Electrifying fleets – challenges, opportunities and considerations

Developing a succeeding transition strategy

September 2023
Foreword

In a world acutely aware of the need for sustainability and environmental responsibility, businesses are under increasing pressure to revolutionise their operations. The urgency to reduce global greenhouse gas emissions, phase out fossil fuels and transition to low-carbon energy systems has never been more critical. While significant strides have been made, both voluntarily and through regulatory mandates spanning industries over the past decade, for the transport sector, one challenge looms large on the horizon: the electrification of fleets.

Fleet electrification is not an entirely novel concept, but it faces a pressing deadline in many markets. The impending ban on sales of petrol and diesel internal combustion engine (ICE) vehicles has thrust this transition into the spotlight. The decision to invest in electrifying a fleet is ultimately driven by the underlying economics, comparing the costs of adopting battery electric vehicles (BEVs) to maintaining a traditional ICE-powered fleet. This includes upfront expenditures, ongoing operational costs and the growing risk of financial penalties for failing to meet decarbonisation goals or fulfil ESG commitments promised to investors and markets.

However, the challenge extends beyond financial considerations. Operational uncertainties and risks must also be carefully weighed. Can the existing infrastructure handle the increased grid load required to power a fleet's chargers? To what extent will schedules and operating models be affected by the unique characteristics of electric vehicles, such as range limitations?

At CRA, we have been closely monitoring the evolving landscape of the mobility and transportation sector. While various technologies, including alternative fuels and fuel cells, may have roles to play, the spotlight increasingly shines on battery electric vehicles as the linchpin of the future of transportation. This points to an increasing convergence between the mobility and transportation sectors on one side and the electricity system on the other.

In this context, we present our latest whitepaper, which delves into the intricate web of challenges, opportunities and considerations with which fleet operators must grapple as they contemplate the right time and pace for transitioning to battery electric vehicles. Simultaneously, we believe this paper holds relevance for utilities, energy service providers, grid operators, policy makers and investors across the ecosystem.

We hope this whitepaper will provide you with a comprehensive understanding and valuable insights into the complex decisions that businesses must make when formulating and executing a strategy to electrify their vehicle fleets. These decisions encompass not only vehicle acquisition but also the necessary infrastructure and business model adjustments required to support the operation of an electrified fleet.

We eagerly anticipate your thoughts and feedback as we collectively navigate this transformative journey toward a greener, more sustainable future.

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Introduction

Road-vehicle fleets constitute a significant portion of our social lives and are the backbones of most economies.¹ As highlighted by the COVID-19 pandemic, we depend on fleets to deliver all types of goods over long and short distances, from medicines to groceries, to new clothes and home fitness equipment. At the same time, fleets provide core services to society, including emergency services such as police and ambulances, and local amenities such as waste collection and maintenance services. Fleets are also central to the provision of mobility solutions both for short distances, through taxis and buses, and for longer distances via inter-city coaches.

Figure 1: Commercial fleets’ share in total vehicle stock and total road transport emissions in Europe

Fleets are an essential component of almost all industries. In fact, 26% of road vehicles within Europe are part of a fleet.² Notably, truck fleets are a key logistics backbone and move 77% of all freight across land in Europe³ while buses account for 56% of all public transport journeys in the region.⁴ This being said, when talking about mobility, and more pertinently the decarbonisation of mobility, the attention typically falls on passenger vehicles, including urban micro-mobility solutions, while fleets are less in focus. However, based on the sheer size of the segment, the rationale and focus on their decarbonisation should warrant more attention from fleet operators through to policymakers. Whilst the decarbonisation options are broad, from electrification to other alternative fuels such as hydrogen and e-fuels, or in the shorter-term biofuels, electrification remains the front runner based on most forecasts and will be the focus of this whitepaper.

¹ Fleet vehicles are owned or leased by an organisation, such as a business or government agency, and are used for commercial reasons or other purposes (not private use). For this paper, fleets have been segmented into passenger cars, light commercial vehicles, buses and heavy-duty commercial vehicles. Examples include vehicles operated by car rental companies, public transport and last-mile delivery firms.
² For the remainder of this paper Europe refers to the EU 27 + United Kingdom.
³ ACEA, “Fact Sheet Trucks”, November 2022
⁴ ACEA, “Fact Sheet Buses”, November 2022
Fleet electrification is key to reducing emissions at the global, national and local levels. Despite consisting of approximately one quarter of the total number of vehicles in Europe, fleets travel and emit disproportionately more than private vehicles, accounting for 50% of total road transport emissions. This also creates a decarbonisation opportunity; electrify 25% of road vehicles and reduce road vehicle emissions by 50%.

Moreover, fleets represent the majority of new sales (~60% of new car and van registrations in Europe), thus their purchasing decisions have a significant knock-on effect with vans and passenger cars typically being sent to the second-hand market after just three to five years. This high rate of purchases can also accelerate the decarbonisation of the sector, which is a primary concern in reducing long-term transport emissions. Fleet electrification is also central to reducing air pollution at the local level; road transport is one of the main sources of air pollution, with high costs for societies that could rise to £5.3B by 2035, as in the case of England.

**Economics**

While environmental concerns should bring fleet electrification to the centre of public debate, other factors contribute to driving this trend, as shown in Figure 2. To begin with, the business case and overall economics for fleet operators and investors to consider fleet electrification is increasingly appealing. Despite higher upfront costs, EV total cost of ownership (TCO) is often lower than that of an internal combustion engine (ICE) vehicle, driven by lower maintenance and fuel costs. The reduction in energy or fuel costs can be as high as 75%, while the reduction in servicing and maintenance costs is typically around 40%. In addition, the upfront cost of EVs is expected to decrease as the production of EVs and batteries scales up, and the residual value of vehicles improves through battery recycling and second-life opportunities. This has already been

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5 Transport & Environment, “Why the EU needs a ZEV Fleets Regulation & how to do it”, April 2021
6 Data based on EU27 and the UK but referred to as geographic Europe throughout this whitepaper
7 EV Energy Taskforce, “Commercial EV Fleet Requirements”, 2021
8 UK Department for Transport, “Decarbonising Transport, A Better Greener Britain”, July 2021
9 UK Government, “Zero emission fleets: local authority toolkit”, 2022
accomplished in the passenger segment with many vehicles now achieving sub-€30K list prices. By 2030, electric fleets are expected to have a 15-25% lower TCO than those with ICE vehicles, and studies today suggest that 60% of fleet operators in Europe could make savings by transitioning to an electric fleet.

