Electric vehicle trends 2020

Top 6 factors impacting fleet electrification

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Introduction

There has been an increasing movement towards sustainable fleet management over the past five years, especially for many organizations with large fleets. Fleet managers are now commonly required to optimize their fleet operations in order to meet sustainability targets defined by ISO 14001, sustainability, or Corporate Social Responsibility (CSR) programs.

Electrification has been a fundamental element of this transition. Integrating electric or hybrid electric vehicles into the fleet portfolio helps address sustainability and environmental goals. As environmental regulations will only become more binding over the next decade, many fleets recognize that a staged procurement strategy will enable them to effectively future-proof their operations and help ensure business continuity.

The future trends impacting fleet electrification

Deloitte estimates that EVs will represent 10% of the total automotive market share by 2024. The International Energy Agency (IEA) reports rapid growth in electric car deployment, particularly in China. If the pledges related to the Electric Vehicle Initiative's EV30@30 Campaign (to reach 30% market share for EVs by 2030) hold true, then the IEA forecasts that EV stock would reach more than 250 million, reducing oil demand by an estimated 4.3 million barrels per day (mb/d).

This white paper explores six important trends that will impact fleet electrification in 2020 and beyond.

1. The EV price tag will continue to drop as battery costs fall

The cost drop on lithium-ion batteries since 2010 has been substantial, and continues to do so. To illustrate the point, in 2010, the price of an EV battery pack was $1,160/kWh (USD), compare that with the 2018 average price of $176/kWh. BloombergNEF predicts that this price will fall to around $94/kWh by 2024, and then to $62/kWh by 2030. This will help to bring forward the moment when there is upfront price parity between electric and internal combustion engine (ICE) vehicles, which they now predict to be around 2022.

A combination of factors is driving these substantial cost reductions.

Improvements in battery technology

Manufacturers have made substantial advances in the chemistry of their batteries. One such advance is a move away from cathode chemistries that are dependent on cobalt, toward nickel-based systems. At around $33,000 to the metric ton, cobalt is the most expensive element in a lithium-ion battery. In contrast, nickel-based cathodes benefit from a higher energy density, longer life cycle, and a lower cost than cobalt-based cells.

Industrial policies supporting battery development

Many governments have recognized the strategic importance of supporting battery manufacturing for the EV sector, since this technology will be vital on a large-scale to help them transition their domestic energy supplies to renewables. As such, there has been an increase in policy support for the development of EV battery manufacturing capacity, contributing towards lower costs.

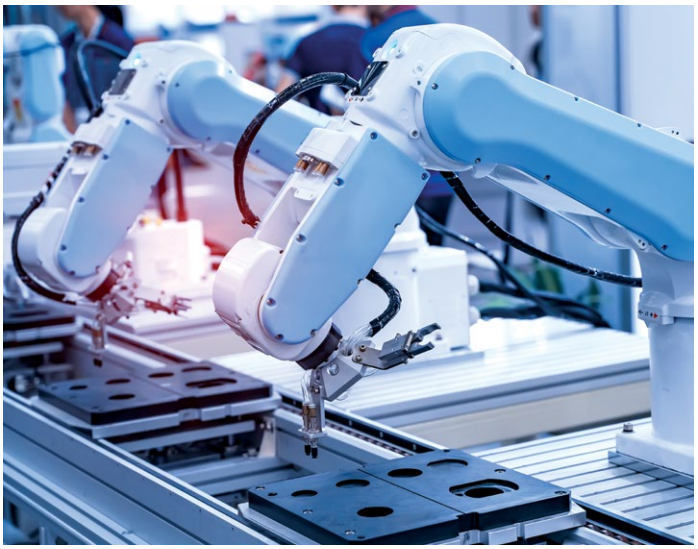
The U.S. Department of Energy's Vehicle Technologies Office (VTO) collaborates with national laboratories and industry to improve batteries and electric drive systems. Their Batteries, Charging and Electric Vehicles Program supports research and development, with the objective to reduce the cost of EV batteries to $80/kWh.

