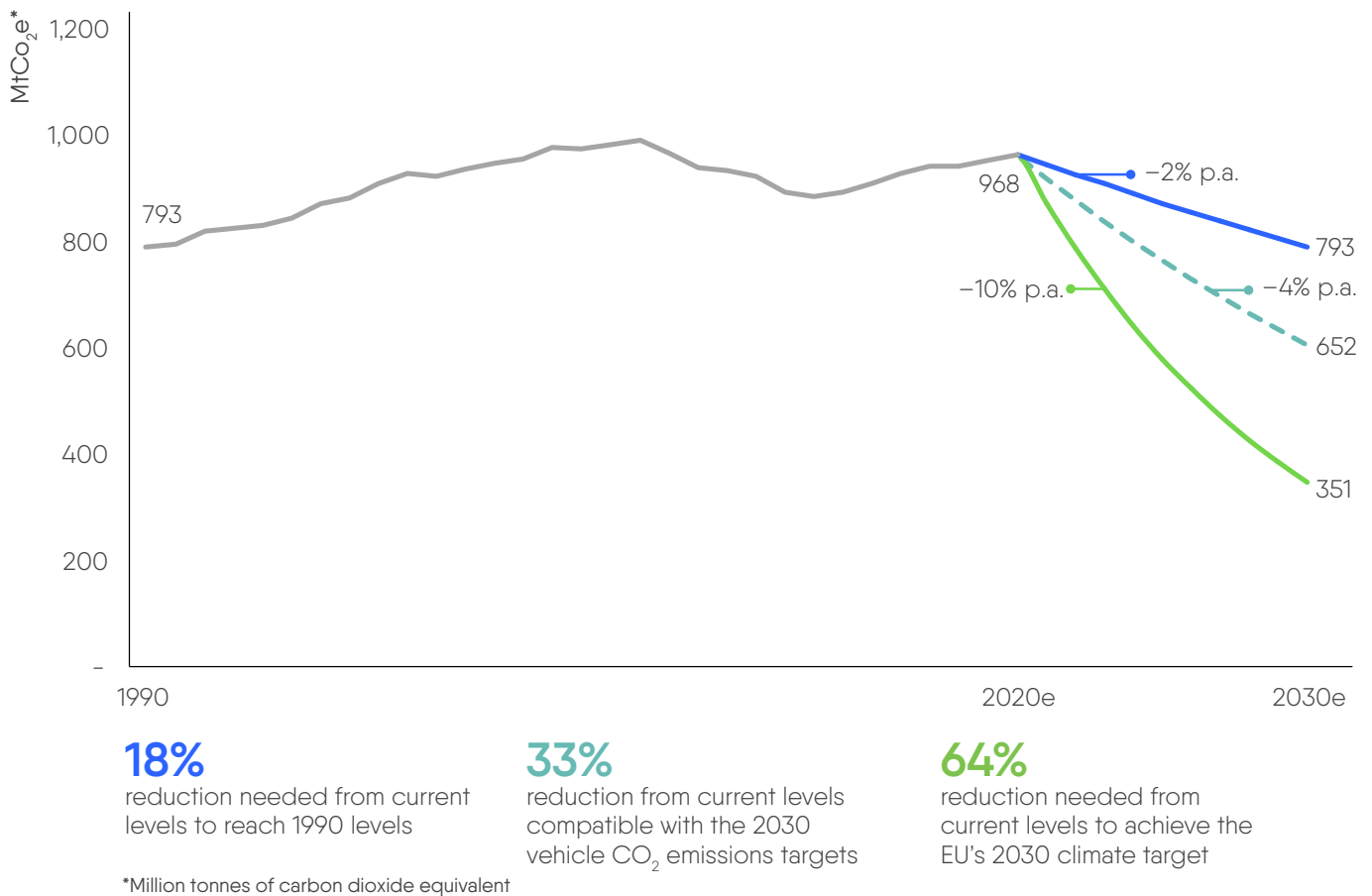
<sup>14</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)

<sup>15</sup> Includes road transport, marine and aviation. [https://cdn.eurelectric.org/media/5018/2020\\_11\\_letter\\_setting\\_eu-wide\\_requirements\\_electrify\\_fleets-2020-oth-0006-01-e-h-E3300C86.pdf](https://cdn.eurelectric.org/media/5018/2020_11_letter_setting_eu-wide_requirements_electrify_fleets-2020-oth-0006-01-e-h-E3300C86.pdf).

<sup>16</sup> [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf).

<sup>17</sup> EU policy includes the European Green Deal, which aims to make Europe the first climate-neutral continent by 2050 by rolling out cheaper, cleaner and healthier forms of private and public transport and decarbonising the energy sector.

**Figure 2: EU27+UK road transport emissions, 1990–2030**



Source: EY analysis.

Figure 2 shows projected emissions. Bringing current transport emissions down to 1990 levels (blue line) would require a 18% reduction, or a 2% reduction year on year. This compares with the 4% reduction year on year (dashed line) expected by meeting the current post-2020 CO<sub>2</sub> emission standards. The green line shows the trajectory needed relative to a 2030 GHG-compatible target. A 64% reduction, or 10% year-on-year saving, is needed to achieve Europe's targeted 55% reduction, compared with 1990 levels.

## Policy directs electrification

CO<sub>2</sub> emissions from passenger vehicles are still on the up. They rose for the third straight year in 2019, up 1.8% year on year to an EU-wide average of 123g CO<sub>2</sub>/km.<sup>18</sup> But policy is pushing decarbonisation of road transport in the right direction.

New CO<sub>2</sub> regulations target the transport sector at source, imposing progressively rigorous limits on emissions for new passenger cars and LCVs. They came into effect for automakers in 2020, but the European Commission has already said it will review the CO<sub>2</sub> standards for cars and vans by June 2021, and heavy-duty vehicles the year after.<sup>19</sup>

Emissions targets are, according to many observers, the single biggest accelerant of the e-mobility transition. They have forced the market down a decarbonised path and will be the fundamental driver of change.<sup>20</sup>

<sup>18</sup> [https://www.acea.be/uploads/publications/ACEA\\_progress\\_report\\_2020.pdf](https://www.acea.be/uploads/publications/ACEA_progress_report_2020.pdf).

<sup>19</sup> <https://ec.europa.eu/transport/sites/transport/files/legislation/com20200789.pdf>.

<sup>20</sup> In interviews with leaders in the e-mobility sector in October and November 2020, the CO<sub>2</sub> emission standards for automakers is identified as the biggest single lever to redressing the impact of road transport on the environment.



Between 2025 and 2029, cars and vans will be required to emit 15% less CO<sub>2</sub>, rising to 31% less from 2030 compared with 2021 levels. From 2030, new cars must emit, on average, 37.5% less CO<sub>2</sub>, and new vans 31% less CO<sub>2</sub>. For every gram that every vehicle exceeds the emissions limits, a €95 fine will be imposed on automakers.<sup>21</sup> The restrictions go right to the heart of the auto manufacturing industry but, to maintain momentum and put Europe on the path to zero-emission mobility by 2050, as per the Paris Agreement, these caps must be further tightened post-2030.

Though EVs are gaining support and traction, it comes from a very low base. Of the 15.2 million passenger vehicles sold in 2019, approximately 460,000 were electrically chargeable – either battery electric vehicles (BEVs) or plug-in hybrid electric vehicles (PHEVs). At just 2.4% growth over the past six years, EVs still only represent 3% of total European vehicle sales. In the new van segment, EV penetration is lower still, at just 1.2%.<sup>22</sup>

While the CO<sub>2</sub> regulations are a lever to EV growth, requiring that EV sales make up more than 5% of automakers' total sales in 2020, rising to 10% in 2021, there is currently no penalty for non-compliance. European industry body Eurelectric is calling for compliance to be made mandatory.

From 2025, the benchmark for car and van sales, as a percentage of total sales, rises to 15%. From 2030, it increases to 35% for cars and 30% for vans. The reward is a relaxation of the emissions cap by one percentage point, to a maximum 5%, for every 1% that the automaker exceeds its zero- and low-emissions vehicle sales targets.<sup>23</sup>

## Regulation forces automakers to bring more EV models to market

To comply with the new regulations and avoid fines, automakers are introducing a raft of new, compliant EV models. In 2021, more than 200 new models will come to market<sup>24</sup> across various price points, making them available to a wider audience while enhancing competition between brands.

## New CO<sub>2</sub> regulations for automakers

Regulation (EU) 2019/631 sets new EU fleet-wide CO<sub>2</sub> emission targets for 2025 and 2030 for newly registered passenger cars and newly registered vans. These targets are defined as a percentage reduction from the 2021 starting points.

### Cars

**15%** reduction from 2025

**37.5%** reduction from 2030



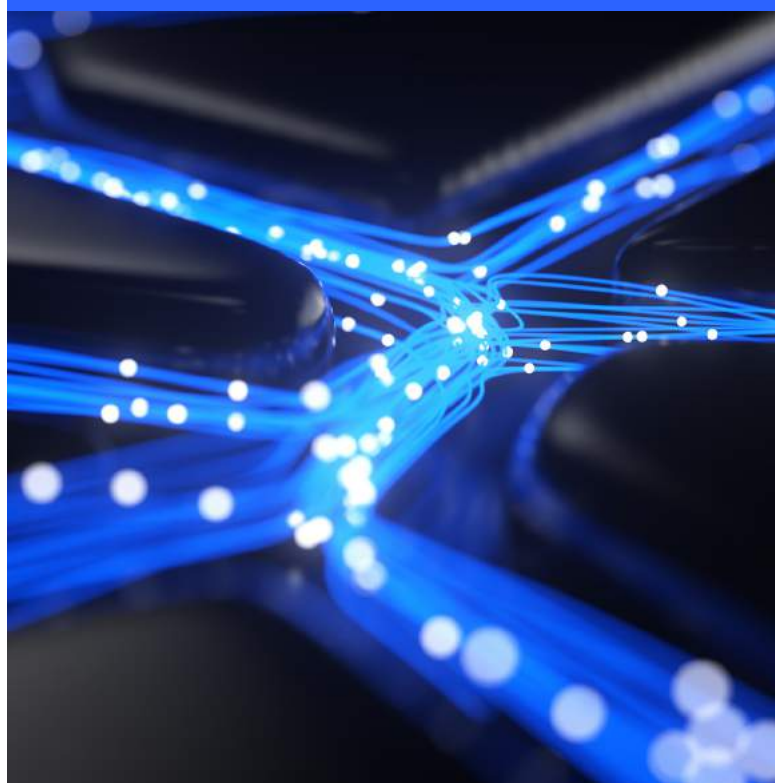
### Vans

**15%** reduction from 2025

**31%** reduction from 2030



Source: [https://ec.europa.eu/clima/policies/transport/vehicles/regulation\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/regulation_en)



<sup>21</sup> [https://ec.europa.eu/clima/policies/transport/vehicles/cars\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/cars_en).

