ELEMENT-ARVAL GLOBAL ALLIANCE

2024 GLOBAL ELECTRIFICATION REPORT

Accelerating fleet decarbonization

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Executive Summary

Within the global science community, carbon dioxide (CO_2) is universally recognized as a leading contributor to climate change.[i] Forecasts suggest an increasing likelihood that the world will see temperatures rise more than 1.5°C before 2040, resulting in increasing occurrences of extreme weather. Consequently, nations are taking action to reduce their emissions to secure a prosperous and just climate-aligned future.[ii]

The transportation sector stands as a major carbon dioxide equivalent ($eqCO_2$) contributor. In 2021, the sector (inclusive of people and goods movement by road, rail, air, and water-based modes) accounted for an estimated 23% of all energy-related $eqCO_2$ emissions[iii] – 75% of which was from road transport alone.[iv]

Reducing transportation emissions is important to mitigate the impact of climate change. For companies operating vehicle fleets, there are many opportunities to reduce emissions while simultaneously increasing operational efficiency and reducing costs.

To detail these opportunities and provide insights based on real-world experience, RMI and the Element-Arval Global Alliance (EAGA) collaborated to analyze data from EAGA's global fleets. In addition to providing qualitative and quantitative assessments of various decarbonization tactics, this report also provides recommendations to aid fleet operators and managers in deploying these new tactics, including zero-emission vehicles.[*] The global geographies on which this report focuses are Australia, Canada, Europe, Mexico, New Zealand, and the United States.

* Zero-emission vehicles are vehicles that can operate without producing tailpipe emissions, such as battery-electric and hydrogen fuel cell vehicles.

Insights

- There is a range of options to increase efficiency and reduce emissions for fleets, including reducing idling, rightsizing vehicles, optimizing fleet size, vehicle and infrastructure sharing, and operating zero-emission vehicles. Selecting tactics should be informed by company goals and feasibility.

- Analyzing telematics data, such as location and route information, speed, fuel consumption, vehicle diagnostics, and vehicle utilization, is a powerful tool for fleet managers to develop approaches to improve safety, compliance, and productivity. An example is smart charging that powers when time-of-use electricity rates are lowest.

- Electric vehicles (EVs) are increasingly competitive with comparable Internal Combustion Engine (ICE) vehicles, both with respect to performance and economics. Analysis of EAGA's global fleet shows electric light-duty vehicles already boast better total cost of ownership (TCO) compared to ICE in Europe, with other regional markets not far behind. Although TCO parity depends on a fleet's use case and duty, EVs tend to yield better results in high-mileage fleets.

- The EV market is growing rapidly as sales have risen more than 600% from 2018 to 2023.[v] Presently, most major automakers have or will soon have one EV model per vehicle class.[vi]

EV sales have risen more than

600%

from 2018 to 2023. Most major automakers will soon have one EV model per vehicle class.

Source: https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-cars

- In addition to having no tailpipe emissions, studies show that EVs have lower lifecycle, or "cradle-to-grave" emissions. The International Council on Clean Transportation (ICCT) estimates that battery electric vehicles (BEV) registered in the U.S. and Europe will have 57–68% and 63–69%, respectively lower lifecycle emissions in real-world driving conditions.[vii]

- To streamline the deployment of various decarbonization tactics, companies will need a robust change management plan. The plan should articulate the company's vision, how to engage with each affected stakeholder, a detailed roadmap describing "how-to" transition, updated policies, a monitoring and evaluation process, and impact assessment.

- Many companies are opting to start with a smaller-scale EV deployment to evaluate new operating approaches and vehicles in real-world conditions. Insights from these early programs are valuable to inform a larger-scale rollout and build buy-in throughout the implementation process.

Introduction

When the Kyoto Protocol was adopted in December 1997, 160 nation-states came together as one to formally recognize the need to act on the connection between carbon emissions and the harmful effects of climate change. More than a quarter century later, we find ourselves at a new stage of the journey. Governments worldwide have set ambitious carbon reduction and "net-zero" targets for the not-too-distant future. At the same time, public opinion on the need to act on climate change has intensified.

For the world's business and fleet leaders, today's challenge of decarbonization is especially pressing. The global commercial light-duty vehicle (LDV) segment comprises of 180 million LDVs including sedans, sport utility vehicles (SUV), vans, and pickup trucks.[1] Commercial LDVs have an outsized impact on $eqCO_2$ emissions, accounting for nearly half of the global transportation emissions.[viii] This equates to roughly the same as aviation, shipping, and heavy-duty freight combined.

The sizeable carbon footprint of commercial fleets, combined with the emerging global regulatory requirements to meet carbon reduction targets, presents a tipping point that will materialize in scale over a gradual period as fleets manage the complexity of the transition. Meaningful action toward fleet decarbonization has quickly transitioned from an aspirational goal to an immediate imperative to get started. Consequently, organizations that provide employee vehicles are continually seeking opportunities to mitigate their environmental impact by reducing $eqCO_2$ emissions, local air pollutants, and waste from vehicle manufacturing and operations.