The European Commission's Strategic Action Plan for Batteries seeks to build a robust battery value chain within Europe. The primary objective of this initiative is to attract more investment and to position the EU as a larger player in the battery industry, in competition with the U.S. and China.

Increasing production capacity

The scale of battery manufacturing plants is gradually increasing and transitioning towards mega plants, significantly reducing the cost per unit. While in 2019, most plants ranged in size from 3 to 8 gigawatt-hours per year (GWh/year), several plants exceeding 20 GWh/year are now coming online and experts predict that there will be five more worldwide by 2023.

Data from Benchmark Minerals predicts that by 2028, there will be sufficient output to produce 1.9TWh of lithium-ion battery capacity per year. That equates to enough batteries for between 35 and 37 million pure electric vehicles annually.



2. Electrification will spread into the heavier vehicle segments

As of 2019, the majority of the electric vehicle fleet was comprised of light-duty cars and two-wheelers. In 2018, the global electric car fleet exceeded 5 million, and global stock of electric two-wheelers was 260 million. In comparison, there were only 460,000 electric buses and 250,000 light-commercial vehicles on the roads.

Thanks to advancements in battery chemistry, tightening emissions regulations, and more models coming online, it is expected that electrification will extend into heavier applications.

Commercial electric vans

For organizations running vans in city centers, the case for transitioning to electric from diesel is compelling, with strict air-quality standards making it increasingly unviable for many operators to run their diesel vehicles. Electrification can now be considered a genuine alternative due to the falling upfront costs of electric vans, improved battery capacity and range. The duty cycles of many fleets lend themselves particularly well to electric, with predictable mileage and routes, and opportunities to install charging infrastructure at depots.

In 2019, Amazon placed the single biggest order for electric delivery vans from the Plymouth, Michigan-based EV start-up Rivian, for 100,000 vehicles. The online retailer has made a climate pledge to go carbon-neutral by 2040, and plans to have those Rivian vans in service by 2021 and all 100,000 in operation by 2030.

Traditional van manufacturers have started to recognize the increase in demand and are now launching electric models. Sales are expected to accelerate in the 2020s and BloombergNEF predicts that 56% of light commercial vehicle sales and 31% of medium commercial vehicle sales will be electric by 2040.

Electric buses

In the right applications, such as in urban transit and school districts, bus electrification is proving to be a viable opportunity. According to a study by Persistence Market Research, the global electric bus market is expected to grow at a rate of 28.0%, reaching estimated volume sales of nearly 34,000 units annually by 2020. BloombergNEF estimates that by 2040, electric buses will represent just under 70% of the global bus fleet. China currently accounts for 99% of global market share, but that will gradually fall through the 2020s as the rest of the world catches up.

The three main suppliers of electric buses in the U.S. are New Flyer, Proterra, and BYD. Daimler is funding Proterra to develop electric school buses, while New Flyer and BYD are planning to invest in manufacturing electric buses within the country.

New York City and California have both set goals to transition to 100% zero-emission bus fleets by 2040. Mandates to promote the electrification of public transportation are starting to influence the procurement process, with transit licenses often granted through competitive tenders.

There were only 2,300 urban electric buses on European roads in 2019, with France, the UK, Holland, Germany, Poland and the Nordic countries accounting for more than half of total market share. That number is predicted to grow at a rate of 68%, such that by 2025, these countries will have an electric bus fleet of nearly 17,000.

Medium and heavy-duty trucks

The market for medium and heavy-duty EV commercial vehicles is currently small compared to other vehicle types. In long-haul trucking for example, the lower energy density of batteries can be considered a restrictive feature, although it is not necessarily a limiting factor for urban delivery trucks.

A number of major truck OEMs have come out with ambitious plans to launch electric product lines, and some models are now commercially available. There are also a handful of pure-electric manufacturers that are planning to enter this market, including Tesla and Thor Trucks.