<sup>22</sup> <https://www.acea.be/publications/article/making-the-transition-to-zero-emission-mobility-2020-progress-report>.

<sup>23</sup> [https://ec.europa.eu/clima/policies/transport/vehicles/regulation\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/regulation_en).

<sup>24</sup> <https://www.transportenvironment.org/press/electric-car-models-triple-europe-2021-%E2%80%93-market-data>.



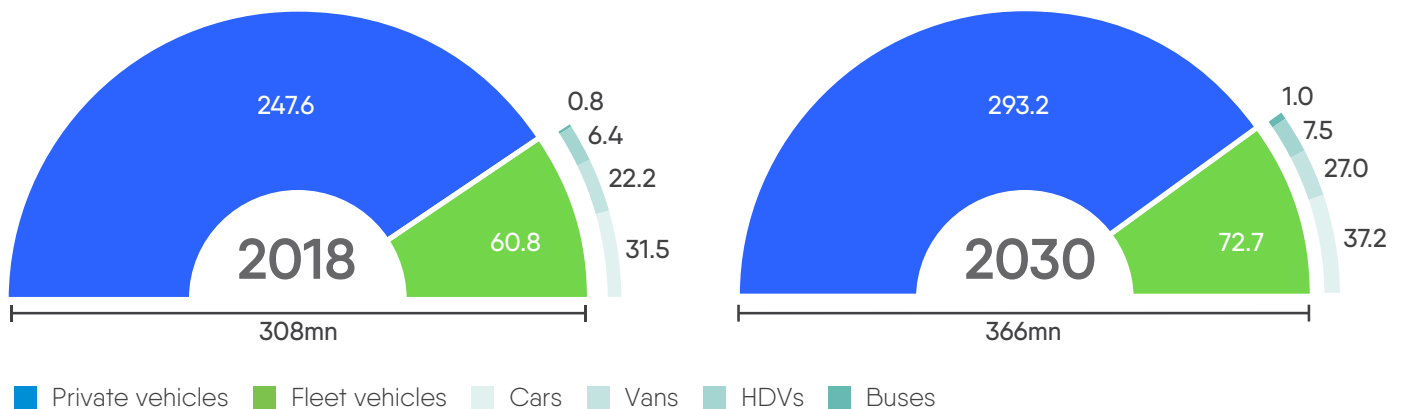
We won't spend €30mn–€40mn to transition our entire fleet in one go, but we will do it in phases. That's due to network implications, financial implications and the fact that there just isn't enough stock of EVs at present.

Lebona Vernon, Client Solutions Manager, ESB



As the regulations become progressively tighter, automakers will have to innovate and electrify faster. Although just 3 million<sup>25</sup> of Europe's total 308 million vehicles are electric today, we estimate that more than 40 million EVs will travel on Europe's roads by 2030, which puts the size of the electrification opportunity into context.<sup>26</sup>

Figure 3: Split of the total EU27+UK vehicle parc and the breakdown of vehicle types in the fleet sector (millions), 2018–30



Note: some numbers might not tally up due to rounding.

Source: EY analysis.

There are signs that the tide is turning. In Europe, petrol and diesel sales declined in 2020, largely due to city bans. EV sales bucked the trend, with market share trebling to 10%<sup>27</sup> due to CO<sub>2</sub> targets for cars and increased subsidies from pandemic rescue packages.<sup>28</sup> It certainly puts us at an inflection point in the evolution of the transport sector. According to Moore's law, doubling in demand is an indicator that the speed of growth is about to become exponential, with associated downward pressure on price.

In Europe, in the first nine months of 2020, EV sales outstripped those in China for the first time in at least five years.<sup>29</sup> In the UK, in September 2020, EV sales eclipsed diesel sales for the first time, but only just.<sup>30</sup>

<sup>25</sup> Includes the one million EV sales recorded in 2020 <https://www.schmidmatthias.de/post/exclusive-western-europe-s-plug-in-electric-car-market-surpasses-1m-landmark>.

<sup>26</sup> EY research analysis on fleet electrification, November 2020.

<sup>27</sup> [https://www.transportenvironment.org/sites/te/files/publications/2020\\_10\\_TE\\_Car\\_CO2\\_report\\_final.pdf](https://www.transportenvironment.org/sites/te/files/publications/2020_10_TE_Car_CO2_report_final.pdf).

<sup>28</sup> Berlin announced a €130bn stimulus package in June 2020, which included a €6,000 subsidy for EVs and a temporary VAT cut. In France, an €8bn plan to support the motor industry, announced in May, included incentives for buying EVs.

<sup>29</sup> <https://www.ft.com/content/2f59ae7d-0bcd-42a7-9459-20398d1de2dc>.

<sup>30</sup> <https://www.thetimes.co.uk/article/sales-of-eco-friendly-cars-overtake-diesel-dntblxhznz>.

It is not just CO<sub>2</sub> standards that are driving uptake in EVs, but also declining vehicle costs and advances in battery technology that allow for longer journeys between charges. According to HSBC, EVs will reach cost parity with diesel and petrol engines by 2024.<sup>31</sup> Battery costs are also coming down globally. From more than US\$1,100/kWh in 2010, they averaged US\$137/kWh in 2020 and are forecasted to drop to around US\$100/kWh by 2023.<sup>32</sup> At this level, automakers are expected to be able to produce and sell EVs at prices comparable with ICE vehicles. Also, the average driving range of EVs quadrupled between 2011 and 2019.<sup>33</sup>

## Country- and city-led decarbonisation programmes

Governments and cities have bought into the decarbonisation vision. They are making pledges to improve air quality by ending sales of diesel and petrol vehicles by 2030. Norway, one of the most progressive economies for EVs, is making a bold bid for 2025.<sup>34</sup>

In November 2020, the UK became one of Europe's biggest economies to set out its plans for a greener transport future, which include a £1.8bn (€2bn) investment in infrastructure and grants to increase access to zero-emission vehicles.<sup>35</sup>

### Country incentive schemes vary

- France offers bonuses of up to €7,000 for households purchasing cars or vans with CO<sub>2</sub> emissions under 20g/km, plus scrappage schemes up to €5,000; a €1,000 subsidy is available for the purchase of an EV if you live or work in a low-emission zone.
- In Italy, subsidies of up to €6,000 are available towards the purchase or lease of a new car with CO<sub>2</sub> emissions under 20g/km for individuals and companies.
- The Netherlands offers a €4,000 subsidy for the purchase or lease of a new EV, and €2,000 for the purchase or lease of a used EV.
- In Sweden, a climate bonus of SEK60,000 (€6,000) is available on new zero-emission cars and light vehicles, and SEK10,000 (€1,000) on PHEVs with emissions less than 70g/km.
- Bonuses in Portugal for private purchases of battery electric cars or vans are €3,000. Companies can buy up to four vehicles, with bonuses of €2,000 for cars and €3,000 for vans.

Data correct as at November 2020.

Source: [https://wallbox.com/en\\_us/guide-to-ev-incentives-europe](https://wallbox.com/en_us/guide-to-ev-incentives-europe).

Germany, as part of its €130bn economic recovery plan, is obliging all petrol stations to offer electric charging to satisfy drivers' refuelling anxieties. It also plans to double surcharges on drivers of SUVs and other gas-guzzlers that emit more than 195g/km, while subsidising new EVs to the tune of €6,000.<sup>36,37</sup>

France, meanwhile, aims for a five-fold increase in EV sales by 2022 compared with 2017. Its revised bonus-malus scheme raises environmental bonuses for purchases of EVs and electric bicycles. But it clamps down on the highest-emitting vehicles by imposing an environmental tax of up to €20,000 at the point of vehicle registration.<sup>38</sup> This pioneering scheme has contributed to increased EV registrations in France.<sup>39</sup> It effectively means that the penalty payments on qualifying high-emitting vehicles fund the bonus pay-outs to EV purchasers.

A bonus-malus mechanism integrated into the CO<sub>2</sub> standards for automakers could prove an effective lever for accelerating uptake in electric road transport and hastening the phase-out of polluting ICE engines.

<sup>31</sup> HSBC webinar, 19 November 2020 – An Electric Vehicle Future: How Regulation & Innovation are Driving Global Adoption.

<sup>32</sup> <https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/>

<sup>33</sup> Company data – Inside EVs.

<sup>34</sup> <https://www.fleeturope.com/en/safety//article/norway-ban-new-fossil-fuel-cars-2025?a=FJA05&t%5B0%5D=Tesla&t%5B1%5D=CO2&t%5B2%5D=Fuel&curl=1>

<sup>35</sup> <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>.

<sup>36</sup> <https://www.reuters.com/article/us-health-coronavirus-germany-autos>.

<sup>37</sup> <https://www.autoblog.com/2020/06/09/germany-electric-car-charging-subsidies-coronavirus-stimulus>.

<sup>38</sup> <https://www.electrive.com/2019/12/19/france-revises-their-ev-subsidy-system>.

<sup>39</sup> Electric vehicles accounted for 6.1% of registrations in the French market in the first eight months of the year, compared with only 1.9% in 2019. <https://www.electrive.com/2020/09/29/france-decreases-ev-subsidies-as-sales-rise140521/>.



At a local level, regulatory initiatives are quickly turning major conurbations into low-emission or emission-free zones. In November 2020, 17 cities pledged to ensure that “a major area of our city is zero emissions by 2030”, as formulated in the C40 Fossil Fuel Free Streets Declaration.<sup>40</sup> Cities such as Oslo and London are supplementing these initiatives with other benefits, including discounts or exemptions on parking fees for EVs. Inevitably, if entering a zone means paying a penalty, it will precipitate a switch to EVs over time, or encourage wider usage of public transport.