Photograph in hexagon:
Kyoto Protocol, December 1997
Credit: UN Photo / Frank Leather

https://media.un.org/photo/en/asset/oun7/oun7671016

1 Some EAGA geographies differentiate LDVs in their fleets as either passenger or commercial vehicles (LCVs) interchangeably. While in Europe, Australia, and New Zealand, for example, sedans and SUVs are referred to as passenger cars; LCVs exclusively refer to vans, pick-ups, and other utility vehicles. This report uses the term commercial LDVs to bundle all cited vehicle types into one segment referred to as commercial LDVs.

For fleets, there are varied approaches to meeting the goal of reducing both costs and emissions. These include reducing idling; optimizing fleet and vehicle size; sharing vehicles, facilities, and other infrastructure; and shifting to low-emission or zero-emission vehicles.

RMI and the Element-Arval Global Alliance (EAGA)

This report details the benefits, effective practices, and solution pathways for company leadership and commercial fleet managers to adopt more efficient, lower emissions operations and vehicles.

To provide a comprehensive picture of these options and guide fleet operators seeking to implement them, RMI and the EAGA collaborated to collect insights and data from EAGA's global fleet management experience. This report details the benefits, effective practices, and solution pathways for company leadership and commercial fleet managers to adopt more efficient, lower emissions operations and vehicles. The global regions in focus are Australia, Canada, Europe, Mexico, New Zealand, and the United States.

This report includes aggregated performance data from EAGA's global fleet to quantify the TCO, $eqCO_2$ emissions, and other impacts of transitioning from ICE to electric LDVs. Experiential insights are also drawn from surveys and interviews with EAGA company experts and stakeholders from over thirty EAGA clients. Responsible for nearly 50,000 vehicles collectively, these clients represent Fortune 500 companies across a range of fleets (e.g., Utilities, Sales, Deliveries) in the focus geographies.

Beyond exploring the latest research and information, this report also provides a practical, streamlined guide to assist fleet operators in their journey to decarbonization. These recommendations take into account that organizations will be in different stages of their decarbonization journey. Some fleets are ready to transition now, while for others, transitioning may not yet be economically viable. Regardless of where an organization may currently be, the time is now to plan for a more sustainable future.

The 2024 Global Electrification Report: Accelerating Fleet Decarbonization was created to help do just that.

Approaches to Decarbonizing Vehicle Fleets

There is no one-size-fits-all approach for fleets looking to improve their operational efficiency and reduce emissions. Exhibit 1 below illustrates the range of options.

> "Clients depend on our industry expertise, robust data, and hands-on experience to keep them ahead of the curve with their decarbonization strategies.
>
> **MANUEL TAMAYO**
> PRESIDENT, ELEMENT MEXICO

Exhibit 1: Efficiency and emissions reduction approaches

Idle reduction	Vehicle size optimization	Fleet size optimization	Shared vehicles and facilities	Zero-emission vehicle deployment
Deploy anti-idling technologies and strategies to reduce fuel consumption.	Use fit-for-purpose vehicles — i.e., vehicles that are the right size and have the appropriate performance characteristics for the intended use.	Remove under-utilized vehicles from the fleet after evaluating usage and operating patterns.	Use common vehicles and/or infrastructure across drivers and/or companies.	Deploy low- or zero-emission vehicles such as battery electric vehicles.

Sources: EAGA and RMI

Reduce idling

Enabling factors: Change management, driver education/behavior

In the U.S., the idling of private and commercial fleet vehicles consumes approximately six billion gallons (22 billion liters) of fuel annually.[ix] While in Europe, if drivers cut out 3 minutes of idling each day, the result would be 1.4 million tonnes of $eqCO_2$ emissions saved annually - the equivalent of 320,000 cars off the road.[x] To reduce idling and other poor driver behaviors (e.g., speeding and cornering that wear heavily on tires, resulting in harmful air pollutants), fleet operators can deploy vehicles with embedded automatic start/stop capabilities and other technologies, as well as leverage telematics and other data sources to influence changes in driver behavior.[2]

Start-stop technology could improve a vehicle's fuel efficiency by

5–10%.

(A study of the E.U.)

EAGA fleets have discovered that visualizing this data helps drivers understand the impact of their choices which, in turn, drives greater buy-in. Simple fixes like placing "anti-idling" stickers on dashboards have made a noticeable difference in overall idling behavior, even in cold and warm climates where drivers keep engines running for temperature control. Although emissions reduction potential varies by fleet, EAGA has found that most of their fleets could reduce idling by 15-30% without impacting operations.

Reduce idling

Reduces fuel consumption, maintenance, and emissions

For one fleet that needed solutions to offset rising fuel costs, a comprehensive plan was enacted that included idle reduction targets. As a result, they reduced idling time by 16%, leading to a savings of USD$50,000 over a year. A prior E.U. study found that start-stop technology could improve a vehicle's fuel efficiency by 5-10%.[xi]

Key takeaway

Reducing idling offers a high-impact, readily attainable opportunity for fleet leaders looking to act now. It not only reduces fuel consumption, but can also reduce maintenance and emissions.[xii]

2 Other technology approaches include Idling Reduction Technologies (IRTs) and auxiliary power units (APUs) to supply cooling, heating, and electrical power while the engine is off.