Early adopters of electric trucks have predominantly urban and port duty cycles, since this allows for charging along the routes and puts less of a requirement on battery capacity. Electric trucks may even benefit from preferential access rights in some cities, due to the lower air and noise pollution created by the vehicles compared to diesel. The proliferation of low- or zero-emission zones expected to come into effect in this next decade suggests that electric trucks are likely to make a strong penetration into the marketplace, particularly in cities.

3. Updates to policy and regulation

Many of the countries that are leading the transition to electric are gradually shifting their policies from direct purchase incentives for EVs, towards zero-emissions vehicle (ZEV) mandates and/or regulatory requirements related to fuel economy, and pollutant and GHG emissions.

Zero-emission vehicle deployment

California is the state with the most aggressive deployment targets, with a goal to have 5 million EVs on the road by 2030. Other states have adopted goals for ZEV deployment, and provided rebates for ZEVs and incentives for ZEV infrastructure, such as EV supply equipment (EVSE) infrastructure. Nine states have joined California in requiring automakers to produce ZEVs to improve local air quality and reduce the emissions that contribute towards climate change. Colorado has announced plans to join the California ZEV program from 2023, and three other states are following California's LEV standards, rather than adopting the ZEV program.

Two Canadian provinces also have aggressive targets with British Columbia requiring 100% of all cars sold to be electric by 2040 and Quebec who currently leads ZEV adoption across Canada with similar goals to California.

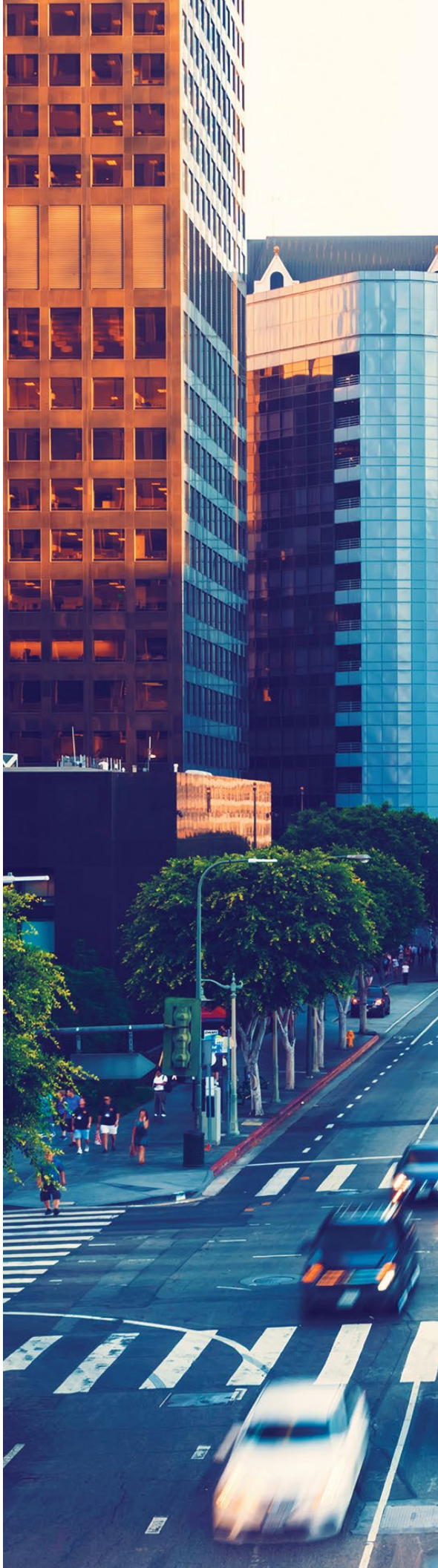
Fuel economy and emissions standards

All major markets have fuel economy and emissions regulations in place. To meet these mandated targets, the EV market will have to grow significantly. For example, for the EU fleet average CO2 emission targets to be met, the EV market share will need to reach 10 per cent by 2025 and 22 per cent in 2030.

Despite progress at state level in the U.S., there have been setbacks at federal level with the government freezing GHG emission standards for light-duty vehicles from 2022 to 2025. Twenty states have challenged this proposal as unlawful and signaled a willingness to adhere to the previously declared update of corporate average fuel economy (CAFE) standards.