Policy

Government policy is also increasingly supportive of fleet electrification. While the European Union has approved a ban on the sale of new ICE passenger cars and light commercial vehicles (LCV) from 2035 (with a proposal for 90% of heavy goods vehicles and buses to be zero-emission by 2040), the UK, Ireland, Netherlands and Sweden have banned the sale of new ICE passenger cars and LCVs from 2030. At the same time, more than 300 cities across Europe have implemented low-emissions zones, forcing fleet operators to switch to EVs or pay emissions penalties. Regulation is often perceived by firms as necessary to incentivise the eMobility shift, as highlighted by the request to the European Commission by 30 companies including Uber, Ikea, Coca-Cola, Tesco and Leaseplan, calling for binding zero-emissions targets for all corporate fleets as early as 2030.

Environmental, Social and Governance (ESG)

Governments also impose different incentives and subsidy schemes to support fleet electrification, such as advantageous tax rates and purchase grants, with almost all European countries offering subsidies for the purchase of EVs. As such, fleet electrification is often seen as an immediate way to decarbonise operations, reduce a firm’s carbon footprint and improve brand image. There is also a trend of firms integrating ESG metrics into their procurement process which would require their suppliers to operate with emission-saving practices in their operations, including electric fleets. Major brands are more aware of their emissions and climate impact, striving to demonstrate their commitment to sustainability to their increasingly climate-aware customers.

Technology

EV technology is rapidly advancing, resulting in more ergonomic, purpose-built EVs with better performance, longer battery range and increased efficiency. When equipped with innovative software solutions, EV fleets would also allow fleet operators more granular control over driving habits, precise data collection and better operation optimisation compared to ICE equivalents. The software that manages and monitors a fleet during its operational life will also inform battery

10 Automotive World, “Why TCO is the final incentive for fleet electrification”, 2021
11 Geotab, “Profitable sustainability: The potential of European fleet electrification”, September 2022
12 UK Department for Transport, “Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030”, November 2020
13 Statista, “Total number of declared low-emission zones (LEZs) in Europe in 2022, with a projection for 2025, by country”, February 2023
14 Electrive, “Greening Corporate Fleets initiative calls on EU to quicken EV transition”, February 2023
15 Hensel-Roth, Latham, Glotzer, Tzanetaki, Stocker, Caputo and Nobili, European Commission, “Competition analysis of the electric vehicle recharging market across the EU27 + the UK”, 2023
16 Aurones, “Amazon to invest over €1 billion to boost electric vehicle fleet and ‘micromobility hubs’ in Europe”, 2022
health characteristics for second-life repurposing or recycling that will determine the residual value of the battery.

While the drivers are clear, several challenges stand in the way of fleet electrification. Different types of fleets have varying operational needs, which must translate into diverse electrification strategies. Fleet electrification will place significant stress on energy systems, and if ecosystem participants do not work together, energy grids could face serious challenges, which could require major investments to expand capacity to avoid overloading the system. Nevertheless, effective cooperation between different stakeholders coupled with the adoption of advanced energy management strategies and technologies have the potential to alleviate grid capacity issues while providing an opportunity to enhance grid flexibility, lower system costs and reduce emissions.

While several fleets across Europe have already electrified, or are presently going through the process, this applies to ‘low-hanging fruit’ situations in which favourable conditions made the process easier than average. However, the electrification of the entire European commercial fleet still faces multiple challenges which will need to be addressed through detailed strategies.

Therefore, this whitepaper aims to provide insights around the fleet electrification transition. Specifically, we discuss:

- current and emerging trends in fleet electrification across Europe, focusing on the historical and required growth of various fleet types to meet the aggressive net-zero targets set by government authorities;
- major barriers to commercial fleet electrification;
- the fleet electrification ecosystem and the main stakeholders involved;
- the grid challenge to fleet electrification, considering both the need for grid investments and additional generation capacity. In particular, a real-life case study of fleet electrification is presented;
- considerations that fleet operators should keep front of mind as they make the decision to start electrification or electrify further.

### Current and emerging trends in fleet electrification

Across Europe, as shown in Figure 3 below, almost 90M of the total 336M vehicles were part of commercial fleet in 2022, with the number forecasted to reach 100M by 2030 (50% passenger cars, 41% light commercial vehicles, 8% buses, 1% heavy-duty vehicles). Once electrified, these are projected to account for 50% of EV energy demand. By 2030, over 10M commercial fleet EVs will be driven in the Europe, translating to a 35% compound annual growth rate (CAGR) in the sector’s electricity demand.17

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17 ACEA, “2022 European EV Charging Infrastructure Masterplan”, 2022
As mentioned previously, fleets are undergoing progressive decarbonisation globally. However, while the decarbonisation of passenger vehicles has made large strides with EV sales at an all-time high, the electrification of other fleet segments is not moving as quickly. In fact, 9% of all new passenger cars sold around the globe are electric while this figure decreases to 1% when examining vans and trucks (driven by high upfront costs, increased operational complexity and a lack of availability of commercial vehicles able to meet operator needs). Despite these challenges, fleet electrification is rising, with 90% of fleet managers believing EVs represent the future of commercial fleets.

In recent years, the commercial fleet EV sector has experienced impressive growth. From 2016 to 2022, commercial EV adoption in Europe grew by a factor of 11 (from ~100K to over 1M, a 50% CAGR). The passenger car and bus segments have been particularly successful in transitioning away from ICE vehicles, with the EV share of new sales reaching 35% for passenger cars and 21% for buses in 2022. LCVs are also starting to accelerate their EV transition, with 12% of new registrations being electric. In contrast, medium and heavy commercial vehicles are lagging, with only 1% of new sales going to EVs (this is largely a result of their electrification business case being less attractive than the rest of the commercial fleet segment).
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Nevertheless, while significant growth has taken place, EV penetration is still in its early stages, with approximately 1.4% of the total European commercial vehicle fleet being electric across all vehicle segments (EV penetration is even lower when focusing on specific fleet segments, with only ~0.8% of LCVs and ~0.1% of trucks being electric at the end of 2022). Moreover, to reach the ambitious net-zero targets set by the EU (i.e., a reduction in CO₂ emissions of 55% for passenger cars and LCVs, and 30% for trucks and buses by 2030), electrification will not only need to continue but will need to accelerate. Specifically, achieving targets would require the electrification of 42.8M passenger cars (for both private and public use, not just fleets), 4.4M electric LCVs and 0.3M trucks and buses to be electric by the end of the decade.