Optimize vehicle size

Enabling factors: Change management

Trends in government policies and consumer preferences have historically encouraged automakers to increase the weight and size of vehicles, especially passenger vehicles.[xiii] In the U.S., although fuel efficiency is improving, horsepower, weight, and footprints are all increasing. This growing prevalence of larger vehicles is offsetting efficiency gains from improving technology.[xiv] Until recently, the U.S. Corporate Average Fuel Economy (CAFE) standards, which establish the average fuel economy threshold for a manufacturer's vehicles, were based on a vehicle's footprint. Footprint or weight-based systems can incentivize automakers to increase the overall mass of a vehicle model, so it falls into a less strict compliance category.[xv]

The average U.S. sedan offers

15–30%

better fuel efficiency than the average SUV.

Many of EAGA's European, Australian, and New Zealand fleets have followed wider consumer trends in selecting an SUV over a sedan for passenger client needs. Since 2005, Australia's SUVs and pickup truck sales have more than doubled, reaching 66% of the market in 2019 – similar to those in the U.S. and Canada.[xvi] Over that same period, the E.U. SUV market grew from 7% to nearly 40% with city cars and compact car sales declining sharply as a result.[xvii] The average weight of LDVs in the E.U. also increased by 20% over that same period, just below the global average.

Additionally, heavy tariffs on generally smaller models from European and Asian manufacturers have served to prevent them from entering the U.S. market. This has had ripple effects, in many ways narrowing global options for smaller commercial LDVs. Smaller LDV markets like Australia and New Zealand, for example, have very limited station wagon or estate car models in right-hand drive (RHD).[xviii]

Consequently, organizations will often select SUV and pickup truck models for passenger and goods delivery use cases, where a sedan could serve just as effectively.[xix] Switching from an SUV to a sedan significantly impacts

emissions reduction as the average U.S. sedan boasts a 15-30% better fuel efficiency than the average SUV.[xx] Besides being easier to afford, maintain, and park, shifting to smaller vehicles can further support electrification as most geographies have electric options in the sedan and SUV segments, whereas options for vans and trucks are more limited, especially outside of Europe and China.[xxi]

Optimize vehicle size

Optimize cost and reduce emissions

Exhibit 2: Comparison of electric and ICE SUV cargo capacities

Fuel type	Vehicle make and model	Year	Cargo room behind rear seats (cubic feet)	Total space with rear seats folded (cubic feet)[3]	Average weight (pounds)
Electric	Ford Mach E	2023	30	60	4,600
	Tesla Model Y	2024	30.2	76	5,400
ICE	Ford Escape	2025	38	65	3,800
	Honda CR-V	2025	39	76	3,600

Sources: Data from Car and Driver[xxii]

Key takeaway

Choosing a vehicle that has the appropriate performance characteristics and size (i.e., no more than is needed) for the intended use case should optimize cost savings and reduce emissions, especially when decreasing vehicle size for the same use case.

3 Total space is the estimated space with front trunk and rear seats folded down. Electric SUVs often have space in the front trunk of the vehicle which comparable ICE vehicles do not.

Optimize fleet size

Enabling factors: Change management

As organizations grow their fleets over time, some vehicles in the fleet may become underutilized. This can occur for various reasons, such as changes to the original use case or route characteristics.

While the idea of fleet optimization may at first appear operationally challenging, several EAGA clients suggested it was one of their biggest opportunities to reduce their fleet's carbon footprint. Amongst the experiential findings were:

- One interviewee advised their company leadership to cancel planned ICE vehicle orders to support their 2035 net-zero target. They opted for gradual retirement of that fleet and to provide support for employees to commute through other modes.
- Another organization not only eliminated emissions from offloaded vehicles, but also used the savings to fund a 100% electric fleet ahead of their original timeframe.

Fleet optimization

Can reduce costs and carbon footprint

Key takeaway

Removing an underutilized or unnecessary vehicle from a fleet can effectively reduce costs without impacting operations, while trimming a fleet's carbon footprint.

Share vehicles and facilities

Enabling factors:

Change management, driver education/behavior, innovative financing

Another option to reduce emissions and costs is to share vehicles and infrastructure (e.g., maintenance facilities, parking areas/depots) with other organizations.

Several EAGA clients noted that although this is a more challenging approach to implement, it is likely crucial to meet their company's net-zero targets while minimizing costs.

A study of two public sector hospitals' static (fixed-schedule) and dynamic (client-specific) trips suggested that sharing their fleets would reduce their overall costs by 16%, vehicle miles traveled by 13%, and $eqCO_2$ emissions by 12%.[xxiii]

Another use case is to share vehicles between several employees within the same company. Implementing a sharing strategy at the same time as electrifying a fleet can be particularly challenging due to charging needs, but it can also help divide the infrastructure investment. Currently, several Mexico-based EAGA clients share warehouse facilities. In doing so, they can also share the cost of installing and maintaining new chargers and ancillary equipment, making transitioning more feasible.

Share vehicle and facilities

Supports higher utilization and lower lifecycle emissions

Key takeaway

Sharing vehicles and infrastructure results in higher utilizations and lower lifecycle emissions for the fleet. This is a result of fewer vehicles operating to cover the same distance which, in turn, means less $eqCO_2$ from vehicle production and recycling.

Deploy zero-emission vehicles

Enabling factors:

Change management, driver education/behavior, innovative financing

By far, the most utilized decarbonization lever involves organizations replacing their ICE vehicles with low- or zero-emission options, such as EVs. How quickly and to what degree an organization can electrify their fleet depends on various policy, technology, and market factors. Equally varied are the resources available to facilitate the transition to EVs. Each fleet's EV deployment strategy will be unique. Accordingly, this report presents common considerations and recommendations to support fleets in the various stages of EV transitioning.