City access restrictions

Worldwide, twenty major cities have announced plans to ban gasoline and diesel cars by 2030 or sooner. In Europe, Paris has set targets to ban all gasoline and diesel vehicles from the city center by 2030, and Copenhagen plans a staggered ban on diesel cars, starting in 2022. Central London will implement zero-emission zones by 2025, and already operates an Ultra Low Emission Zone (ULEZ), which charges a daily fee for diesel vehicles manufactured pre-2016 and petrol vehicles manufactured pre-2006. In Asia, Beijing has weighted the balance of its number plate lottery in favor of EVs, with over 60% of number plates allocated to new EVs in 2019.



4. Increase in public charger availability and capacity

As of May 2019, there are now over 20,000 EV charging stations with more than 68,800 connectors across the U.S. Of that total, approximately 16% are DC fast chargers. Many players are active in building out this infrastructure, including utilities, oil and gas companies, and automakers. However, it is generally understood that the scale of infrastructure needs to grow exponentially in order to serve the growing fleet of EVs and to meet policy targets. Most fleets will not rely on public charging though and may be able to obtain all their charging from private infrastructure, such as at their own fleet facilities.

Ultra-fast chargers, wireless charging and battery swapping are all emerging as solutions to improve the public charging experience. These charging innovations will make EVs fully competitive with their ICE counterparts with regard to the fueling experience for drivers, who don't have home or workplace charging. This is a key concern for policymakers and automakers alike in order to substantially incentivize the transition to electric.

The International Council on Clean Transportation (ICCT) calculates that an investment of more than $2.2 billion in charging infrastructure will be required across the U.S., in the 100 most populous metropolitan areas, by 2025, just to meet the demand based on the current expected increase in EV adoption.

The dawn of the mega-charger in heavy duty

Several companies have stated their intentions to develop mega-chargers that could charge at 1 megawatt (MW) or above. With the growth in demand for electric intercity buses, as well as medium- and heavy-duty freight trucks, all of which have limited time windows for charging, interest in this technology is expected to explode.

Tesla is developing this infrastructure to support its semi heavy-duty truck, with estimated recharging capacity as high as 1.6MW. ChargePoint has already presented a four-set interface concept that would provide a combined power of 2 MW, suitable for heavy trucks and electric aircraft.

Investments in public charging infrastructure

China currently has the greatest number of charging points in the world, followed by the U.S., Netherlands, Japan and Germany. At the other end of the spectrum, Australia, Poland and Hungary have the lowest number of charging points per 100 km.

The U.S. is working to further build public charging infrastructure in the country. More than half of U.S. states now have EVSE incentives in place. California is making the greatest investment in infrastructure deployment, with targets to deploy 250,000 charging points by 2025. An estimated 4% of outlets are expected to be DC fast chargers. Various other states are increasing their financial commitments for charging infrastructure, in partnership with electric utilities firms. Combined, the states of New Jersey, California and New York have announced investments of nearly $1.3 billion, which would bring total investments across the entire U.S. to almost $3.5 billion between 2017 and 2027.

In Europe, the Alternative Fuels Infrastructure Directive requires member countries to set deployment targets for public charging infrastructure in 2020 as part of their national policy frameworks. Based on current levels of deployment, the IEA predicts that the target of one public charger per 10 electric cars is likely to be achieved by 2020. The cumulative spend in Northern and Western Europe for public EVSE in the period 2020-2025 is estimated at €12 billion.

5. Collaboration accelerates EV adoption

More and more cities, local governments and utility companies are developing programs for vehicles and infrastructure upgrades, bringing about greater opportunities for collaboration and shared learning. Organizations such as the Electric Power Research Institute (EPRI) and the U.S. Department of Energy (DOE) offer thought leadership, industry expertise, and policy updates to their stakeholders. They also work to identify technology gaps and market needs that can be addressed through effective R&D programs. As large fleets plan their transition to electric, these collaboratives provide a valuable forum to engage with relevant external parties.