The newly launched Sustainable and Smart Mobility Strategy goes further, setting milestones through to 2050. It aims for 100 European cities to be climate-neutral by 2030, with at least 30 million zero-emission cars on the roads.<sup>41</sup>

## Incentivising customer behaviour

EV take-up is most pronounced in jurisdictions that offer the most attractive subsidies and fiscal incentives to bridge the cost gap between new EVs and petrol or diesel vehicles. Currently, 21 European countries offer bonus payments or premiums to buyers of EVs, but monetary values vary. Most offer some sort of tax benefit or exemption.

However, there is growing concern about polarisation. Though the European Green Deal pledges “turning climate and environmental challenges into opportunities and making the transition just and inclusive for all”,<sup>42</sup> some parts of the continent are getting left behind. E-mobility acceleration is centred predominantly in major European economies with the most progressive EV policies, wealthier populations and larger concentrations of the overall vehicle parc.

## Polarisation in Europe

More than three-quarters of all EVs are sold in Germany, France, the Netherlands, the UK and Norway, while just over 75% of all EV charging stations are located in Germany, France, the Netherlands and the UK.

Source: [https://www.acea.be/uploads/publications/ACEA\\_progress\\_report\\_2020.pdf](https://www.acea.be/uploads/publications/ACEA_progress_report_2020.pdf).

## Good for the environment; good for health

In 2020, at an urban level, we experienced reduced traffic and noise pollution due to the lockdowns that accompanied the COVID-19 pandemic. It presented a compelling case for the decarbonisation of road transport.

We saw the positive knock-on effects of cleaner air on the natural environment and on health. According to the World Health Organization, some cities in Europe saw reductions in nitrogen oxide (NOx) from traffic of between 50% and 70% compared with pre-lockdown values.<sup>43</sup> It is little wonder, perhaps, that pure EVs and PHEVs crossed the landmark one million sales in 2020, accounting for 1 in 10 of all new vehicles sold.<sup>44</sup> These tangible, albeit temporary, impacts on air pollution and on health certainly bring home the inherent and long-term social value in accelerating e-mobility.

The case for decarbonisation of road transport is further evidenced by 390,000+ premature deaths in Europe every year due to air pollution. Annual costs for tackling the health consequences of pollution from road transport are estimated at between €67bn and €80bn.<sup>45</sup>



<sup>41</sup> [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_20\\_2330](https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2330).

<sup>42</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en).

<sup>43</sup> <https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2020/9/a-new-international-day-to-celebrate-clean-air-and-a-sustainable-recovery-from-covid-19>.

<sup>44</sup> <https://www.schmidtmatthias.de/post/exclusive-western-europe-s-plug-in-electric-car-market-surpasses-1m-landmark>.

<sup>45</sup> <https://www.transportenvironment.org/what-we-do/air-quality-and-transport#:~:text=In%20the%20EU%20more%20than,the%20European%20Public%20Health%20Alliance>.

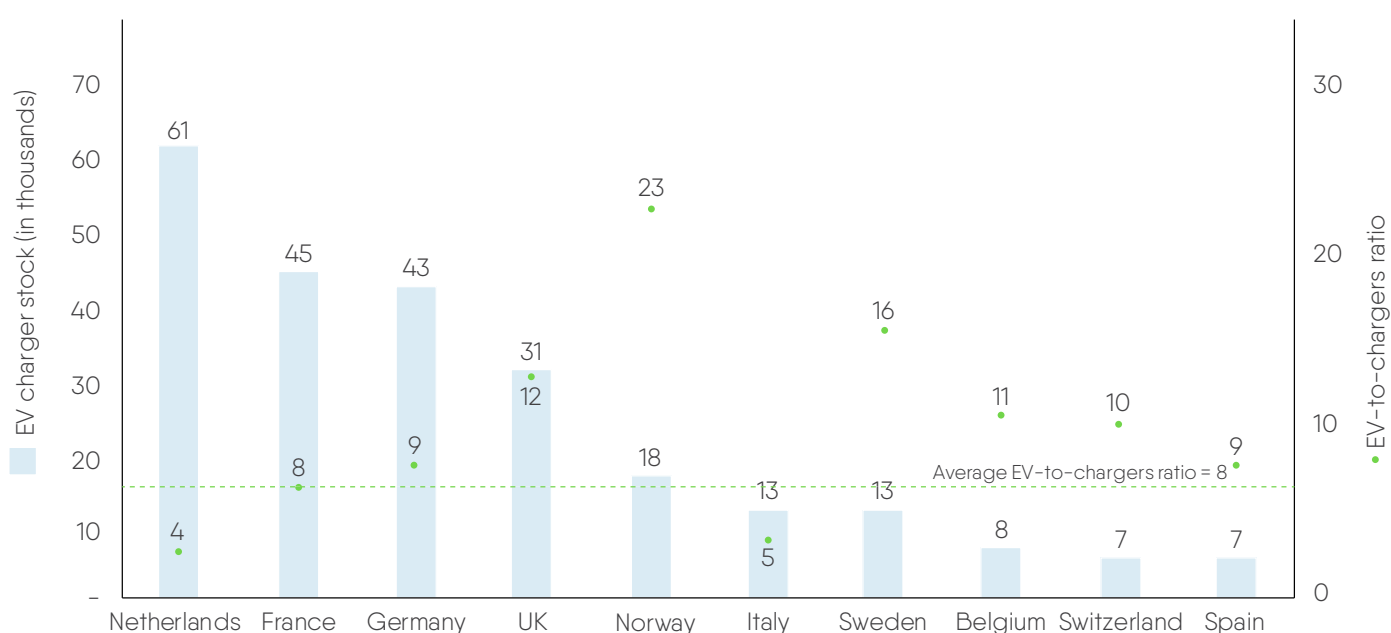
## Infrastructure to make the transition go faster

The estimated 40 million EVs on Europe's roads by 2030 will be going nowhere without parallel investment in public and private infrastructure.

Europe's existing 213,000 public EV charging points<sup>46</sup> are well below target. At the end of 2020, just 1 in 10 charging points is a fast charger.<sup>47</sup> The European Commission is calling for three million public charge points by 2030,<sup>48</sup> demanding a 13-fold increase within the next 10 years.

European non-profit organisation Transport & Environment estimates that we need 1.3 million public charge points by 2025 and close to 3.0 million by 2030. This calls for investment of around €20bn, based on an assumed uptake of between 33 million and 44 million EVs on Europe's roads.<sup>49</sup> Further investment of around €25bn is needed in power distribution grids to support charging infrastructure rollout, according to Eurelectric.<sup>50</sup>

**Figure 4: Number of EV charging points and ratio of chargers to EVs across top 10 European nations by EV parc**



Source: EY analysis.

Figure 4 shows the number of EV charging points and the ratio of EVs to every public charger. The Netherlands has experienced 83% growth in the past three years, to 61,400 charge points with a ratio of four EVs per charger. France, too, has seen rapid growth (107%) and now ranks second in Europe. Germany, although an early leader, grew its charging infrastructure share by 73% between 2017 and 2020, with a ratio of nine EVs per charger.<sup>51</sup>

With more than 107,000 charge points added across Europe since 2017, there are now around eight vehicles to every public charge point. Though this is sufficient for the current market, it is by no means an indication of future needs. Already, there is strong divergence across markets, with 4 cars to every public charge point in the Netherlands compared with 16 cars to every charge point in Sweden. To give all Europeans the chance to shift to zero-emission mobility, charging infrastructure needs to be spread across the continent.

<sup>46</sup> <https://www.eafo.eu/alternative-fuels/electricity/charging-infra-stats>.

<sup>47</sup> <https://ec.europa.eu/transport/sites/transport/files/legislation/com20200789.pdf>.

<sup>48</sup> [https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/co2\\_cars\\_vans\\_non\\_paper\\_technical\\_update\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/co2_cars_vans_non_paper_technical_update_en.pdf).

<sup>49</sup> <https://www.transportenvironment.org/sites/te/files/publications/01%202020%20Draft%20TE%20Infrastructure%20Report%20Final.pdf>.

<sup>50</sup> Power Distribution Grid: Critical enabler of the European Green Deal, Eurelectric, November 2020.

<sup>51</sup> <https://www.bloomberg.com/news/articles/2020-08-05/global-ev-charging-points-hit-1-million-threshold>.

## Funding the cost of infrastructure

A combination of Europe's ambitions for decarbonisation and the CO<sub>2</sub> emission standards for automakers will push up EV sales. Charging infrastructure has to match. But who will pay?

As part of its initiative to ramp up the production and deployment of sustainable and carbon neutral transport fuels in the European Green Deal, the European Commission is reviewing guidelines for the development of the Trans-European Transport Network (TEN-T). A cornerstone of this review, in parallel with the revision of the Alternative Fuels Infrastructure Directive (AFID), is to ensure that the guidelines can accommodate EV momentum in Europe and prioritise full coverage of electric-charging infrastructure.

As a flagship funding programme for TEN-T, the Connecting European Facility (CEF) must prioritise EV charging as a cost-efficient means to decarbonise transport.<sup>52</sup> Selection criteria focuses on projects that contribute significantly to reduced GHG emissions and promote infrastructure that is compatible with the long-term decarbonisation of transport. They include funding for charging points and electricity infrastructure such as grids.

In future rounds, Eurelectric is calling for changes to funding for:

- Cross-border projects that enable an EU-wide coherent transport network
- Projects that deliver benefits from synergies between the transport and energy sectors
- Projects that can make high-power chargers more commercially feasible by, for example, shifting the focus of subsidies from construction of charging points to actual usage and efficiency
- Co-financed projects, particularly alternative fuel and cross-border projects, by raising the rate from 20% to 50%<sup>53</sup>

Though, under State aid rules, the European Commission is required to demonstrate technology neutrality, it has made an exception for a number of infrastructure investments where it deems the benefits exceed potential distortion of competition. Some programmes have already received backing.



**We need a corridor of decent charging infrastructure across Europe. It is impossible to drive across the EU due to the lack of a sufficient DC-charger network.**

Stefan Meers, Global Industry Segment  
Director – Car Fleets, EVBox

At the beginning of 2020, Romania gained approval from European competition regulators for a €53mn public support scheme for charging stations.<sup>54</sup>

The Commission has also approved an €8mn scheme for investments in publicly accessible electric charging stations along the Danish road network. The Commission concluded that the positive effects of the scheme on EU environmental and climate goals outweigh any potential distortion of competition and trade brought about by the support. Also, in Denmark, companies that supply EV charging on a commercial basis will get an electricity rebate, while favourable tariffs for electric bus charging will remain in place until 2024.<sup>55</sup>

<sup>52</sup> [https://cdn.eurelectric.org/media/4502/eurelectric\\_ten-t\\_policybrief\\_final-2020-030-0416-01-e-h-3AA36CE2.pdf](https://cdn.eurelectric.org/media/4502/eurelectric_ten-t_policybrief_final-2020-030-0416-01-e-h-3AA36CE2.pdf).