The recent introduction of various new EV models and EV original equipment manufacturers (OEMs) have also helped lower the total cost of EVs. McKinsey & Company estimates on a cost-per-mile basis, commercial EVs will be 5-10% cheaper than ICE vehicles in 2025 for light-, medium-, and heavy-duty use cases.[xxiv]

Deploy EVs

Expected to be 5% to 10% cheaper than deploying a new ICE vehicle by 2025 in particular use cases

Key takeaway

As EVs gain traction globally, they offer a competitive option to replace comparable ICE vehicles. In doing so, organizations will experience both economic and environmental benefits.

Optimize operations

Monitor vehicle and driver style by collecting data such as:

- Location
- Route information
- Speed
- Fuel consumption
- Vehicle diagnostics

Leveraging telematics data to optimize operations

Telematics monitors and maps vehicles, equipment, and other assets using Global Positioning System (GPS) technology and on-board diagnostics (OBD) systems. Telematics can help assess vehicle and driver performance by collecting data such as location and route information, speed, fuel consumption, vehicle diagnostics, charging connectivity status, and vehicle utilization, amongst others.

Although the types and scale of the impact from applying telematics will differ depending on a fleet's ability to apply predictive analysis and other conditions, harnessing historic data almost always yields benefits. From poor driving behavior and percentage chance of a collision along a route to where and when to fuel based on current energy prices, vehicle telemetry helps fleet managers make informed decisions to improve safety, compliance, and productivity.

> "Moving to electric vehicles is essential to decarbonize road transportation, but it is not enough. Changing our whole mobility behavior is required to have an effective impact and reach ambitious decarbonization targets.
>
> **KAREN BRUNOT**
> CHIEF SUSTAINABILITY OFFICER, ARVAL BNP PARIBAS GROUP

Exhibit 3: Types of telematics data and benefits to fleets

Category	Benefit
Productivity	▪ Improve routing and/or dispatching by tracking assets' locations, vehicle requests, and job performance. ▪ Monitor vehicle stops at garage locations or at customer locations. ▪ Inform drivers where they can improve and fleet managers where to give feedback or training.
Safety	▪ Observe driver behavior: » Flag speeding and harsh braking in real-time. » Monitor trends around speeding, braking, idling, and seatbelt use, provided as a regular scorecard.
Maintenance	▪ Monitor vehicle maintenance schedules. ▪ Access electronic inspection checklists to immediately report defects to the fleet manager or submit signoff. ▪ Track vehicle diagnostics such as oil life and tire pressure or use vehicle fault codes to make sure your vehicles are being used efficiently. ▪ Monitor vehicle downtime while a vehicle is down at a shop.
Decarbonization	▪ Capture fuel consumption data to improve fuel economy. ▪ Track behaviors to help prevent idling, over-acceleration, and harsh braking. ▪ Optimize vehicle routes (e.g., help merge trips or re-route according to live traffic updates).
Compliance	▪ Keep hours-of-service records to comply with relevant regulations. ▪ Be alerted when safety, efficiency, or other features fall below regulated thresholds (e.g., tire pressure) and avoid penalties.

Sources: EAGA and RMI

Zeroing in on Electrification

The EV advantage

Reduced emissions

Transitioning from ICE to EVs is one of the leading emissions reduction levers EAGA clients are pursuing. BEVs have zero-emissions, and studies indicate lower lifecycle emissions than comparable ICE vehicles.

ICCT estimated that battery electric vehicles (BEV) registered in the U.S. and Europe will have

57–68%

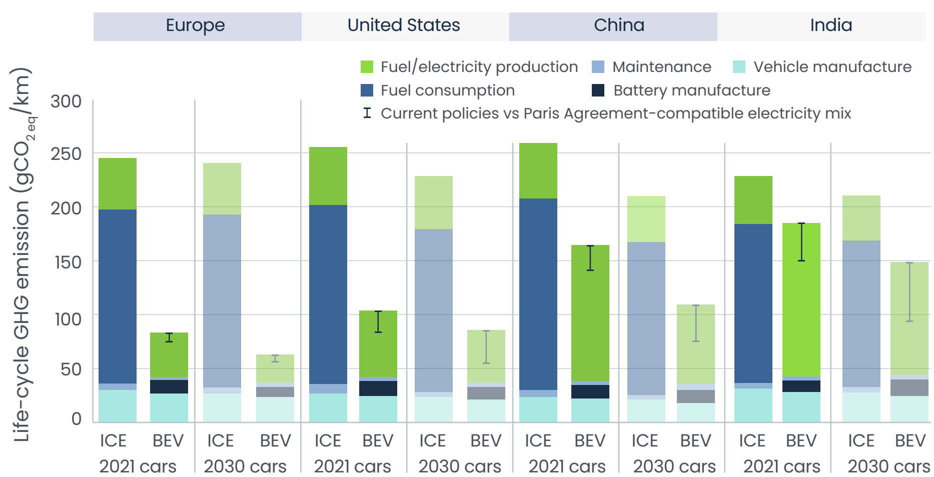
and

63–69%

lower lifecycle emissions than comparable ICE vehicles.