For smaller fleets that may not have the internal capacity or EV knowledge in-house, collaboratives offer a chance to learn from peers and take advantage of external expertise in electrification. Collaboratives could also open up the possibility of group purchasing opportunities that can lower the costs of EVs for all involved.

Public and private sectors show their intent

In 2019, the U.S. Climate Mayors launched their Climate Mayors Electric Vehicle Purchasing Collaborative to leverage their collective buying power and accelerate the conversion of public fleets to EVs. They have committed to purchasing more than 2,100 EVs by the end of 2020, with the intention to send a signal to the global auto market and help the U.S. maintain its commitment to the Paris Climate Agreement. The collaborative offers an online procurement portal that provides U.S. cities, counties, state governments and public universities equal access to EVs and charging infrastructure, financing options and best practice guidance.

The Climate Mayors Association partnered with the Electrification Coalition (EC) to promote the adoption of electric for ground transportation. The EC has also launched a data-driven zero-emissions vehicle (ZEV) state scorecard that evaluates individual state policies to inform the public and policymakers of strategies that are effectively increasing EV adoption. This shared learning tool underscores the importance for states and regulators to support existing policies and create new policies to accelerate EV adoption.

The European Association for Electromobility (AVERE) promotes electric and sustainable transport throughout Europe, supporting the work of policymakers to establish effective policy frameworks throughout the EU. Members range from SMEs to vehicle manufacturers and other companies with a commercial interest in electromobility. AVERE provides its members with a forum for exchanging knowledge, experience, and ideas on how to stimulate electromobility throughout Europe.

The Electric Vehicles Initiative (EVI) is another collaborative entity dedicated to accelerating the introduction and adoption of electric vehicles worldwide. There are currently 13 participating countries, including France, Germany, the UK, Sweden, the Netherlands and Canada but excluding the U.S.

6. EVs to dominate shared mobility services

Shared mobility, including services such as car sharing, taxis and ride hailing, currently accounts for an estimated 5% of the total annual distance travelled by passenger vehicles. However, the growth in popularity of these services is expected to rise exponentially in 2020 and beyond. BloombergNEF predicts that by 2040, shared mobility services will account for 19% of the total annual mileage completed by passenger vehicles.

With higher utilization rates than for private ownership, the economics of EV usage for shared mobility are considerably more favorable. Total cost of ownership is lower for shared mobility vehicles due to the lower 'fuel cost' of electricity compared to diesel, and lower maintenance costs related to the comparative simplicity of the electric drivetrain. These factors can combine to make EVs cheaper overall. EVs currently account for 1.8% of the shared mobility fleet, but this is predicted to rise steeply to 80% by 2040.

If EVs proliferate in the shared mobility services to the extent predicted, the potential exposure of millions of users could indirectly help to increase adoption of privately-owned electric vehicles.

Hurdles to market penetration

For EVs to successfully penetrate the car sharing market, there will likely be a requirement for larger batteries and a more extensive network of fast chargers. Alternatively, car sharing companies may look to utilize hubs, where cars are left in designated parking spots with their own charging infrastructure, allowing for slower and cheaper scheduled overnight charging.

For taxis and ride hailing fleets, manufacturers will have to consider providing greater seat capacity and trunk space in order to effectively meet the operational requirements of these services. Charging infrastructure will again be a limiting factor until there are sufficient fast chargers to save drivers from the potential loss of revenue associated with long charging times and searching for available public charging stations.

The upfront cost of EVs will likely have to fall to incentivize individual owners to make the transition. Several operators are initiating programs to encourage their drivers to switch to electric. Uber offers financial assistance to London drivers for switching, while Lyft offers short-term lease options to allow drivers to test out the suitability of an EV in a risk-free manner.

The benefits of going green

The transportation sector accounts for over a quarter of total U.S. greenhouse gas (GHG) emissions. Because of this, many organizations now recognize the important role that they play in minimizing the harmful effects of climate change.