### Barriers to fleet electrification

To achieve the sector-wide electrification of fleets, several barriers need to be addressed, scoping from technical to financial and logistical ones. While certain challenges are expected to be time-contingent, as vehicle availability and costs will improve throughout the years, others are longstanding and will affect fleet electrification independent from its timing, such as operational complexity.

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24 CRA analysis based on ACEA, EAFO and IEA
25 CRA analysis based on ACEA, EAFO and IEA
26 European Commission, “Fit for 55 package”, 2021
27 ACEA, “European EV Charging Infrastructure Masterplan”, 2022
High upfront costs and uncertain residual values. The upfront cost of EVs is often higher than that of ICE vehicles due to several factors including battery costs, lack of economies of scale in commercial markets, requirements to customise vehicles to meet specific service needs and the accompanying charging infrastructure. This can be a major barrier, especially in situations where businesses need to purchase multiple vehicles at once. Some operators are not ready to commit to a certain technology and have expressed concerns about the unknown residual value of used EVs and underdeveloped resale markets.28

Supply chain and vehicle availability. Required material (e.g., lithium, cobalt, nickel) shortages and the limited production capacity of EV components drive up costs and create bottlenecks in the supply chain. Not all requirements of fleet operators are satisfied by the models on offer today (e.g., payload/towing capacity).

Limited accessibility to charging. Operators need access to fast and convenient charging options to maximise the practicality of EVs. In many cases, there are not enough public charging stations at convenient locations, creating operational complexity and slowing down EV adoption in fleets. Furthermore, part of the existing public charging infrastructure was built for smaller passenger cars and is unable to accommodate larger vehicles such as LCVs. Unlike ICE fuel cards which have allowed fleet operators to centralise refuelling expenses seamlessly, today’s equivalent solutions for electric fleets come with difficulties as an operator will need to plan carefully in terms of distances, routes and charging opportunities. In addition, charge point operators (CPOs) typically grow their charging network from a specific location, and then expand to neighbouring regions or cities. This makes it difficult for a fleet operator to control where their fleet charges and means that a single B2B partnership with a CPO for preferential charging rates or rewards is not easily achieved. This is further complicated if a fleet consists of different vehicle types.

28 BatteryCycle, Residual Value Risk of EVs for Car Leasing Companies and Fleet Owners, October 2022
types. For instance, a large truck may only be able to charge at a CPO that focuses on megawatt charging, such as the recently formed joint venture of truck OEMs, Milence.29

**Consumer concerns.** Some fleet operators continue to delay electrification due to the low-perceived reliability and performance of EVs (e.g., range anxiety, battery life, towing/hauling power etc.). Additionally, a lack of familiarity with the technology can generate concerns about operational feasibility.

**Increased operational complexity.** For larger fleets with a range of operating profiles, operations become more intricate and a lack of experience in managing charging remains a major barrier. At depots, this is often more manageable but an effective/tailored software solution for planning charging (combined with the right internal management capabilities) is needed to meet operational efficiency.30 For EVs, further fleet optimisation is required including vehicle range, charging needs, route-charging availability and charging concentration at the most convenient times.

**Grid and network constraints.** Many EVs charging from the grid would result in a significant increase in overall energy demand and a far higher peak load – today’s electricity network is unable to handle this demand, which can lead to brownouts and local or national price spikes.

**Capital risk.** The high upfront costs related to fleet electrification represent a considerable capital risk for fleet operators, especially in times of high interest rates and inflation. While different types of financing solutions exist, allowing operators to partially offset capital risk, upfront investments are still required for EVs, facility upgrades and the installation of charging infrastructure. Similarly, capital will be needed to shift operations to electric (workforce training, software requirements, etc.).

**Temporarily decreased productivity.** Operators are concerned by initial reductions in driver productivity due to longer shifts to cover charging a vehicle before routes are optimised. Similarly, other operational processes would need to be adapted to new charging needs, potentially requiring organisational restructuring.

Addressing these barriers will be key to unlocking the potential of fleet electrification, but it will require a multi-faceted approach that involves effective government policies, innovative funding and financing mechanisms, industry collaboration and major investment in infrastructure and technology.

**Fleet electrification ecosystem**

As operators electrify their fleets, they engage with a diverse set of stakeholders that are active in different segments of the value chain. Regulators play a key role in steering the transition to electric by setting requirements and incentives across different areas (e.g., mandating the suspension of new ICE vehicle sales). Besides policymakers, as depicted in Figure 6 below, there are four key interfaces that fleet operators need to consider, each with its own set of stakeholders: the financing of the transition, the provision of EVs, the rollout of charging infrastructure and the adaptation of operations and existing assets. In many areas, operators can choose either to

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29 Andy Salter, Volvo, Traton and Daimler electric infrastructure joint-venture renamed Milence, December 2022

30 Highly utilised vehicles will need priority and top-up charging at public hubs will support the rest of the fleet. However, there is uncertainty around the pricing at rapid hubs, so companies prefer to rely less on these until there is more pricing clarity and confidence. Vehicles in use 24 hr/day will need very fast charging, ideally done whilst loading and unloading.
partner with other stakeholders or to rely on internal capabilities. That is, for instance, the case when it comes to depot energy management and smart charging; ICE fleets are not required to optimise their energy consumption, leaving operators the choice of whether to develop new internal skills or rely on a third party when transitioning to electric. Similarly, maintenance can be either conducted in-house or outsourced. The decision on whether to outsource often depends on an operator’s strategy and scale, as having internal maintenance capabilities only becomes cost-competitive for larger fleets. As will be discussed here and in further sections, decisions regarding outsourcing are of a strategic nature and must fit within a broader electrification strategy for fleet operators.

Figure 6: Fleet electrification ecosystem from the fleet operator perspective

Financing
High upfront costs remain a key challenge to electrifying fleets. As a result, different financing solutions have emerged in an attempt to capture a market that could be worth $1T (€0.9T) per year by the end of this decade.\(^{31}\) To offset part of the capital risk related to electrification, operators can rely on several types of financing, scoping from debt to equity and hybrid models. This applies both to the purchase of EVs and the infrastructural investment in charging and depot upgrading. Firstly, many public authorities at the national and local levels offer incentives, both in the form of grants and tax discounts. While public support in Europe is more common for the purchase of EVs rather than for installing chargers, subsidies covering fleet charging have been instated in countries including Germany and the Netherlands.\(^{32,33}\) Similarly, public authorities offer zero or low-interest rate loans to operators aiming to electrify their fleets, as in the case of the €40M loan provided by the European Investment Bank (EIB) to Cabify.\(^{34}\) While less common in Europe, US utilities offer financing for fleet electrification, either via loans at preferential rates or through on-bill financing, which allows operators to pay back via their energy bill.