ICCT estimated that BEVs registered in the U.S. and Europe will have 57-68% and 63-69% lower lifecycle emissions, respectively, than comparable ICE vehicles. This study considers real-world driving conditions and geography-specific inputs to estimate the lifecycle emissions. To calculate the lifecycle carbon footprint of EVs, ICCT factors greenhouse gas (GHG) emissions produced from mining raw materials and producing the battery, manufacturing the vehicle, generating and transmitting the electricity that fuels them, and vehicle disposal.

Exhibit 4: Lifecycle emissions of average medium-size ICE vehicles and EVs registered in Europe, the U.S., China, and India in 2021 and projected to be registered in 2030.[4]



Source: International Council on Clean Transportation[xxv]

4 The error bars indicate the difference between the development of the electricity mix according to stated policies (i.e., the higher values) and what is required to align with the Paris Agreement.

Lower operating costs

Central to the economic case for EVs is that they rely on a typically cheaper and less volatile priced fuel – electricity.[xxvi] EVs also tend to be more efficient at converting energy to motion, and therefore, have lower fueling costs than ICE vehicles when used in the right applications.[xxvii]

Sales-oriented EV sedans typically require

40%

less maintenance spend compared to ICE counterparts.

EVs' batteries, motors, and associated electronics also require less regular maintenance than ICE vehicles.[xxviii] Having fewer moving parts and fluids likewise results in fewer recurring maintenance requirements. However, EVs' less frequent maintenance early in ownership tapers near their end-of-life.[xxix] Research from EAGA's European fleet found that sales-oriented sedans typically require 40% less maintenance spend compared to ICE counterparts.[5]

Catalysts for fleet electrification

> "With the right data-driven approach to plan for decarbonization, there exists a robust business case that supports both financial and carbon reduction objectives.
>
> **AVNINDER BUTTAR**
> SENIOR VICE PRESIDENT, HEAD OF ELECTRIFICATION, ELEMENT

The EV market is growing globally as both individuals and organizations adopt EVs. Factors such as corporate sustainability commitments, improvements in technology, vehicle supply, tax incentives, and regulatory initiatives are combining to create a favorable climate to facilitate the EV transition.

5 This is based on maintenance cost data from service-oriented sedans operating in Europe. The number of electric larger LDVs (e.g., vans and electric pick-up trucks) operating in EAGA's European fleet was deemed too small to analyze.

Corporate sustainability objectives

The growing recognition that sustainable operations are essential to an organization's long-term success is driving the shift to EVs.

Globally, as of 2023, more than two-thirds of the annual revenue earned by 2,000 of the world's largest organizations was covered by a net-zero target.[xxx] To support these goals, organizations are deploying EVs, workplace and depot EV charging stations, and even integrating onsite renewables with chargers.

Globally, as of 2023, more than two-thirds of the annual revenue earned by

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The 2024 Arval Mobility Observatory Fleet and Mobility Barometer, which surveyed over 8,600 corporate decision-makers from 30 countries, found 70% of companies have already introduced at least one alternative energy technology into their fleet or expect to before 2027.[6]

Improvements in technology

Whether it's the internet, cell phones or automobiles, the development history of any societal-shaping technology shows a correlation between advancements in technology with pricing and adoption rates. The case with EVs is no different. Costs, range, reliability, and other EV performance factors continue to improve, facilitating a smoother transition from an ICE vehicle to an EV.

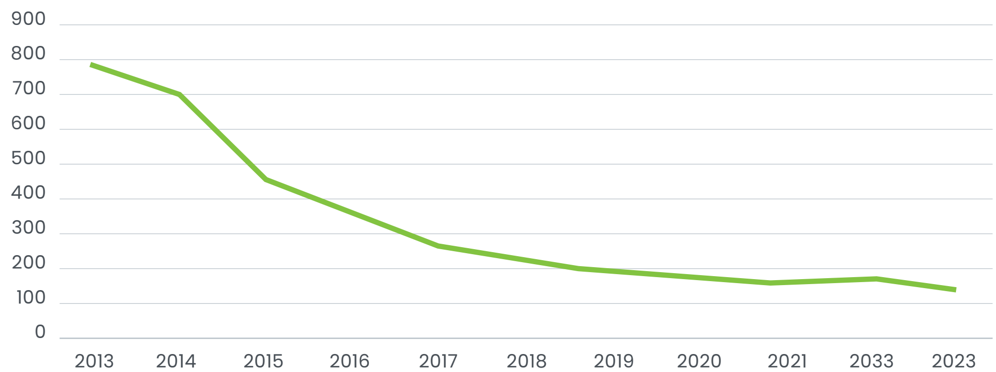
With improvements in technology and a growing market, most light-duty EVs have already or, per estimates, will reach cost parity with ICE vehicles in the next five years in particular use cases.[xxxi] This has led to more OEMs starting or expanding their EV production, creating greater competition and better

6 The alternative fuel technologies covered in the Barometer include hybrids, plug-in hybrids, and battery hydrogen fuel cell vehicles, not battery electric alone. BEVs are the focus of this report's analysis.

economies of scale, further driving down costs. This includes recent shifts toward hybrid electric vehicle (HEV) production as market demand drives interest in that as a bridge technology.