The benefits of greening a fleet extend far beyond environmental savings, which is why the concept has gained so much traction. The triple bottom line of sustainability (People, Planet, Profit) is interlinked, such that a saving that benefits the environment or society should also benefit the organization's financial bottom line, or at least be cost neutral. This ensures that sustainable practices endure and are built into the organization's culture.

Conclusion

The future is bright and exciting for fleet electrification, and there is unlikely to be a sector that remains unexploited as battery technology improves, costs continue to fall, and manufacturers release new models to capitalize on the turning tide of interest in EVs. 2020 is shaping up to be a hugely important year, beckoning in a decade of greener transportation.

To learn more about fleet sustainability and for advice on how to electrify your fleet, go to Geotab.com/ev

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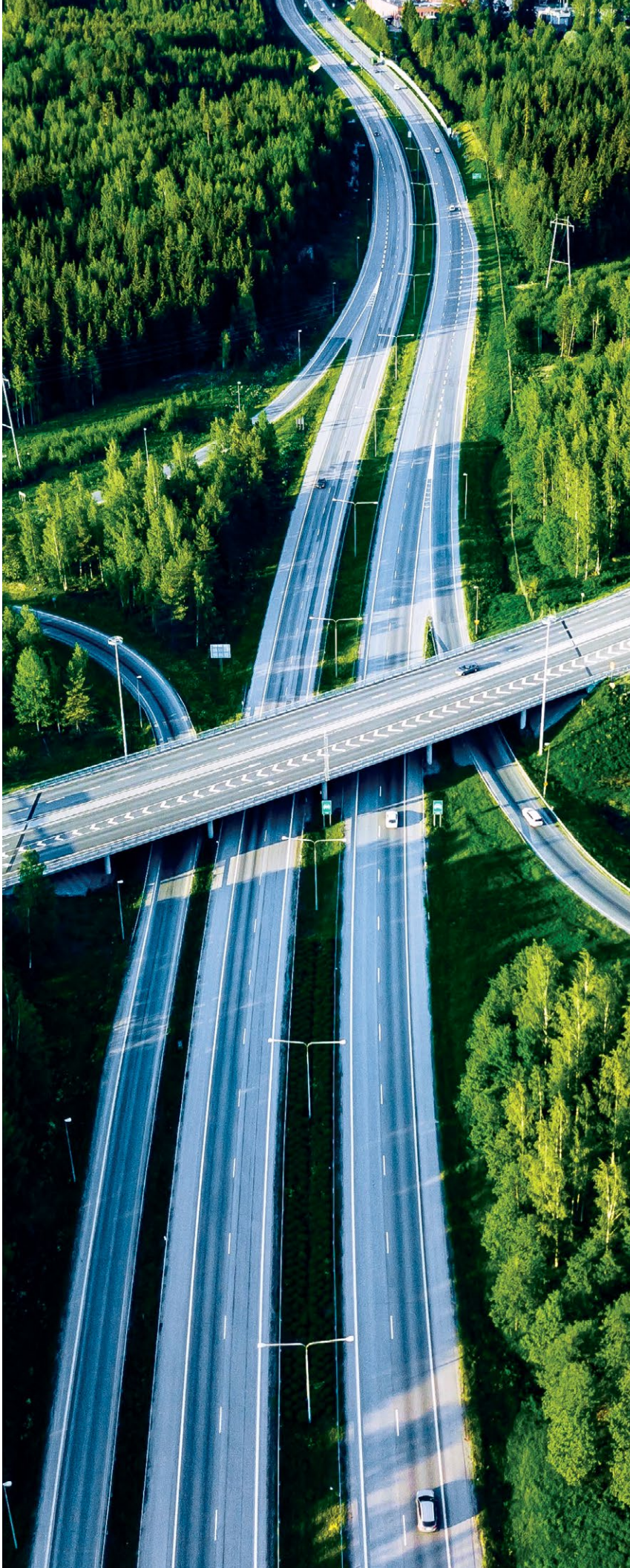

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