\(^{31}\) Standard and Poor’s, “EV Impact: Electric vehicle surge resonates across global economy”, September 2021

\(^{32}\) European Commission, “Competition Policy State Aid Register”

\(^{33}\) European Commission, “Competition Policy State Aid Register”

\(^{34}\) European Commission, “Future Mobility: €40 million EIB loan for Cabify to finance a zero-emission fleet of electric vehicles in Spain”, December 2022
Private financing opportunities are also available. However, there are fewer options in this space mainly due to the lack of an established market for second-hand EVs, which brings significant uncertainty around their residual value. Consequently, there is limited scope for lenders to use vehicles as collateral, increasing overall risk. While commercial banks are providing lower interest rate loans to large fleet operators with higher credit ratings, access to this type of loan is limited for smaller operators due to the uncertainty relating to residual value and their limited track record in this space. Alternatively, financial companies are offering higher interest rate loans to reflect the increased risk, and some operators have also borrowed from the market via purpose-built bonds to finance their transition to electric.

Equity investors have also supported fleet electrification projects. However, this comes with its own challenges; namely, the minimum investment of many investors is considerably larger than typical amounts needed for these projects based on investor portfolio sizing requirements. At the same time, higher target returns increase the cost of capital they can offer, and evolving technologies hindering the business case for long-term investments coupled with large regulatory variation across Europe limits scale. Nonetheless, equity investors are typically less risk-averse than most lenders, making them an attractive source of financing for fleet operators and especially for commercial fleets with contracted service business models (rather than companies providing services on a merchant basis).

Lastly, innovative financing solutions for fleet electrification have come to the market over the last few years. The overlap between financial players, leasing firms and mobility companies can be seen in the emergence of different ‘as-a-Service’ (aaS) offerings. These solutions vary in coverage, ranging from Charging-as-a-Service covering the financing, installation, operation and maintenance of chargers, as well as the upgrading of depots, as in the case of Fleete,\(^{35}\) to alternatives including the financing of vehicles and the negotiation of specific energy tariffs, as in the case of Zenobe.\(^{36}\)

**Vehicles**

The availability of EV models that can satisfy the operational needs of an operator constitutes the basis of every fleet electrification strategy. While the number of electric passenger cars on the market has been growing steadily, other vehicle segments are now starting to catch up. In 2022, the number of new electric LCVs coming to the market was higher than the corresponding figure for passenger cars. Similarly, around 100 new electric bus models became available in the same year. Trucks are observing a similar growth, with around 100 new models coming to market in 2022, equally split between the medium-duty and heavy-duty segments. Furthermore, while truck electrification has so far been slower than other segments, acceleration is anticipated as more electric models become available. In fact, several truck OEMs such as Scania, Mercedes-Benz Trucks and MAN have committed to transitioning to a fully zero-carbon offering by 2040.\(^{37,38,39}\)

There is considerable overlap between players in the vehicle and financing areas, with leasing firms sitting across the two spaces. Several OEMs, including Volkswagen and Mercedes, offer

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\(^{35}\) Fleete Group, “Supporting Businesses to Achieve a Fully Electric Vehicle Fleet”

\(^{36}\) Zenobe, “It’s our mission to make clean power accessible”

\(^{37}\) Scania, “Electrification roadmap”

\(^{38}\) Daimler Truck, “Mercedes-Benz Trucks continues to drive electrification forward”

\(^{39}\) MAN, “Sustainability at MAN”
financing solutions through subsidiaries. Similarly, leasing firms owned by major banks, such as ALD Automotive and ARVAL, also provide EV financing for private and corporate customers. Through these ventures, fleet operators rent the EVs via a monthly fee. The EV ownership remains in the hand of the leasing firm, which normally resells the vehicles on the second-hand market once their fleet lifetime reaches an end. While EV leasing rates are generally higher than for ICE-equivalent vehicles, these financing solutions allow operators to reduce their capital risk exposure resulting from purchasing the vehicles.

**Charging**

Charging OEMs are central partners for fleet operators, as they provide the equipment needed to charge at depots. The necessary charging infrastructure depends on a fleet's specific requirements, which are determined by its use cases, as will be discussed in further sections. In general, the quicker the required turnaround, the higher the charging capacity necessary. This has important consequences on capital requirements, as charger costs vary between different levels of capacities. Aside from capacity levels, chargers might be equipped with different features such as V2G (vehicle-to-grid) capabilities. However, whilst this technology is developing in the domestic segment, there is limited starting to compete with utilities in the supply of energy for EVs. As an example, Tesla has announced the intention of entering the B2C energy retail segment in the UK offering an integrated private charging solution to its customers. At the same time, some Energy-as-a-Serv players include negotiated power purchase agreements (PPAs) to the service they offer to fleet operators. Overall, operators should engage with energy suppliers, either incumbents or new entrants to the sector, to guarantee convenient electricity tariffs. Given the size of their demand, especially when considering depot charging, operators can also negotiate PPAs directly with generators. On top of ensuring green electricity is being used, PPAs shield fleet operators from price uncertainty, reducing their exposure to increasingly variable power prices. Aside from the supply of electricity, energy and solutions providers can support a fleet's energy management. The transition to EVs entails new complexities for fuel management; on top of optimising fleet operations, charging needs to be optimised to minimise costs and increase potential earnings from the provision of energy and other services to the grid, as is discussed in the next section.

Fleet operators also need to engage with power transmission and distribution system operators (TSOs and DSOs), which is sometimes carried out indirectly via the fleet operator's electricity provider. Depending on fleet size and depot location, fleet depots require sizeable grid connections to satisfy their charging needs. While the grid challenge to fleet electrification will be analysed in depth in the next section, it is important to underline the key role of grid operators in shaping a company's fleet electrification potential. As a matter of fact, DSOs and TSOs are key to providing indications for accessible grid capacity at different locations, informing the choices around the location of an electrified depot.

availability of a true V2G fleet product. Furthermore, a significant price difference remains between unidirectional and bidirectional chargers (with price premiums varying from €1K to €8K for

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40 Hensel-Roth, Stocker, Glotzer, Caputo, Charles River Associates, "Introduction to V2G: A critical technology to enable the energy transition", September 2022

41 Lars Mucklejohn, Bloomberg, "Tesla Plans to Expand Into UK Energy Market", July 2023
bidirectional 22 kW AC chargers\textsuperscript{42}, making planning key for operators before procuring the infrastructure.