Batteries, a critical component in EV production, have especially advanced in recent years. Battery density has doubled since 2013, with costs falling 80%.[xxxii]

Exhibit 5: Falling battery pack prices over time



Source: BloombergNEF (BNEF), 2023[xxxiii]

Increasing battery density means more options for longer-range EVs capable of supporting a wider range of use cases, while striving to minimize vehicle weight. The average EV model available today has twice the range of its 2010 counterpart and this upward trend is expected to continue.[xxxiv]

Market growth and availability of applicable EVs

EV sales have risen more than 600% since 2018, reaching almost 14 million worldwide in 2023.[xxxv] This brings the global electric fleet to 40 million at the start of 2024.

Most major automakers already have or intend to have at least one EV model per vehicle class.[xxxvi] Not including plug-in hybrid EVs (PHEVs), the U.S. and Canadian markets today have more than 130 light-duty EV models

U.S. and Canadian markets today have more than

130

light-duty EV models, and

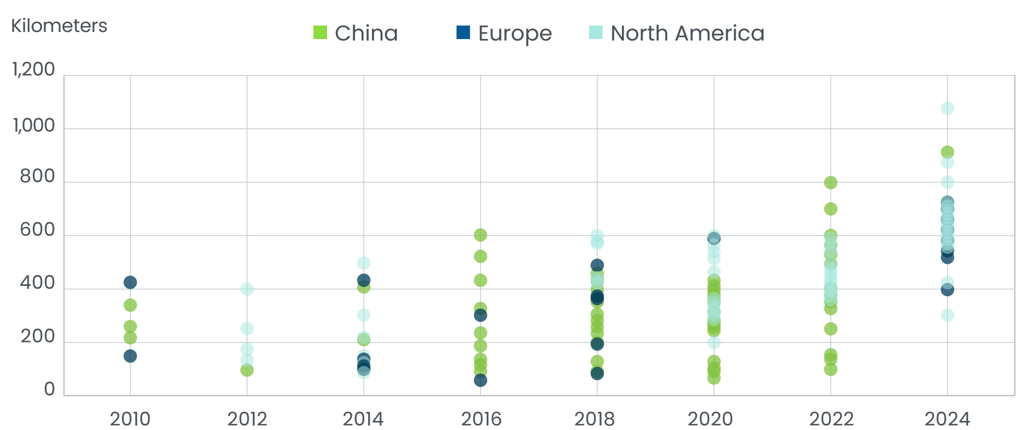
50

medium- and heavy-duty trucks.

available for purchase and nearly 50 medium- and heavy-duty trucks.[xxxvii] With fewer tariffs on Chinese imports, Australia and New Zealand have more than 150 electric LDV models available.[xxxviii] Although each country's market offers unique options, collectively, the E.U. and UK boast over 200 electric LCV models for sale.[xxxix] Mexico has proved a huge emerging market as well, both flooded with model options as well producing close to 250,000 EV units in 2023.[xl] The ten largest car manufacturers in the world all have EV production and sales targets. Some have even committed to phasing out light-duty ICE options by 2040.[xli]

Growing competition is generally driving a decline in EV purchase prices.[xlii] Between 2022 and 2024, several EV manufacturers cut prices by more than expected given the declining battery prices, suggesting the importance of competition.[xliii]

Exhibit 6: EV model range by market and year technology is available



Source: BNEF, 2024[xliv]

Emerging vehicle regulations and political landscape

Another global trend heavily shaping the transition to EVs is the rise of government policies and compliance regulations. These include supply and demand-side fiscal and non-fiscal incentives, support for R&D, and preferential operating conditions like low- and zero-emission zones.

Dozens of countries are introducing zero-emission vehicle (ZEV) mandates (Exhibit 7). Organizations are taking advantage of applicable policies to see reduced costs and get ahead of what some term "pollution penalties."

Exhibit 7: Countries with ICE sale ban dates for LDVs

Norway	Australia*	Canada	U.S.*	E.U.	Mexico	New Zealand
2025	2035	2035	2035	2035	2040	2040

*Not a national-level policy, but a target for several states as of report publication.
Source: ZEV Transition Council[xlv]

To help accelerate EV consumer adoption, as of 2024, Canada and the U.S. both offer significant EV purchase incentives — CDN$5,000 and U.S.$7,500 respectively. Mexico offers an exemption of the 15% import tax as well as the vehicle ownership tax. Australia exempts EVs from the Fringe Benefits Tax (i.e., benefits-in-kind). Another successful sales accelerator example was Norway's incentive, which exempts EVs from a 25% value-added tax (VAT).[xlvi]

Governments are also making ambitious commitments to expand charging infrastructure, allaying concerns about charger availability. New Zealand has established a target and funding to support charging hubs every 150-200 kms along highways by 2028.[xlvii] The government of Canada has estimated that nearly 700,000 or more public chargers (a mix of level 2 and fast charging for all vehicle classes) will be needed to meet the country's forecasted EV penetration and the government is developing programs to aid the financing of this infrastructure rollout.[xlviii]

Similarly, the European Commission is seeking 3.5 million charging points by 2030 to meet rising EV demand.[xlix] While most charging for commercial fleets will occur in private settings (i.e., home, workplace, or depot), public charging availability and public fast charging, in particular, will be important.[l]

In California, the California Air Resources Board (CARB) can set air quality regulations that influence fleet ZEV adoption at levels higher than the federal government's.[li]

- Approved in 2021, the Advanced Clean Trucks (ACT) regulation aims to ensure ZEVs are available for sale by mandating automotive manufacturers to sell an increasing share of ZEVs over time.
- Advanced Clean Fleets (ACF) came into effect in 2024 and requires certain medium- and heavy-duty (MHD) fleets operating in California or a participating state to adopt increasing numbers of zero-emission vehicles at a higher rate than the OEMs are required to sell.
- Enacted in 2023, ACC II uses a similar mechanism to ACT by mandating OEMs sell an increasing share of ZEV or plug-in hybrid EV light-duty vehicles over time, with the goal of reaching 100% ZEV sales by 2035.