<sup>53</sup> [Ibid.](#)

<sup>54</sup> [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_20\\_224](https://ec.europa.eu/commission/presscorner/detail/en/IP_20_224).

<sup>55</sup> [https://wallbox.com/en\\_us/guide-to-ev-incentives-europe](https://wallbox.com/en_us/guide-to-ev-incentives-europe).



In Stockholm, land is given free of charge to electricity companies to install clusters of charging points in 'charging streets'. The city requires that the charging points are interoperable and offer users universal access.<sup>56</sup>

Private sector investors also need to be convinced by the case for infrastructure. Profit margins are often deemed too small, and the lack of unified charging standards adds uncertainty. Closing the private funding gap, gaining investor confidence and giving EVs the chance to become mainstream will hinge on new and innovative ways to raise private capital for infrastructure investment.<sup>57</sup>

Until other programmes and schemes catch up, the widening mismatch between numbers of EVs on Europe's roads relative to charging points will continue to contribute to driver anxiety.

### Interoperability essential for EV adoption

In the same way that an ICE driver can refuel at any gas station in any town or country, the same must hold true for EVs. Currently, however, interoperability is lacking.<sup>58</sup>

A big part of the problem is that the industry is still new and lots of different players are coming to market with their own charging station solutions, with different cables, plugs, payment mechanisms and contracts.

For passenger vehicles, which charge at home 80% of the time<sup>59</sup> and typically travel 400 km per charge, (more than enough for the average 30km to 60km daily journey), finding the right charge point, with the right provider and right payment mechanism, is less of a worry than it is for large depot-based trucks that travel greater distances.

<sup>56</sup> [https://grow-smarter.eu/fileadmin/editor-upload/12Solutions/Factsheets/Stockholm/Solution\\_11\\_fast\\_charging.pdf](https://grow-smarter.eu/fileadmin/editor-upload/12Solutions/Factsheets/Stockholm/Solution_11_fast_charging.pdf).

<sup>57</sup> [https://www.ey.com/en\\_gl/power-utilities/how-to-make-ev-charging-pay](https://www.ey.com/en_gl/power-utilities/how-to-make-ev-charging-pay).

<sup>58</sup> [https://cdn.eurelectric.org/media/4562/20200709\\_eurelectric\\_ev\\_charging\\_interoperability-2020-030-0465-01-e-h-4C8220FC.pdf](https://cdn.eurelectric.org/media/4562/20200709_eurelectric_ev_charging_interoperability-2020-030-0465-01-e-h-4C8220FC.pdf).

<sup>59</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/818810/electric-vehicle-charging-in-residential-and-non-residential-buildings.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/818810/electric-vehicle-charging-in-residential-and-non-residential-buildings.pdf).

“

A big obstacle in the development of infrastructure is installing it in a public space. It is an operational nightmare, as rules and regulations vary town by town. This is not stopping the development of infrastructure, but it is not helping it.

Alberto Piglia, Head of e-Mobility, Enel X

“

If charging is going to succeed, we need a standard. If every country does its own thing, then it will never work for long-haul journeys. We need one standard that works for every country and for every vehicle.

François Detroux, Business Development Executive, Green Mobility, ENGIE

“

I only know of three or four public charging stations in Europe that you can access with an HDV.

Henrik Engdahl, Chief Engineer Charging, Volvo

## Amsterdam accelerates electrification

Amsterdam is held up by many as an example of electrification done well.

Its charging network is the fastest-growing in the world, according to Bloomberg. Installed by energy company Vattenfall, the meters are smart and adjust charging speeds according to load and availability on the grid.

Meters can be used by any EV driver, irrespective of network or contract.

From 2022, Amsterdam will have no-go zones for diesel and petrol engines. Currently, it is encouraging its people to switch to electric with car-sharing schemes and subsidies.

Source: <https://www.bloomberg.com/news/articles/2020-08-05/global-ev-charging-points-hit-1-million-threshold>.

Regulatory or policy intervention is needed to ensure standard protocols for communications between the EV, the charger and the central management system, as well as the grid. The driver needs seamless payment options that are standardised and available to all.

Until there is greater uniformity and a price-transparent e-roaming capability, as in the telecoms industry, the EV experience could disincentivise customer uptake and, in turn, frustrate achievement of decarbonisation goals.



## Harnessing synergies between energy and transport

As EV take-up accelerates, demand for both slow- and fast-charging capabilities will become more acute. If this additional load is not managed properly, grid stability may be put at risk in some parts of Europe. Exploiting the synergies between the European power and transport sectors will help to unlock the commercial, environmental and societal value that e-mobility offers.

The role of system operators is critical in the rollout of charging infrastructure. They must ensure adequate grid capacity to accommodate the surge in drivers putting their EVs on charge at the end of the working day, without disrupting existing assets.

Distribution system operators (DSOs) will work alongside charge point operators to connect charging points to the grid. They will also work with e-mobility service providers, transmission system operators (TSOs), EV users, businesses and municipalities to make the grid smarter and able to utilise all the flexibility and storage options across the distribution network. Through partnerships and collaboration, stakeholders gain a better understanding of the perspectives of other players and can work towards common solutions.

Planning is critical to the resilience of the network and grid capacity. DSOs will incorporate new load requirements into their network development plans and:

- Identify projected load from EVs and the need for charging infrastructure in their service territories
- Consider load management and smart-charging strategies to optimise network investment and, potentially, reduce the need for grid reinforcement
- In cooperation with other players, identify the best locations for site charging infrastructure

DSOs also provide guidance on charging infrastructure allocation at both existing and new-build developments to avoid costly retro-fitting and other capacity-related issues. And they will seek future opportunities for V2G energy exchange to leverage flexibility and keep power flows in balance.

As soon as there are enough EVs on the roads, batteries will provide the best short-term flexibility to the grid. Smart charging will shift power demand to times of the day when renewable supply is high and power prices low. V2G goes one step further and enables the charged power to be pushed back to the grid to balance variations in energy production and consumption. Additionally, at the end of the EV's life, its batteries can be repurposed into stationary energy storage for another 5 to 20 years. Batteries, therefore, have a second life at very low cost.<sup>60</sup>

By 2025, all Member States will be required to make the installation of charging infrastructure simpler under the EU's Energy Performance in Buildings Directive (due for revision at the end of 2021). To avoid the lengthy delays that have characterised some charging infrastructure rollouts, and to encourage private investment, city administrations will pre-approve sites for installation. For tenants, new 'right to install' legislation will mean that they do not need the building owner's permission in advance of installing charging points.

Deployment of on-street public infrastructure will be prioritised, making charging simpler for taxis and private-hire vehicles. Meanwhile, open-charging standards will enable greater interoperability to allay user anxiety.



Regulators are concerned by the cost of the network. But the network is only an enabler for investment returns from e-mobility.

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Anthony Walsh, Manager, Future Network Development, ESB



Open data access – communications between the vehicle, the plug and the grid – by way of digital identities, is absolutely critical. Data should be disclosed to any actors according to what they need to perform their tasks. For us, this data will be needed to efficiently operate a system with much more renewables. And for that, we need regulatory changes.

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Manuel Gálvez, European Affairs, Elia Group



In many cities, the majority of drivers on the Uber platform do not have access to off-street parking at home where they can install a private charger, so they depend on reliable public charging infrastructure. There is a need for many more chargers, specifically in the areas where commercial drivers live, which have often been overlooked.

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Matthew Richardson, Director of Electrification, Uber

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<sup>60</sup> <https://www.greentechmedia.com/articles/read/car-makers-and-startups-get-serious-about-reusing-batteries>.



## Customer-driven transition

Of course, none of this investment and innovation has value unless it takes end customers along on the journey and wins them over to the electrification of transport and the decarbonisation vision.



We need to change mindsets. And make managing the EV fleet the responsibility of someone who really understands the business operations and the needs of fleet.

Tomáš Chmelík, Head of /E/MOBILITA, ČEZ, a.s.

And customers are certainly beginning to embrace electrification, as seen by the record one million passenger EV sales in Europe in 2020.<sup>61</sup> At both an individual and corporate level, customers will dictate the pace of e-mobility uptake and, by extension, influence the rollout of a supporting infrastructure and ecosystem.

But if e-mobility solutions let customers down, or exacerbate anxieties over range and recharging, the transition will slow. Conversely, with an efficient infrastructure that meets or exceeds expectation, and other factors such as vehicle affordability and government support in place, EV adoption and the road to decarbonisation will accelerate.

One measure of corporate customer buy-in to the electrification agenda is The Climate Group's EV100.<sup>62</sup> So far, 53 leading European companies have signed up to the initiative, committing to electrify their fleets and install charging infrastructure for staff and customers by 2030. In turn, they send a powerful demand signal to automakers and governments to scale up e-mobility and roll out supporting policy.

Many companies, both inside and outside the EV100, have started partial electrification of fleet, encouraging their earliest EV drivers to share their experiences, raise awareness and open up dialogue about the benefits of electric over ICE.

We see fleet as Europe's 'low-hanging fruit'. It is, we venture, most likely to have the biggest overall impact on reducing emissions from road transport while delivering on decarbonisation. But first, a number of 'enablers' must be in place to smooth the fleet transition to electric mobility.



We joined the EV100 club and committed to fully electrify our fleet by 2030. However, given the work we have done so far and the plans we have in place, we anticipate being there by 2026.

Steve Winter, Head of Fleet (UK), Centrica

<sup>61</sup> <https://www.schmidtmattias.de/post/exclusive-western-europe-s-plug-in-electric-car-market-surpasses-1m-landmark>.

<sup>62</sup> <https://www.theclimategroup.org/ev100>.





## CHAPTER 3

# How to accelerate e-mobility

E-mobility is still very new. As in previous industry transformations, scaling it up and making it happen depends on bringing together different enablers so that value from the transition can be realised quickly.

Putting these enablers in place will help to transform a sector that ranks as one of the biggest polluters in Europe. They will, in turn, define the participation required from players operating in the emerging ecosystem.