Charge Point Operators (CPO) and eMobility Service Providers (eMSP), which are often integrated within the same firm,\textsuperscript{43} are also relevant partners for operators willing to electrify their fleets. Certain operators collaborate with CPOs for the installation and operation of charging points at their premises. Furthermore, depending on the use case, certain fleets rely on public charging. For instance, Europcar has partnered with Shell Recharge for the provision of charging at depots and access to their public charging network.\textsuperscript{44}

In the charging space, there continues to be considerable overlap between players, especially energy suppliers. Several utilities have diversified their offering, providing CPO and eMSP services via subsidiaries. Some utilities also have their own offering of charging hardware, competing with CPOs and charger manufacturers. Increasingly, the opposite trend is observed with new players

**Operations**

In contrast to the operation of ICE fleets, the transition to electric requires coordination between the fleet operator and depot facility owner. In many cases, an operator would typically lease or rent their depots rather than own them. The lessor will likely vary between private landlords, real estate companies and airport operators. Landowners now need to be part of the discussion on the upgrading of depots; in fact, depending on the contractual agreements, the cost for upgrading the depot and installing the charging infrastructure might fall in part or in full on the landowner. As the electrification of fleets becomes more profound, sites with large grid connections will become more valuable and landowners may demand a higher premium if they can readily support full fleet electrification.

Software and technical advisory firms also play a central role in supporting fleet electrification. Given the considerable amount of CapEx involved in electrifying fleets, tools are needed to allow operators to simulate the performance of their electric fleet, defining their charging and vehicle needs based on operational use cases to inform their electrification strategy accordingly. Similarly, as fleet operators will need to coordinate their different needs in terms of day-to-day operations, charging, battery health and potentially flexibility services and V2G, software solutions for optimisation will become increasingly important.

Similar to owning an ICE fleet, the operator will need to carry out routine maintenance on their fleet. Whilst this will remain similar in practice, intervals and types of jobs will vary which will require an outsourcing agreement or internal knowledge to service the vehicles accordingly.

**The grid challenge to electrify fleets**

System benefits for fleet electrification are starting to stack up, with a profound set of established or ever-emerging drivers for fleet operators to transition to EVs. However, whilst there are multiple

\textsuperscript{42} Ofgem, “Case study (UK): Electric vehicle-to-grid (V2G) charging”, July 2021

\textsuperscript{43} European Commission DG Competition, “Competition analysis of the electric vehicle recharging market across the EU27 + the UK”, April 2023

\textsuperscript{44} Europcar, “Charging your Electric Hire Car”
barriers that must be resolved, one complex challenge stands out: the delivery of sufficient power to fleet depots through constrained electricity grids.

For context, the electricity systems in many core markets were designed in a different era (e.g., much of today’s UK grid was built in the 1960s) and 70% of the US grid is more than 25 years old and were not sized for the significant uptick in electricity demand driven by the shift away from fossil fuels through the energy transition. Whilst national electricity systems and their interconnections to neighbouring markets are developing, a gap has emerged between connection capacity and electricity demand. The problem is compounded with other industries also in growth phases, such as data centres and heat electrification. Specific to the electrification of fleets, by 2030 over 10M commercial fleet EVs will be driving in Europe, translating to a 35% CAGR in the sector’s energy demand, placing significant stress on energy systems.

Figure 7 below portrays the effect of this fleet-specific growth, highlighting that approximately €45B would need to be invested by 2030 to ensure commercial EVs are effectively integrated into power systems and to ensure power provision is secure and of a decarbonised source.

**Figure 7: Estimated growth in fleet EVs and the associated energy system implications, based on the EU’s Fit-for-55 transport decarbonisation objectives**

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<thead>
<tr>
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<th>Cars</th>
<th>LCVs</th>
<th>Trucks</th>
<th>Buses</th>
<th>All fleets</th>
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<tbody>
<tr>
<td><strong>Cumulative number of EVs</strong></td>
<td>From 0.4m in 2021 to 4.8m in 2030</td>
<td>From 0.2m in 2021 to 4.4m in 2030</td>
<td>From &lt;0.1m in 2021 to 0.23m in 2030</td>
<td>From &lt;0.1m in 2021 to 0.5m in 2030</td>
<td>From 0.7m in 2021 to 9.5m in 2030</td>
</tr>
<tr>
<td><strong>Grid upgrade investments</strong></td>
<td>€3.4b by 2030 (€0.4b per year)</td>
<td>€6.5b by 2030 (€0.7b per year)</td>
<td>€5b by 2030 (€0.6b per year)</td>
<td>€5b by 2030 (€0.6b per year)</td>
<td>€20b by 2030 (€2.2b per year)</td>
</tr>
<tr>
<td><strong>EV charging energy demand</strong></td>
<td>From 1 TWh in 2021 to 13 TWh in 2030</td>
<td>From &lt;1 TWh in 2021 to 23 TWh in 2030</td>
<td>From &lt;1 TWh in 2021 to 26 TWh in 2030</td>
<td>From &lt;1 TWh in 2021 to 3 TWh in 2030</td>
<td>From 1.5 TWh in 2021 to 65 TWh in 2030</td>
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<tr>
<td><strong>Additional RE capacity needed</strong></td>
<td>€5.5b by 2030 (€0.6b per year)</td>
<td>€8.9b by 2030 (€1.0b per year)</td>
<td>€10b by 2030 (€1.1b per year)</td>
<td>€1b by 2030 (€0.1b per year)</td>
<td>€25.4b by 2030 (€2.8b per year)</td>
</tr>
<tr>
<td><strong>Implied 2021 to 2030 CAGR</strong></td>
<td>+32%</td>
<td>+41%</td>
<td>+42%</td>
<td>+20%</td>
<td>+34%</td>
</tr>
</tbody>
</table>