Overcoming fleet electrification challenges

Despite numerous factors supporting EV adoption in fleets, the shift from ICE vehicles to EVs is not without obstacles. These include driver reluctance to drive and fuel differently; operational barriers like charging constraints, significant investment in facilities owned by a third party, and lease terms; and fleet leaders' hesitance to change what determines their choices.[lii]

> "In Australia and New Zealand, Sustainability is one of our strategic drivers, so we walk the talk aligned to our strategy. This is why we've already achieved full electrification in our internal ANZ fleet.
>
> **CHRISTOPHER TULLOCH**
> PRESIDENT, ELEMENT AUSTRALIA AND NEW ZEALAND

Resistance to change

For the EAGA clients who have already begun the transition to EVs, many faced the common obstacle of driver hesitance. EVs are a relatively new technology, and drivers and fleet managers often do not have the full picture of today's EV capabilities and effective practices for their use.

EVs power differently from ICE vehicles, and although access to EV charging is growing in EAGA client geographies, it is not considered as accessible and fast as gas stations. Providing drivers with proactive change management plans, organizing EV test drives, and managing home charging installation can alleviate the fear of running out of battery power, commonly known as range anxiety.

According to interviewees, initial concerns that electrification could lead to driver attrition have proved unfounded.[7] According to a 2020 American Automobile Association survey, over 77% of drivers who had range anxiety pre-purchase reported less or no concern post-purchase, and close to all responders said they were unlikely to go back to an ICE vehicle, except where range is an issue.[liii]

77%
of drivers who had range anxiety reported less or no concern post-purchase.

One interviewee emphasized the need to assuage fleet managers that the long lead times for new, high-demand EVs (e.g., electric pick-up trucks),[8] does not represent broader EV availability. EV suppliers and EV supply equipment (EVSE) providers are striving for utilization, so there are gains to be had for fleets who get in early.

Operational barriers

Although EV market options are changing quickly, not all fleet vehicle types may be ready for electrification.

Common operational barriers:

- Drivers without off-street parking or living in multifamily buildings may struggle to charge at home.
- Company depots may lack sufficient space and electrical capacity for chargers.
- Fleets typically lease depots and may lack the legal right or incentive to add charging infrastructure.
- Lack of availability of certain models may prevent a fleet from making the switch.
- Certain routes may lack public fast charging options to ease range anxiety or to support longer rural commutes.

7 Most clients interviewed have only transitioned their vehicles with the simplest EV use cases and routes so far, so this trend may change as they move closer to a 100% EV fleet.
8 Electric pick-up truck options are very scarce for EAGA Australia and New Zealand customers.

Higher upfront costs

Although the gap is narrowing, today's capital cost of EV purchasing and leasing tends to be higher than comparable ICE vehicles. In the U.S., Canada, Australia, and New Zealand, the median EV model options across vehicle types are, on average, about 20% more expensive than their median ICE counterparts.[liv]

With higher purchase prices and the added cost of deploying private charging infrastructure, fleet decision-makers can be reluctant to shift how they evaluate financial investments, such as by shifting emphasis from operational to capital costs. Additionally, the lack of familiarity with EV costs, such as maintenance or resale values, can deter organizations from making the transition.[lv]

> "Electrifying a fleet is becoming increasingly less costly and less complex. Countless fleet drivers, managers, and owners are benefiting from a more advantageous regulatory, technological, and commercial landscape for EVs and bringing their colleagues along for the ride.
>
> **ANNA ZETKULIC**
> SENIOR ASSOCIATE, RMI

Understanding the economics and emissions of electric vehicles in fleets

Quantifying the economic and environmental impact

As EVs proliferate globally, corporate fleets are beginning to realize the economic and environmental benefits of EVs relative to ICE vehicles. To fully capture these advantages, EAGA in collaboration with RMI, assessed the observed TCO and environmental benefits (i.e., tailpipe emissions) of EVs in EAGA fleets.

The analysis leverages anonymized real-world data from EAGA-managed fleets. Fleet and vehicle data are aggregated, resulting in TCO and emissions results, which are representative assessments of local markets and political conditions, business models, and how the vehicles are used in each geography. A direct comparison between country TCOs should be performed at a high level, as there are variations in use cases and methodology. For example, in U.S., Mexico, and Canada, the TCO analyses are bottom-up, whereas in Europe, Australia and New Zealand, it's the median of actual contracts, and the data is aggregated to protect anonymity.

In this comparison, an ICE vehicle is replaced with a comparable EV used in the same manner and with similar vehicle attributes, such as performance, quality, and function (i.e., seating and storage) and contract terms (i.e., duration and maximum distance). Exhibit 8 details the business models in each country and analytical inputs. Vehicle emissions are calculated based on vehicle distance travelled, manufacturer advertised vehicle efficiencies, and well-to-wheel emissions values for ICE and regional grid intensity factors for EVs throughout the contract length.