ENABLER

1

## Cohesive regulation

- A strong mandate for electrification at a European, national and city level will give clear direction on what is happening and when, and in what volumes, to enable joined-up planning and investment by every participant in the value chain.
- A vision for EV rollout and infrastructure aligned to grid capacity will help determine how we go about scaling from 2 million to an estimated 40 million EVs by 2030. And it will direct how we accelerate from 200,000 to 3 million charge points in the same timeframe, while tackling bottlenecks such as permissions and grid capacity.
- Broad agreements on financial and tax incentives will help to iron out differences in EV take-up across geographies and endorse a unified and cross-continent effort to change behaviours and meet Europe's decarbonisation goal.
- At a company level, a clearly defined road map should set out the fleet electrification journey and timeframe.



ENABLER

2

## Funding models

- A €20bn investment is needed for three million public charge points, and a further €60bn for private charging infrastructure by 2030.
- Forward-looking regulatory frameworks for distribution grids are the starting point for enabling adequate levels of investment. Where grid costs are too high, or consumer density too low, additional funding models for grid reinforcements and grid connections may be required.
- Existing funding mechanisms, such as the CEF, must be extended beyond public charging infrastructure to fleet depots, etc.
- Funding provision for fast charging will enable comprehensive coverage across Europe.
- Government funding and grants for a second-hand market in EVs will accelerate take-up and decarbonisation goals.



ENABLER

3

## Supply chain

- A robust and integrated supply chain will deliver batteries and vehicles to the right markets at the right price.
- Availability of EVs must match demand. Where buyers snap up entire national allocations at source, other companies and fleet owners may lose out on fair-priced or use case-specific vehicles.
- Local battery manufacture, using renewable energy sources to reduce the carbon footprint of EVs, will reduce degradation in transit and improve availability within Europe while creating employment opportunities.
- Skills and resource transfer from ICE to EVs will facilitate the transition and help to firm up the supply chain.





ENABLER

4

## Physical infrastructure

- A physical infrastructure, with charging points optimally sited and aligned to the broader capabilities of the grid and energy system, is needed. This is especially pertinent in rural areas where distances between charging stations are much greater.
- Detailed modelling of potential EV uptake, driver behaviour and the location of charging points will help to identify areas where bottlenecks in grid supply could arise.
- Improvement is needed to both slow- and fast-charging infrastructure to accelerate e-mobility. Around 80% of charging takes place at home or at work, for which slow charging will suffice. But fast chargers are needed in urban environments where drivers cannot charge at home, and to raise the competitiveness of EVs over ICE alternatives. Though fast chargers represent just 14% of charging infrastructure in Europe, automakers are pushing ahead with EVs that charge fast.
- To sync the customer's EV purchase and connection to the grid, DSOs, charge point operators and public authorities must work together to speed up infrastructure deployment and reduce delays in permitting and connection. Cooperation between players can reduce investment costs for infrastructure deployment significantly.



ENABLER

5

## Digital interface

- A data and software interface between the vehicle, the charge point and the grid will enable smart charging, grid optimisation and reduced user costs.
- Standard interoperability protocols between the EV, the charger and the central management system ensure that any EV user can charge with confidence at any charge point.
- Simplified authentication protocols enable seamless, fair and transparent payment, equivalent to making a purchase at a petrol or diesel pump.
- Open access, and the efficient exchange of data, will facilitate coordination between players in the power and transport sector, enabling the development of EV services that optimise the operation of the electricity system.

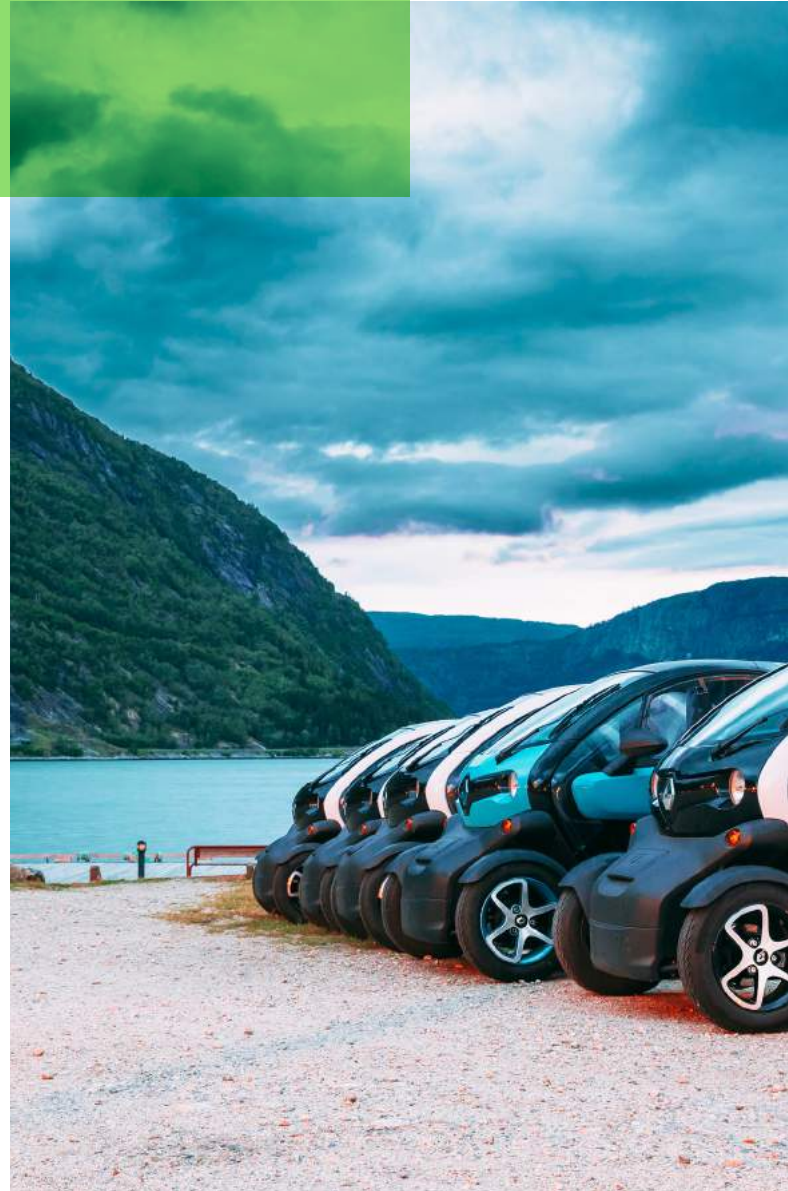
## CHAPTER 4

# Why fleet is the catalyst in the e-mobility transition

- Currently at 63 million vehicles, fleet (company vehicles) makes up just 20% of the total vehicle parc in Europe.<sup>63</sup>
- Fleet vehicles travel more than 40% of total vehicle kilometres in Europe and are responsible for half of total emissions from road transport.<sup>64</sup>
- Six out of 10 cars sold in Europe are company cars and, in 2019, 96% of new company car registrations were petrol or diesel.<sup>65</sup>
- On average, company cars drive 2.25 times further than private cars, making a disproportionate contribution to emissions.<sup>66</sup>
- There will be a 24-fold increase in the total electrified fleet by 2030.<sup>67</sup>
- National and local government incentives, purchasing managers' ability to negotiate discounts on vehicle contracts, and route predictability all make fleet ideally placed to lead the transition to electric.

Electrifying fleet first is, we believe, the obvious and quickest way to scale electrification. Fleet is the catalyst for carbon reduction and value creation.

Fleet is a disproportionately big polluter. Fleet vehicles travel more frequently and cover more kilometres than any other vehicle segment and, as a consequence, make a larger contribution to CO<sub>2</sub> emissions.



## What do we mean by 'fleet'?

- 'Fleet' refers to company leased or owned vehicles that are predominantly for business use.
- Fleet sizes may range from just one or two vehicles to several thousand.
- In Europe, around 75% of fleet is spread across six key industries:
  - Wholesale and retail
  - Public administration and defence
  - Manufacturing
  - Construction
  - Transportation, including taxis, buses and logistics
  - Vehicle rental and leasing, and travel

<sup>63</sup> EY research analysis on fleet electrification, November 2020.

<sup>64</sup> Ibid.

<sup>65</sup> [https://cdn.eurelectric.org/media/5018/2020\\_11\\_letter\\_setting\\_eu-wide\\_requirements\\_electrify\\_fleets-2020-oth-0006-01-e-h-E3300C86.pdf](https://cdn.eurelectric.org/media/5018/2020_11_letter_setting_eu-wide_requirements_electrify_fleets-2020-oth-0006-01-e-h-E3300C86.pdf)

<sup>66</sup> Ibid.

<sup>67</sup> EY research analysis on fleet electrification, November 2020.



Passenger cars and LCVs account for 13.0% and 2.5% of total European CO<sub>2</sub> emissions respectively. Trucks and buses are responsible for slightly more than one-quarter (25.8%) of road transport CO<sub>2</sub> emissions, equating to 6.0% of total emissions.<sup>68</sup> The lessons learned from the electrification of fleet will likely cascade into the entire transport sector, making the transition easier for vehicle segments that follow.

## Factors accelerating fleet electrification

The environmental drivers for fleet electrification are clear cut, but there are other significant drivers for fleet-first electrification.

### How fleet managers go about electrification

In interviews with some of Europe's leading fleet managers, EY identified that the transition to electric tends to be experimental at first.

They electrify a small percentage of vehicles to test driver sentiment, vehicle suitability, TCO and depot-charging capabilities. They want to ensure that vehicle range, comfort and ease of finding and using charging stations en route make for a simple, seamless driving experience that equals or betters the ICE alternative.

Only then will they progressively replace ICE vehicles in their fleets with EVs as leases expire.

## i) Regulation: a 'carrot-and-stick' stance

Regulators and policymakers have adopted carrot-and-stick tactics to jump-start the low-carbon economy. They are encouraging EV adoption and disincentivising ICE fleet vehicles.

Polluting vehicles are being legislated out of towns and cities due to the detrimental impacts of exhaust emissions, especially NOx and particulate matter, on local air quality and public health. As of 2019, there were nearly 300 low-emission zones in Europe, across a dozen countries.<sup>69</sup>

Urbanisation and the continued growth of e-commerce are set to increase demand for the delivery of goods. Operating costs and commercial risks will increase for fleet drivers that do not electrify but need to enter low-emission zones to reach their end customers. In the UK, for instance, registered EV drivers travel free of charge in congestion and ultra-low emission zones, while it costs non-qualifying vehicles up to £12.50 (€14) per day (up to and including 3.5 tonnes) and £100 (€110) for heavier vehicles. The perks and penalties add up to a strong case for electrification.