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45 National Grid, "History of electricity in Britain"
46 The White House, "The Biden-Harris Administration Advances Transmission Buildout to Deliver Affordable, Clean Electricity", November 2022
48 Estimates refer to upgrades strictly related to eMobility, namely grid capacity extensions and additional renewable generation capacity needed to meet demand. Investments in smart meters, digitisation, automation, modernisation or resilience upgrades are not included. The scenario reflects some penetration of V1G based on current EU trends.
49 CRA analysis, based on the 2022 European EV Charging Infrastructure Masterplan.
Whilst the challenge is profound, targeted grid capacity and renewable energy generation investments can unlock the e-Fleets segment for operators. The investments typically take place over a longer period given the planning and regulatory challenges associated with upgrades, but significant commitments have already been made including by the UK ESO, National Grid, who pledged £16B (€18.7B) between 2021 and 2026 towards unlocking the energy transition.\(^{50}\) Across the EU more broadly, the European Commission calls for €584B of investments to the electricity systems within member states.\(^{51}\) However, these upgrades will be in high demand and the EV segment will face competition from the other industries, including the integration of flexibility assets or generation assets that also require significant grid upgrades this decade.

Though investment in the national system could help enable the transition, more localised planning and upgrades are fundamental. The nature of fleets could result in tens, hundreds or even thousands of electric vehicles all being charged at the same time through a single grid connection which may strain the grid or lead to localised brownouts.

If fleet operators are to achieve the targets mandated within packages such as the EU’s Fit for 55 – and to avoid potential disincentives through operating an ICE fleet – operational planning and alignment with both distribution and transmission operators must begin today. For established fleets with existing depots, this alignment is crucial to create awareness among the respective DSO that a large electricity demand hotspot is incoming which could help inform their targeted investments in a proactive way. Without this contact, the investment may go elsewhere to neighbouring energy transition technologies, meaning further delays are observed for fleet operators before grid connection is possible. For newly planned fleets, there is therefore an opportunity to consult with the electricity system operator to identify a site that can provide a connection to readily support an e-Fleet.

Based on this geographic hotspot map of grid capacity, there will be winners that are already in the right location, or are looking to grow and add a location, or have a small fleet in the first place. There will also be losers that face either long connection lead times causing a delayed (and possibly more costly) fleet electrification, or re-siting their operations altogether, which will create an operational challenge in optimising logistics for a new site. Whilst being a winner is an eventuality, targeted early-stage planning can help optimise electrification decisions and costs. These decisions can be informed through simulation and facilitated planning.

\(^{50}\) National Grid, “National Grid sets out case for urgent reform to drive the energy transition”, May 2023

\(^{51}\) European Commission, “Digitalising the energy system - EU action plan”, September 2022
Empowering fleets for tomorrow, a Dynamon electrification simulation case study

The following case study simulates the electrification of an operator with an existing depot and small delivery operation (e.g., furniture delivery) of 11 12-ton trucks which are depot-based overnight and start their deliveries between 04:00 and 06:00 to then return to the depot between 16:00 and 18:00. Based on the simulation of their daily routes that range between 200 and 260 kilometers, the typical vehicle battery usage would be 94 kWh and the typical depot energy consumption would be 1,029 kWh per day. The simulation also factors in the impacts of external conditions, specifically the presence of ambient or harsh weather, as can be seen in Table 1 below:

Table 1: Weather condition impacts to battery usage and depot consumption

<table>
<thead>
<tr>
<th></th>
<th>Vehicle battery usage (per vehicle per day)</th>
<th>Depot energy consumption (per depot per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambient weather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical</td>
<td>94 kWh</td>
<td>1,029 kWh</td>
</tr>
<tr>
<td>Heavy</td>
<td>130 kWh</td>
<td>1,428 kWh</td>
</tr>
<tr>
<td>Maximum</td>
<td>227 kWh</td>
<td>1,773 kWh</td>
</tr>
<tr>
<td><strong>Harsh weather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical</td>
<td>112 kWh</td>
<td>1,235 kWh</td>
</tr>
<tr>
<td>Heavy</td>
<td>156 kWh</td>
<td>1,713 kWh</td>
</tr>
<tr>
<td>Maximum</td>
<td>227 kWh</td>
<td>2,128 kWh</td>
</tr>
</tbody>
</table>

This insight is particularly important when considering fleet planning and working within the limits of a site’s grid capacity, notably when simulating the usage during non-typical periods such as the Christmas season or a summer sales promotion window. For instance, electricity drawdown could experience a surge between 40% and 70%, and sometimes a further 20% for adverse harsh weather conditions.

When the consumption extremities are understood, the charging infrastructure design can be sized accordingly to ensure the delivery logistics can operate conveniently, and that charging can take place within the capacity constraints of the site. This demand-and-supply equation can be iterated and optimised through simulating different charging point configurations at the site, which will have a direct impact on charging

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52 The analytic tool Zero developed by Dynamon, a start-up artificial intelligence simulation company invested in by BP, facilitates this planning process via mathematically heavy computations, but an easy-to-use approach.

53 Ambient represents optimum or favourable weather conditions. Harsh represents extreme or unfavourable weather conditions, which vary depending on the location. e.g., in the UK and EU countries, it is typically the winter months from December to February while in Florida in the US, it is the summer months from July to October.
demand throughout the day as high-capacity chargers draw more power but charge in less time, and the inverse for low-capacity chargers. Figure 8 below shows the Dynamon dashboard within the Zero optimisation tool where this simulation takes place. Based on the simulation, to ensure that all 11 vehicles are powered sufficiently without disruption to the operation, one 22-kW charger and 10 11-kW chargers would be needed.

**Figure 8: Dynamon Zero simulation tool charger optimisation**

However, whilst this example of one 22-kW charger and 10 11-kW chargers satisfies the needs of the delivery operations, it does breach the site capacity limit, or ‘fuse limit’. Whilst the fleet operator can look to upgrade the site capacity via feeder extension or substation build, the operator should also consider infrastructure and operational systems that enable smart charging, i.e., a digital system that reduces peak demand by charging throughout the day, which may require re-slicing the charger configuration. Similarly, on-site battery storage can be deployed, so the ability to charge the battery system takes place when the site has spare capacity and then discharge it when the site is near the limit. The example below illustrates the breach of the fuse limit with the scenario mentioned above and overlays a cost illustration of the expected electricity costs based on available tariffs.
The fleet operator is therefore faced with a series of decisions to optimise for time and cost. The charging solution should be as low as possible in CapEx and have a low-enduring OpEx (electricity cost) that satisfies the needs of the fleet's operations. If that solution exceeds the connection capacity, other charging infrastructure solutions must be considered that may increase the initial CapEx or enduring OpEx. This will, however, unlock the e-Fleet opportunity sooner rather than applying for a grid connection extension.

If the fleet operator were to then re-configure with a revised fuse limit of 580 kW (up from 500 kW) and utilise smart charging within the system, the system could operate without breach. Whilst the increase of the fuse limit may not be the quickest, or the most desirable decision to make based on cost, for some fleet owners this may be the only present option. During the process of increasing the limit through upgrades to their site's grid connection, the fleet operator could pursue more partial electrification in the shorter term. Alternatively, if the operator would consider changes to operational schedules, this upgrade could also be avoided. For example, they could introduce a staggered midday charge for vehicles to charge before completing their rounds to spread the charging throughout the day and reduce the overnight charging-site peak that would breach the fuse limit.

The fleet operator is therefore faced with a series of decisions to optimise for time and cost. The charging solution should be as low as possible in CapEx and have a low-enduring OpEx (electricity cost) that satisfies the needs of the fleet's operations. If that solution exceeds the connection capacity, other charging infrastructure solutions must be considered that may increase the initial CapEx or enduring OpEx. This will, however, unlock the e-Fleet opportunity sooner rather than applying for a grid connection extension.
The optimal solution may also include mechanisms to provide flexibility for the local grid operator, and an additional revenue stream for the fleet operator. Specifically, V1G (one-directional smart charging) can accommodate existing grid constraints and limit peak-price spikes caused by commercial fleet electrification, whereas V2G creates load-shifting benefits as well as an effective mechanism for mitigating dynamic network constraints in real time. Specifically, grid operators can call on EV batteries to supply energy into the grid to meet demand, in effect a dispatchable power plant. In practice, depending on operational use schedules, an EV fleet could take advantage of excess renewables (e.g., solar) during the middle of the day and offset evening grid demand. This would significantly reduce overall grid costs through energy arbitrage (between low midday prices during the day and higher prices in the evening), more efficient operation of generation assets and lower need for additional grid CapEx.

Beyond the flexibility opportunities, a fleet operator (and grid operator) can benefit through enabling smart and bidirectional charging; they could also consider integrating additional assets into the system which could lower enduring OpEx and allow for transmission or local distribution deferral. Specifically, generation assets, such as solar or wind or battery storage assets (both first- or second-life batteries), could be added to the fleet depot. A well-designed system would give the operator control over their enduring cost of electricity by removing the reliance on grid imports and strengthening the ability to store any surplus from the generation assets to be used (or discharged to the grid for a fee) at a later moment.

Fleet electrification considerations

The specific fleet type, or use case (i.e., rental car fleet, or a last-mile delivery fleet) is the main determinant behind an electrification strategy. Other factors, such as vehicle type, do have consequences on the electrification potential, however the use case is core to determining the charging requirements, which is then central in determining capital, operational and partnership requirements.

As shown below in Figure 10, charging locations largely depend on the fleet use case. Rental cars, for instance, are mainly used for unpredictable and often long-distance trips, thus primarily relying on faster on-route charging along highways and only partially on depot charging due to short turnaround times at the rental car depot. On the contrary, urban buses and short-haul transport fleets rely solely on depot charging, thus requiring substantially larger charging infrastructure investment at the depot, which comes with the aforementioned grid issues.
The fleet use case also determines charging opportunity windows. For instance, short- and long-haul logistics have natural idle times related to loading and unloading, making simultaneous depot charging possible. Car-sharing vehicles, on the other hand, have highly variable downtimes and are often parked on public streets, making it necessary to utilise on-street charging during these idle periods. Similarly, rental car fleets will need access to public charging networks, often made possible through partnership agreements between the rental car company and CPO networks.

Many fleets will require a more agile mix of solutions; last-mile delivery services can charge either at the depot or at the driver’s home depending on the business model. Similarly, company cars align to private passenger cars in their charging behaviour, largely relying on a mix of private, workplace and on-street charging.

While the fleet use case is seemingly the central component of every fleet electrification strategy, a series of other key considerations should remain front of mind. These considerations should be assessed based on the business’ current position today, developed as a detailed strategy before electrifying and then managed through implementation to ensure value is captured by the transition, as can be seen in Figure 11.
Electrifying fleets – challenges, opportunities and considerations

Figure 11: Fleet electrification considerations

- Is now the right time to electrify?
- How would electrification impact the business’ fleet cost position?
- Would electrification cause operational challenges for drivers/vehicle users?
- Would electrification create business improvements against competitors?

<table>
<thead>
<tr>
<th>Fleet design</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types and quantities of vehicles (leveraging subsidies)</td>
</tr>
<tr>
<td>• Phased introduction over time based on readiness</td>
</tr>
<tr>
<td>• End of first-life residual value planning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Charging design</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Depot charging infrastructure and grid planning</td>
</tr>
<tr>
<td>• Partnerships with CPOs for public charging</td>
</tr>
<tr>
<td>• Access to additional revenues (i.e., V2G)</td>
</tr>
<tr>
<td>• Service-level agreements for O&amp;M</td>
</tr>
<tr>
<td>• Infrastructure openness to others when not utilized</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organisational design</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Employee training design</td>
</tr>
<tr>
<td>• ESG metric capture</td>
</tr>
</tbody>
</table>

- Small-scale programme to manage the transition, ensuring the business adopts electrification successfully to reap the economic benefits
- KPI tracking to measure the long-term benefits and inform ways to squeeze additional benefits from electrification
- Inform second-life residual value relating to battery state of health

Not fully exhaustive

Timing

Premature electrification could cause operational difficulties and exacerbated costs associated with being an early adopter, and delayed electrification could lead to higher costs related to disincentives associated with driving ICE vehicles or potential brand reputational impacts associated with a perceived lack of focus on ESG factors. Today, smaller vehicles, such as passenger cars and LCVs, have reached TCO parity with ICE alternatives, but larger vehicle segments have seen fewer innovations, leaving costs noticeably higher, with TCO parity expected later this decade.