On car taxation, the higher a vehicle's CO<sub>2</sub> emissions, the higher the tariff. Clean electric and hybrid vehicles attract a much lower tax rate. In the UK and France, the 'carrot' for electric fleet is a zero-rated benefit-in-kind, which has boosted demand.

<sup>68</sup> <https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases-7/assessment>.

<sup>69</sup> <https://easyelectriclelife.groupe.renault.com/en/outlook/cities-planning/low-emission-zones-lezs-in-europe/>

## ii) Total cost of ownership

Fleet buyers can exercise their bulk purchasing power to secure lower upfront vehicle costs and reduce the total cost of EV ownership or lease.

Whereas ICE vehicles currently benefit from lower upfront costs, they suffer from volatile fuel prices, higher maintenance costs and, typically, higher insurance premiums. For EVs, servicing and maintenance are cheaper. And, once the significant operational cost savings from electricity, rather than diesel, are factored in, the EV's TCO attractiveness increases.



We encourage fleet managers to look at the total cost of ownership of EVs versus ICE vehicles, rather than on a price-per-employee budget basis. Though the monthly lease cost might be lower, an ICE vehicle can end up costing more overall when considering all costs.

Piet Cortier, Chief Operating Officer, Numobi



## What fleet managers want to know

- What are the costs of adding EVs to an existing fleet?
- How do you identify which parts of the fleet are best suited to electrification?
- What are the operational considerations of integrating EVs into a fleet? What impact will it have on work scheduling and vehicles' daily ranges, and what are the optimal charging locations and times?
- What financing model is most suited to EVs?
- How do we choose the most suitable vehicles to meet our daily needs?
- How do we identify the best sites for our charging stations?
- How do we choose the right charge point provider?

Considerations around lease duration, annual mileage and vehicle selection are also critical to understanding TCO parity. Generous grants and incentives by some governments will further lower the TCO of EVs and help to bridge the cost gap with ICE vehicles.

An added bonus of electrifying fleet first is that company vehicles tend to be refreshed more quickly than privately owned ones. This will result in a continuous flow of relatively new, affordable, zero- and low-emission vehicles into the used-car market. It will, in turn, extend EV penetration at affordable prices, with associated benefits for decarbonisation.

### iii) Operational characteristics

Not all fleet is the same. Different segments have different purposes for their vehicles. Some are simply not ready or able to electrify at the current time. Fleet managers can, however, test the feasibility of electrifying their fleets based on operational characteristics.

These operational characteristics are broadly defined as 'route predictability' and 'ease of charging'.

We know, for instance, that fleets stick to fairly standard routes, between, for example, depot and store. The predictability of journeys and known daily mileages determine, in turn, the ease of and use of smart charging. Charging can be organised to fit with drivers' breaks, delivery points or stopovers, reducing redundant time and easing range anxiety.



Our ambition is to electrify everything by 2030. We're starting with the quick wins, electrifying our passenger cars, and have gained a lot of experience on the way. The more difficult use cases require pilot projects and will come next.

Tomas Björnsson, Head of E-mobility, Vattenfall

## The size of the fleet electrification opportunity

To identify the size of the fleet electrification opportunity in Europe, EY people analysed the make-up and characteristics of 600 fleets operating across 16 industry segments.<sup>70</sup> EY teams determined that the size of the opportunity is equivalent to the value of market characteristics, plus fleet operational characteristics.

Figure 5: Fleet electrification opportunity



#### Definitions

- **Vehicle availability:** considers the availability of different vehicle models for various fleet use cases
- **Price suitability:** analyses the price differential required to be paid for an EV compared with an ICE vehicle
- **Daily running suitability:** refers to the average distance travelled during a day
- **Route stability:** examines the degree of route predictability for various fleet use cases
- **Ease of charging:** considers the availability of low-cost charging infrastructure at the most prominent charging locations for a fleet
- **Energy requirement feasibility:** estimates a fleet's energy requirements based on parameters, such as a vehicle's loaded weight and intensity of operations

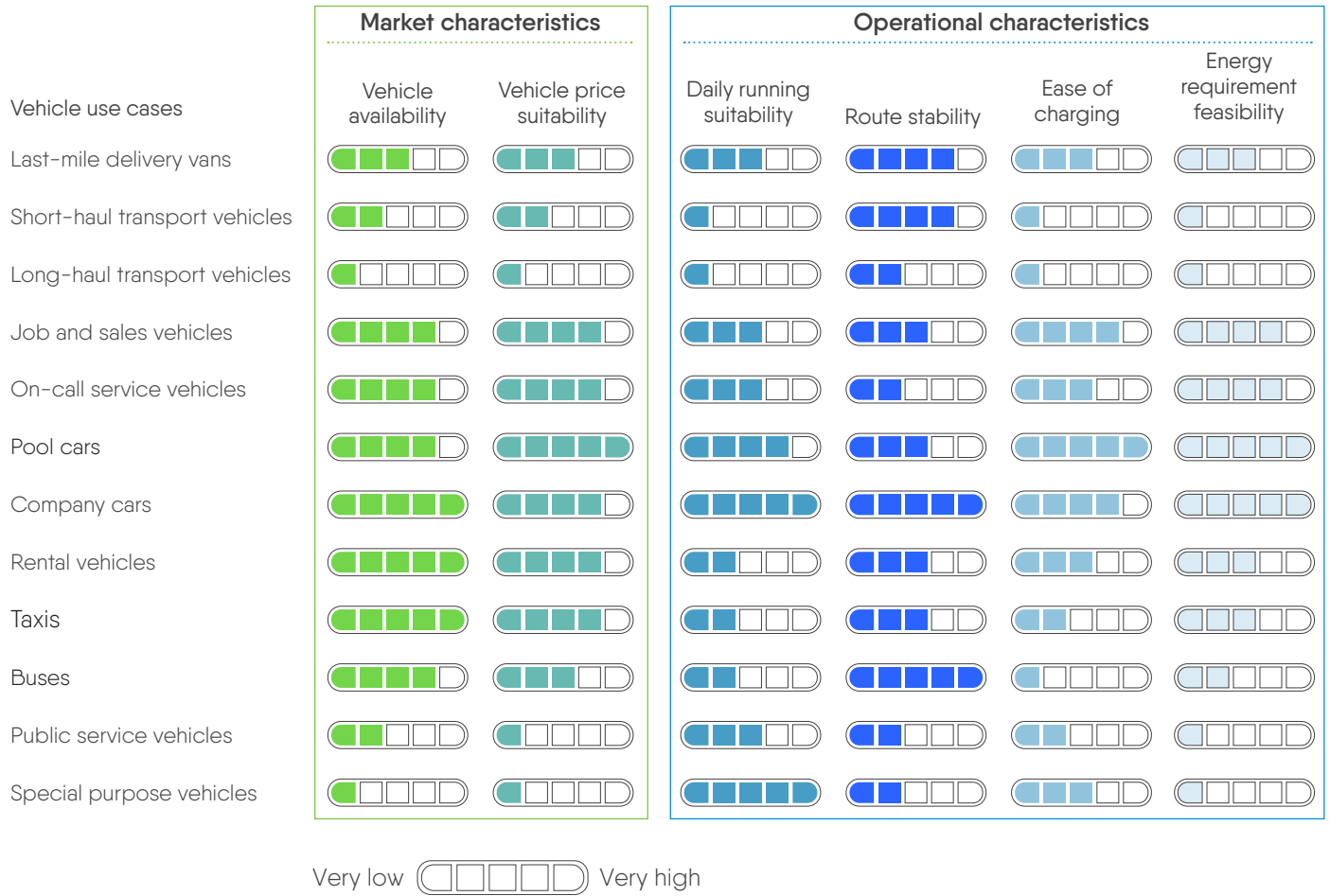
Source: EY analysis.

EY analysis finds that with 15% growth anticipated by 2030, the total number of fleet vehicles in Europe will rise to 73 million.

<sup>70</sup> The study, carried out by EY in November 2020, assessed two metrics: fleet vehicles per employee and fleet make-up, i.e., cars, LCVs and HDVs. By aggregating those company metrics at an industry level and extrapolating the number of employees operating in the industry, we estimated the total fleet size. Expected EV penetration to 2030 was used to determine fleet size per sector.



**Figure 6:** Factors that govern acceleration of electrification across fleets and the scope of the opportunity



Source: EY analysis.

Fleet electrification is expected to grow at pace. This decade, a 24-fold increase in total electrified fleet will mean 10.5 million vehicles by 2030.

Currently, electric passenger cars, including company cars, pool cars, rentals, ride-hailing vehicles and taxis, make up more than half (59%) of the total EV fleet parc. The LCV or van segment, which includes last-mile delivery and service vehicles, represents 38%. HDVs and buses make up the remainder.

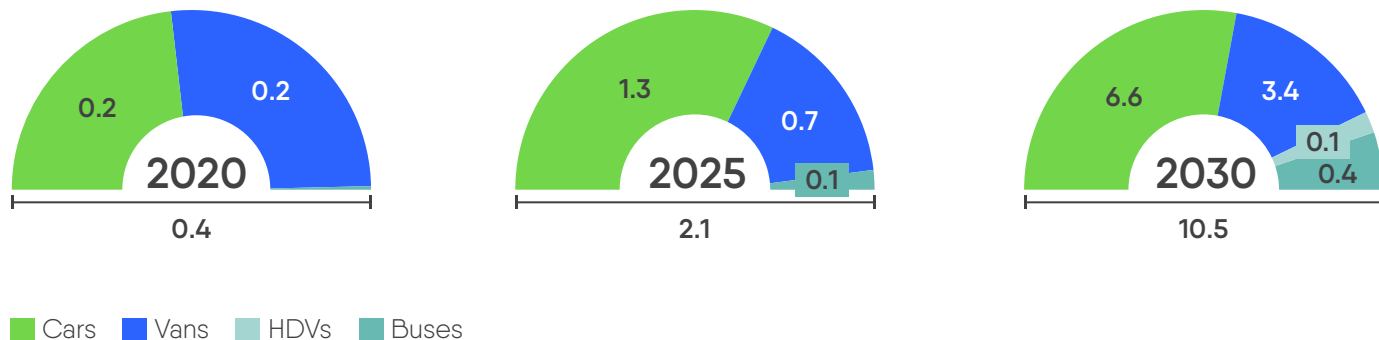
The bus segment is expected to electrify fastest, with 42% of the total bus parc electrified by 2030. The car segment will be next, reaching 17.5% by 2030, reflecting a shift in company car policies towards electric, and greater vehicle choice. More than 12% of the van segment will be electric by 2030, compared with just 2% of HDVs. Electric HDVs will be restricted, for now, to sub-7.5 tonnes and special service vehicles, such as refuse-collection and road-sweeping vehicles.