Model availability is improving each year but remains disparate in nature with gaps across the segments, leaving some operators without a suitable electric alternative. However, the steep decrease in costs driven by technological innovation across the entire value chain, from battery to chargers, suggests the existence of a timing risk for operators that decide to electrify today. Electrification timing also impacts the residual value of an EV, driven by the state of the second-hand market for ICE vehicles, EV vehicles and batteries more generally. Today, the second-hand ICE market is either on par or considerably larger than the market for new cars in most European countries, with sales volumes of used cars at almost five-times greater than that of new car sales in the UK.\(^{55}\) Whereas the second-hand EV market is nascent which limits the opportunity for fleet operators that choose used over new EVs for commercial reasons, or have confidence in residual values achieved when selling vehicles.

Costs and benefits

Fleet electrification strategy must be underpinned by a comprehensive cost-benefit analysis that captures the higher cost of capital as well as their expected depreciation and residual value projections. As mentioned in previous sections, the limited track record of fleet electrification and

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\(^{55}\) Statista, “New and used car sales in the United Kingdom between 2004 and 2021”, December 2022
the concerns around the value of EVs on the second-hand market makes financing the transition to electric fleets more expensive than ICE fleets. On the other hand, a plethora of innovative financing solutions are available, ranging from commercial bank loans to government grants and subsidies, leasing, as-a-service solutions and equity investor backing. Overall costs from transitioning to and operating an EV fleet include those related to the TCO – namely purchase, operations and maintenance, energy, taxes and insurance costs – as well as investments in assets. At the same time, the opportunity cost from time devoted to charging, the costs from partnerships with charging providers and those related to logistical and organisational restructuring must be considered.

Among the benefits, aside from the beneficial TCO position, electric fleets also bring improved cost positions and additional revenue streams. For instance, smart charging or V1G, would minimise charging costs for fleet operators, allowing the charging system to capture lower power prices throughout the day. Then, vehicle-to-everything (V2X or V2G) could provide depot-based flexibility services for other site requirements (i.e., using surplus energy stored in the EV battery to power site machinery), but it could also represent an additional revenue stream both from electricity arbitrage and the provision of flexibility services to the grid.

**Operational disruption**

The transition to electric forces fleets to reorganise their operations and facilities, including restructuring depots, or even changing location, to accommodate charging requirements. At the same time, operational schedules need to change to account for charging needs while being optimised to maximise aspects including a vehicle’s battery health and the revenues from V2G.

Aside from the organisational optimisation of operations, electrification interaction must be optimised as well. This will require workforce training to allow drivers to capture the full value offered by EVs. This is particularly relevant for driving and charging habits, including average speed and the ability to use regenerative braking, which both have an impact on EV’s range and overall battery health. Furthermore, when defining their fleet electrification strategy, operators must account not only for immediate operational needs, but for future ones too. In particular, fleet expansion prospects must be considered when planning the charging infrastructure to ensure appropriate charging capacity is installed to avoid potential future costs associated with retrofit civil works and larger grid connection upgrades.

**Competitive advantage**

Early movers might gain a competitive advantage against peers for multiple reasons. Advantageous TCO may increase margins, and early electrification may strengthen a brand’s public perception and lower the company’s exposure to climate transition risk. Similarly, as electrification advances across sectors, grid constraints become increasingly scarce in the short term, whilst grid operators work through the backlog of requests, therefore making a sizeable grid connection a valuable asset. On the other hand, moving too early might not capture brand benefits in full as customer awareness is expected to increase over time, or an accelerated fleet electrification could leave operators with a solution that is not fit for purpose, with consequently negative sentiment around the electrification agenda.
Conclusions

Faced by the pressure to decarbonise their fleets, operators must be able to transition to electric at the appropriate time to capture the most value while minimising their exposure to risks. Accordingly, the decision to electrify must be based on the thorough assessment of factors such as geographical location, overall economics, availability and reliability of infrastructure, competitive position against peers and access to partners, among others. Therefore, all-encompassing economic analysis is vital to make electrification a success story.

If electrification were found not to be economically sustainable yet, operators would still have a series of options to plan for the future. First, partnerships across the value chain can help sharing risks and reducing costs. Coordination among operators to share EV procurement and/or infrastructure could provide desirable scale economics, driving costs down for all operators. Moreover, by partnering with charging providers, fleet operators could acquire advantageous terms on charging solutions tailored to their needs, covering for instance both depot and public charging. Another way for operators to improve electrification conditions is engaging with policymakers. Regulation could help by creating the needed market stimulus for electrification to occur across segments, while subsidies can support a quicker transition. Lastly, interfacing with other stakeholders can enhance electrification. For instance, engaging preemptively with electricity network companies could allow fleet operators to identify available grid capacity in different areas, solving one of the greatest roadblocks to commercial fleet electrification.

Conversely, if electrification is found to be economically sustainable, operators would need to define a detailed strategy capable of supporting the transition within a predefined timeframe while minimising operational disruptions. While different frameworks exist, electrification strategies must cover all aspects of a fleet’s operations including depot and charging infrastructure, vehicles, routes and a firm’s organisational structure. Given the scale of the transition, implementation represents a challenge which requires accurate management and monitoring via KPIs to ensure the shift happens on track while reducing negative externalities on day-to-day operations. Similarly, where needed, organisational restructuring might occur simultaneously to the reshaping of operations, consequently requiring high levels of coordination as well as the identification and resolution of relevant skill gaps.

While electrification comes with its own risks, including the risk of technological obsolescence from alternative solutions, we see it as an established trend across the road transport sector. The electrification timeline changes considerably between segments and use cases and is impacted by several emerging trends. For example, the pace at which the Megawatt Charging Standard and the related infrastructure will be adopted will have considerable influence over the electrification of long-haul transport. Similarly, policy bans on the sale of ICE vehicles in Europe differ based on vehicle class, impacting respective electrification timelines. Other elements such as model availability and available grid capacity and grid connection time frames all have consequences on the overall timeline of fleet electrification.

Overall, while the current market conditions highlighted in this whitepaper suggest there is a considerable opportunity for specific vehicle classes and use cases to electrify sooner, the electrification timeline should be defined on a case-by-case basis to allow operators to benefit the most from the transition.
Electrifying fleets – challenges, opportunities and considerations

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CRA’s Energy Practice helps a wide range of industry clients devise winning strategies, create opportunities, navigate uncertainty and transform their operating models. We combine evidence-based research, rigorous analysis and proven industry experience to deliver value across all aspects of energy industry issues.

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Dynamon provides fleet management software solutions for fleets, OEMs, charging infrastructure providers, vehicle leasing operators and telematics companies since 2015. Dynamon help all transport companies confidently accelerate transition to electric vehicles, reducing operational costs while increasing fleet efficiency.

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