Figure 7: Factors that govern acceleration of electrification across fleets and the scope of the opportunity

in millions of EVs



Note: some numbers might not tally up due to rounding.

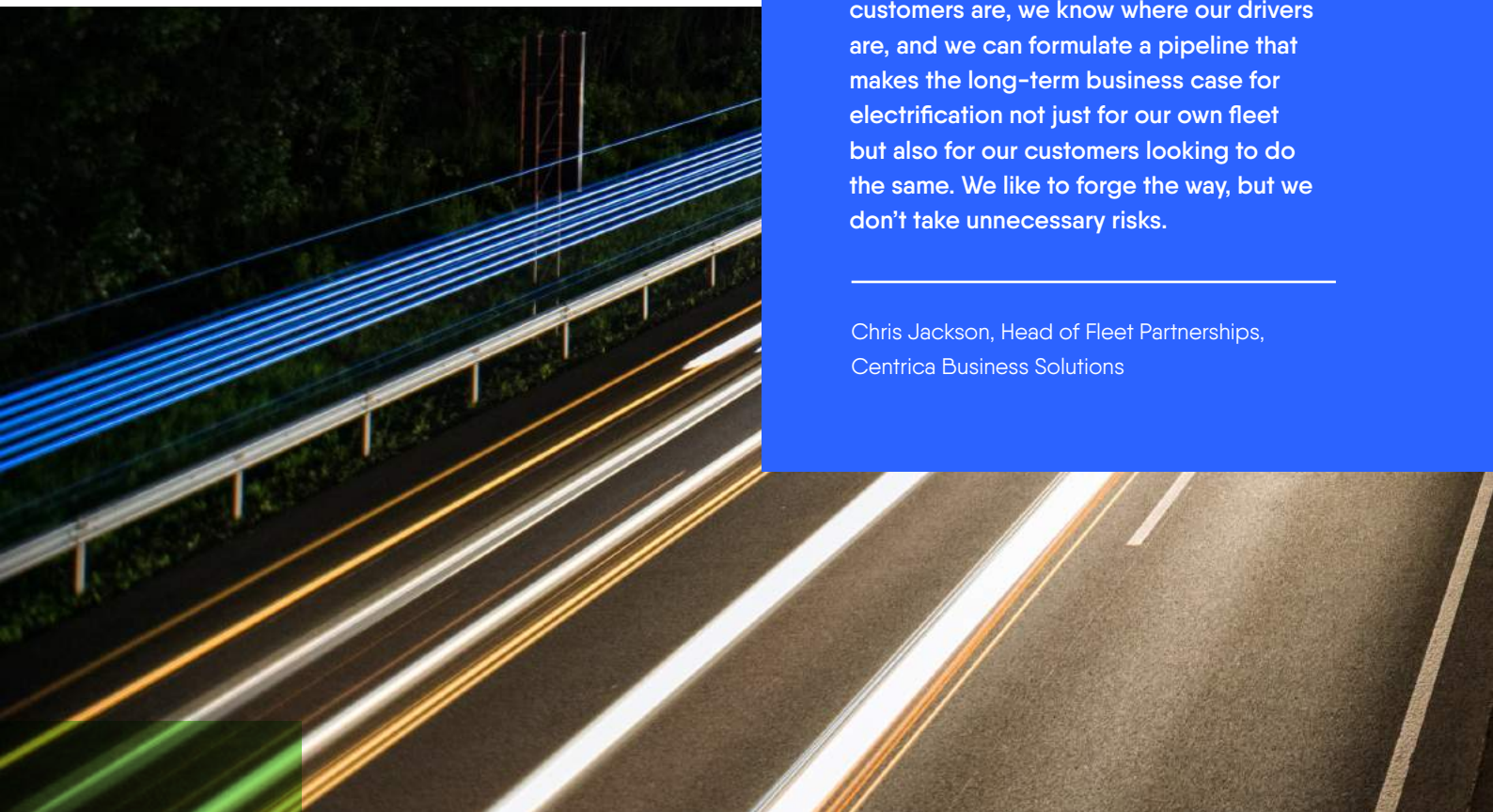
Source: EY analysis.

All of these factors make fleet the most likely catalyst in the transition to electrification. And, as the largest road transport polluter, it will deliver the biggest single boost to the decarbonisation agenda. In turn, it will create value and give life to a new ecosystem of interconnected businesses that will come together and collaborate to resource emerging need.



We've been an EV trailblazer since 2014. We've got a decade-long plan. We know where our fleet travels, we know where our supply chain is, we know where our customers are, we know where our drivers are, and we can formulate a pipeline that makes the long-term business case for electrification not just for our own fleet but also for our customers looking to do the same. We like to forge the way, but we don't take unnecessary risks.

Chris Jackson, Head of Fleet Partnerships, Centrica Business Solutions

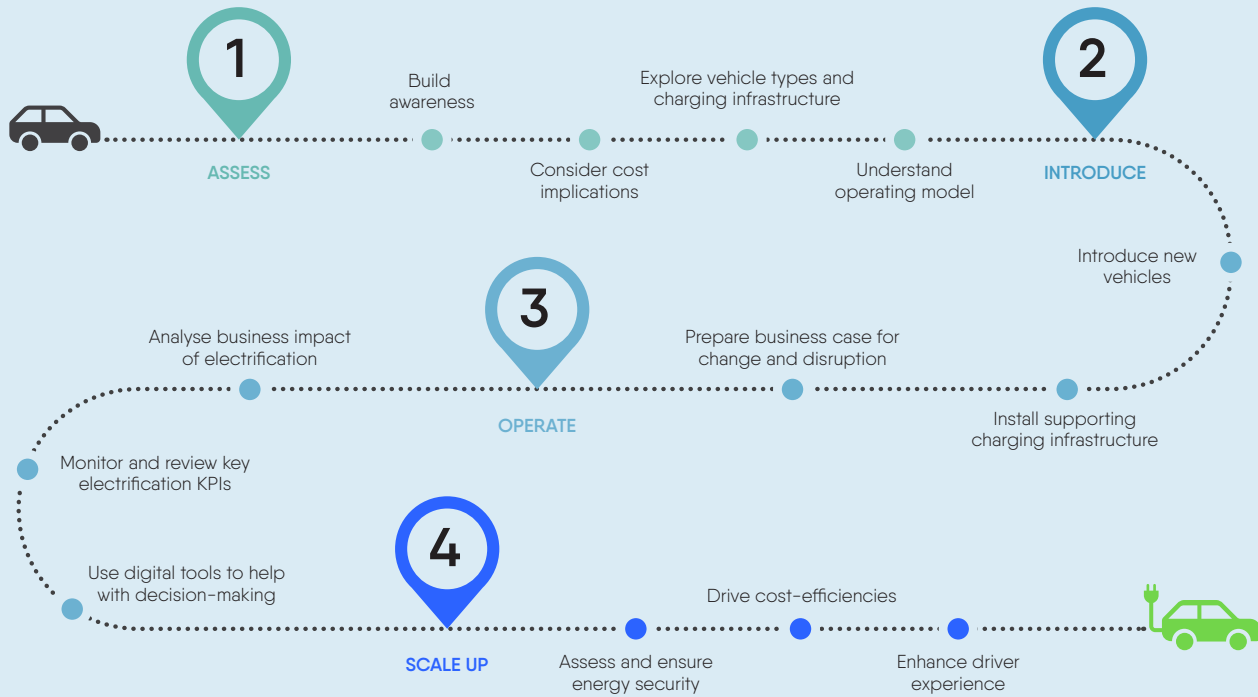


## Fleet electrification in planning

Vehicle and battery costs are decreasing, and vehicle range is increasing. Aside from the obvious environmental, sustainable and social value of electrification, fleet managers need a clear view on how to integrate EVs into their operations.

Recognising that not all fleets are the same, and that some are not suited to electrification at this time, the journey to electrification is likely to cross through four distinct phases. Typically, a small number of EVs are added to an existing fleet on a trial basis, before the company makes a decision to scale up. A feedback mechanism and monitoring process is important to assess the success of the fleet migration strategy.

Figure 8: Fleet electrification journey

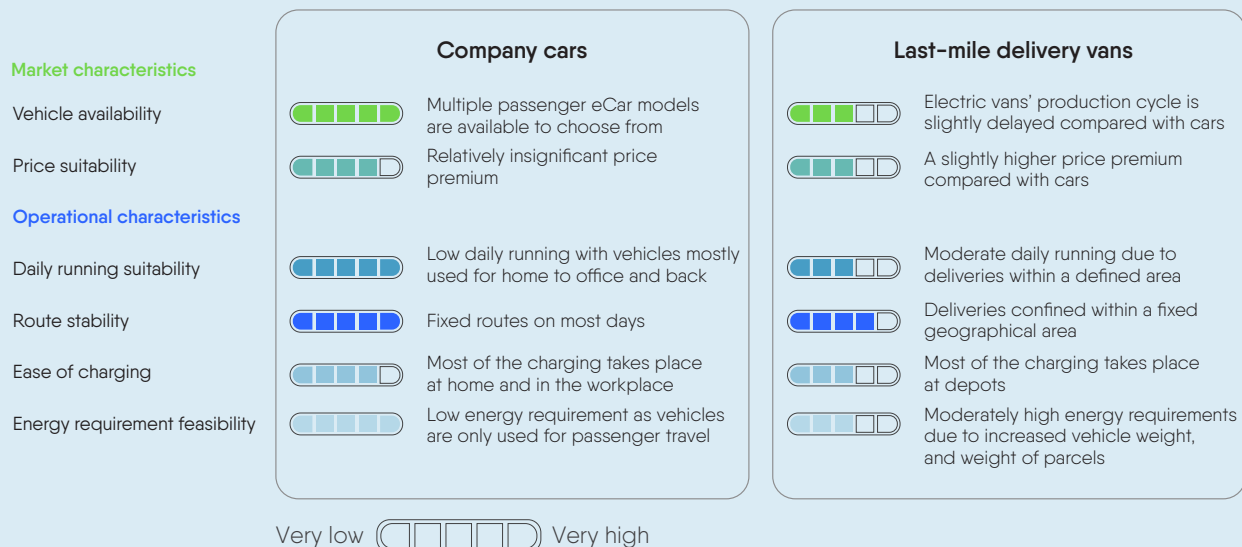


Source: EY analysis.

## Fleet electrification in practice

Taking two of the largest fleet segments – company cars and last-mile delivery – we mapped individual operational characteristics to assess suitability for electrification. Using the same criteria, fleet managers can make a broad assessment of their own suitability for electrification.

Figure 9: Fleet electrification case studies





## CHAPTER 5

# The journey to electrification

Europe has big decarbonisation ambitions. The enablers to make it happen are clear. Fleet is positioned as the catalyst to electrification; it will deliver the biggest environmental rewards and precipitate an industry-wide adoption of electric mobility.

The journey to electrification starts with carbon-neutral and renewable energy. There is little point in electrifying the vehicle if we continue to use a polluting energy source.

Then comes the EV. But, strictly speaking, the EV is not just a vehicle anymore. An EV can charge, store and shift load; it can deliver flexibility to the grid to help manage the peak, becoming a potential income earner in its own right. It could be one of several million vehicles aggregating capacity; it could, equally, redirect energy from the car to the home – and vice versa – becoming an independent renewable energy management system.

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Charging infrastructure is part of the solution. It needs to be sited promptly and appropriately. And, with a nod to the future, it must be designed and deployed in ways that capture value from the flexibility in vehicle assets.



As a global leader in renewable energy, we are also committed to the electrification of transport and provide EV solutions based on green energy.

Carlos Bergera Serrano, Head of External Relations Smart Mobility, Iberdrola

The supporting built environment must adapt too. Planning rules in towns and cities must reflect and facilitate the changing vehicle market. New-build commercial and residential properties should pre-empt future electrification demands before construction even begins, with fleet customers' needs integral to the journey:

- The ability to charge whenever and wherever
- Transparency of cost
- Access to vehicles that are always available at the time of need

To facilitate that shift, an extended ecosystem is emerging, as it has done in other sectors in transition. Linkages are forming outside traditional parameters. Utilities are entering into partnerships with charge point operators and leasing companies. Automakers are teaming up with utilities to become providers of choice. New players are entering the market to innovate services for the burgeoning opportunity. Among their solutions are peer-to-peer contracts and platforms that enable e-roaming and give access to charging stations in other jurisdictions.

This combination of new and established players will have to work collaboratively and cohesively to deliver on the decarbonisation vision. They will come together for the greater good of the customer, transport, energy and, ultimately, the environment.

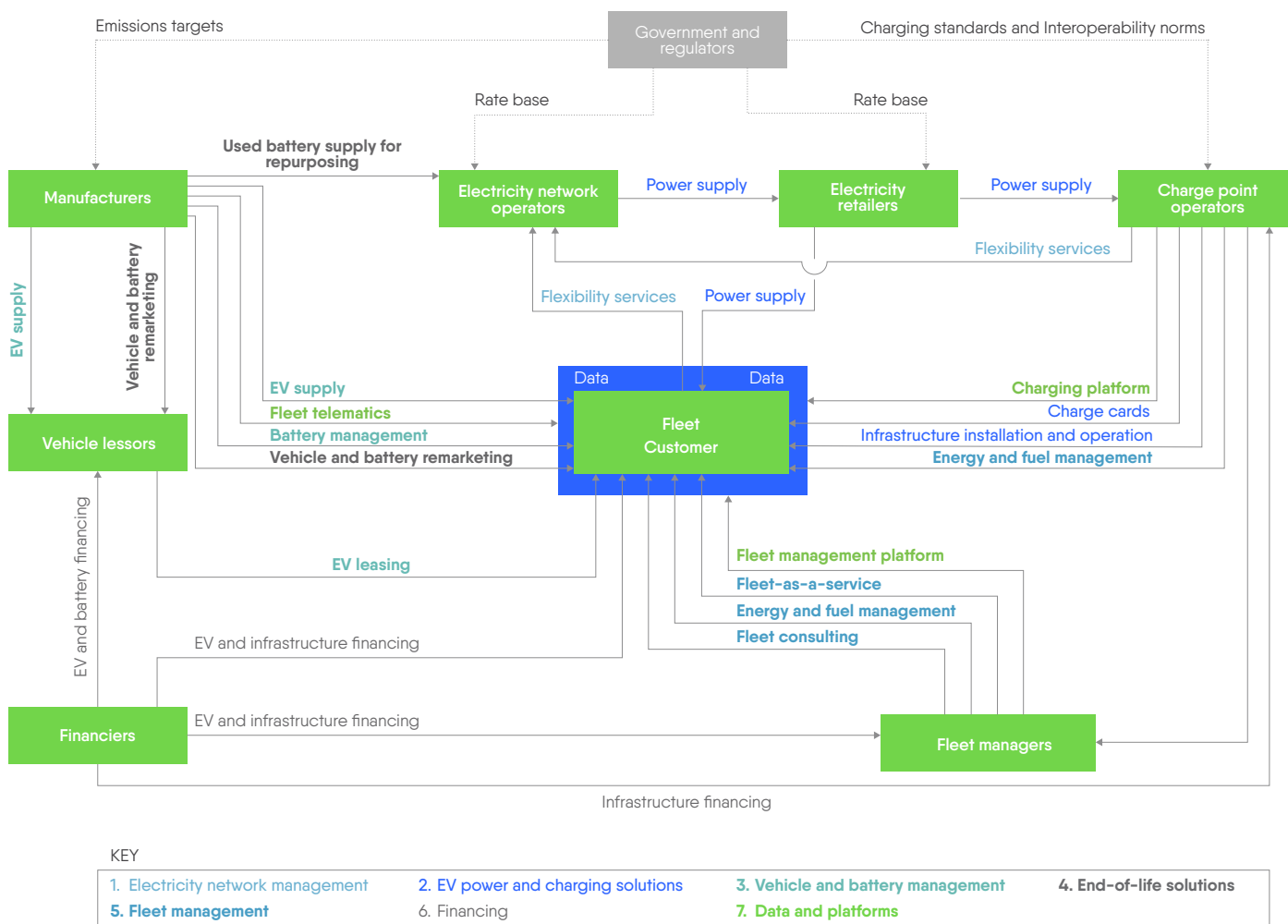


We're shortening the battery supply chain by locating manufacturing in Europe. It means materials do not travel around the world several times. From a high-carbon economy processing and conversion perspective, it is more environmentally sustainable.

Isobel Sheldon, Chief Strategy Officer, Britishvolt

Ecosystem players that address those fundamental needs will win over customers' hearts and minds. They will earn their trust in the web of services and products that underpin fleet e-mobility and enhance the overall customer experience.

Figure 10: Fleet electrification ecosystem puts the customer at its centre





## A continuing journey and value potential

There might not be an end state. Rather, this electrification journey is a continuum of the innovation that has typified the transport industry for the best part of a century.

For now, it has led us to a tipping point that will define the future direction Public infrastructure to allow all EV drivers to charge and go' of travel. And, if we accelerate quickly, we will deliver on the societal values of reduced emissions and improved air quality. But there are considerable commercial and network value opportunities that will also come from putting 40 million EVs on the roads in Europe by 2030.



- **Electricity network management:** minimising grid infrastructure investment and accommodating new EV load, courtesy of flexibility services from aggregated EV batteries.
- **EV power and charging solutions:** provision of tailored smart and scalable charging infrastructure and charging management software to electric vehicles.
- **Fleet management:** a one-stop shop or platform-provider model that allows the customer to choose and pay for a vehicle, select a charge point operator, choose a tariff and pick an electricity supplier. Likely to be offered as a bundled service by lessors, fleet management will deliver a seamless ordering, installing and operating experience.
- **Vehicle and battery management:** as EV prices come down and reach TCO parity with ICE vehicles, EVs are likely to change hands. The second-hand car market dwarfs the new car sales market,<sup>71</sup> a trend that is expected to continue into the electric mobility market. Within five years, the first wave of lease vehicles will begin to rotate, adding to the second-hand vehicle market capacity.
- **End-of-life solutions:** when the EV battery is retired, it still has life left in it. A market is emerging in repurposing EV batteries, potentially three or four times, to optimise costs and to salvage scarce raw materials.<sup>72</sup>
- **Financing:** by 2030, cumulative investment in public and private charging is estimated to be €80bn.<sup>73</sup> It includes equipment, installation and grid upgrades. While several private players have already committed substantial investment to charging infrastructure, public-private partnerships are still an important route to market. Vehicle leasing finance will continue to be important too, given the rapidly transitioning EV market, uncertain residual values and likely influx of new models. Lease ownership models seem likely to remain the customer preference.
- **Data and platforms:** the ecosystem will depend on data from parties to succeed. Players will need to find ways to collaborate on data sharing within a secure architecture that maintains the trust of all stakeholders.

<sup>71</sup> Eight million second-hand cars were sold in the UK in 2018, compared with a total of 15 million new vehicle sales across the whole of the EU.

<sup>72</sup> [https://www.ey.com/en\\_uk/automotive-transportation/why-the-ev-battery-life-cycle-is-more-important-than-the-battery-life](https://www.ey.com/en_uk/automotive-transportation/why-the-ev-battery-life-cycle-is-more-important-than-the-battery-life).

<sup>73</sup> <https://www.transportenvironment.org/sites/te/files/publications/01%202020%20Draft%20TE%20Infrastructure%20Report%20Final.pdf>.

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We need to take action now. This is not about waiting for a solution or an innovation that will eventually come. It's about taking the best available option on the market today, deploying it and making it better. Whether you are a policymaker, an original equipment manufacturer or a transport service provider, you should take action within your sphere of influence.

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Angela Hultberg, Head of sustainable mobility,  
IKEA Retail (Ingka)

The emerging e-mobility ecosystem creates opportunities which, in turn, generate value. Some players will not stand the test of time and will be replaced by other market participants with more innovative and appropriate solutions. However, those that move fastest and tailor their services to a specific need will reap the biggest commercial rewards in terms of increased sales, growth in market share and enhanced customer satisfaction.

The coming together of all of these ancillary services will enable a seamless transition to a completely new transport state. Reinventing the wheel will, indeed, make a very substantial contribution to Europe's decarbonisation goal.