For each geography, the TCO on a per mile basis for a single vehicle and the emissions reduction potential is provided.

> Electric vehicles are one powerful option transforming the transportation sector and paving the way for a sustainable future. By embracing EVs, we're reducing emissions and building a foundation for long-term resilience in a low-carbon economy, while recognizing they are just one of several solutions needed to drive a truly sustainable future.
>
> **SHERI MCGRATH**
> VICE PRESIDENT, SUSTAINABILITY, ELEMENT

Exhibit 8: Overview of fleet details for total cost of ownership and emissions analysis

Geography	North America			Europe[9]			Oceania	
	U.S.	Canada	Mexico	Norway	Germany	France	Australia	New Zealand
Business model	Flexible length contract based on level of support (fleet size, kilometer value, savings include registration and renewal, roadside assistance, relief vehicle, accident management)			Fixed length contract with maximum kilometer value (full service, inclusive of such elements as registration and renewal, roadside assistance, relief vehicle, accident management, fuel card, and regular maintenance)				
Vehicle segments	▪ Compact and SUV ▪ Van ▪ Pickup	Compact and SUV	▪ Compact and SUV ▪ Van	Compact and SUV			Compact and SUV	
Monthly vehicle distance (miles)[10]	▪ Compact & SUV: 1,566 ▪ Van: 1,486 ▪ Pickup: 1,552	Compact and SUV: 1,201	▪ Compact & SUV: 1,172 ▪ Van: 1,574	Compact and SUV: 1,554			Compact and SUV: 1,267	
Charging infrastructure and approach	Varies	Varies	Varies	Use third party EVSE provider, bundle charger cost per vehicle MRSP into contract				

Source: EAGA

9 EAGA operates in several countries in Europe. Norway has been selected to provide a world-leading example of EV TCO parity. Germany and France have been selected because they are larger markets.

10 EAGA regularly coordinates with customers to update contract terms and maximum kilometers/miles to ensure the client is receiving the best package. With this, the maximum kilometers/miles for the contract term are used as total VMT/VKT by the vehicle in the analysis.

Results

Exhibit 9: Total cost of ownership (USD) per mile for ICE and EV by geography

Source: EAGA and RMI analysis

EAGA fleet data and estimated TCO on a per-mile basis shows that a vehicle's life cycle and where it is used is important to understand the cost saving opportunities for fleets. For example, when considering the national aggregate for EAGA fleets at this time, for the U.S., Canada, and Mexico, EVs are more costly to operate relative to comparable ICE vehicles. The difference in TCO for EV and ICE is generally lower for high-mileage vehicles as is the case with U.S. vans and pickups in EAGA fleets. As EVs tend to have lower operating costs, (inclusive of fueling and maintenance costs) EVs can accrue savings over their lifetime relative to a comparable ICE vehicle. As more EV options become available in these markets and battery prices continue to decline, this TCO gap will reduce further.

EAGA electric sedan/SUV and van fleets in Mexico have higher TCOs than other regions due in part to Mexico's limited EV incentives.[11] However, given EV charging costs in Mexico can be 60–70% less than ICE vehicle, as policies and charging infrastructure develop, that gap should reduce.

For other geographies such as New Zealand, EVs are subjected to a user tax and are generally driven fewer miles resulting in a higher TCO as they cannot recoup operational savings. Though TCO for EVs is better in some instances, hurdles still exist, including limited availability of fleet-type vehicles and complexity of installing and managing charging infrastructure which are also important to consider when shifting to an electric fleet. These hurdles continue to provide a headwind even as TCO approaches parity.

For Europe, given a supportive political environment, EVs have lower TCOs relative to ICE counterparts for the analyzed use cases.

> "As companies and fleet managers explore a shift to clean vehicles, a thorough change management plan that supports all stakeholders in the transition and provides a detailed roadmap for execution is critical for an efficient and successful transition.
>
> **MARSHALL ABRAMCZYK**
> PRINCIPAL, RMI

11 A mix of moderate state and federal EV incentives do exist in Mexico, from property tax subsidies to exemption from emission control fees and the ability to maximize fiscal deductions.

Exhibit 10: $EqCO_2$ tailpipe emissions for ICE and EV by geography

Source: EAGA and RMI analysis

Geography	Vehicle segment	Monthly distance (miles)	$EqCO_2$ emissions		Change (%)
			ICE	EV	
U.S.	Sedan and SUV	1.566	20.9	5.4	74
	Van	1,486	68.4	8.3	88
	Pickup	1,552	54.2	7.6	86
Mexico	Sedan and SUV	1,172	13.0	5.5	58
	Van	1,574	45.2	19.0	58
Canada	Sedan and SUV	1,201	17.1	1.1	94
Norway	Sedan and SUV	1,554	23.8	0.8	97
Germany	Sedan and SUV	1,554	18.4	9.6	48
France	Sedan and SUV	1,544	17.0	1.2	93
Australia	Sedan and SUV	1,267	17.7	7.4	58
New Zealand	Sedan and SUV	1,267	12.4	0.9	93

Source: EAGA and RMI analysis

EAGA fleets on aggregate are realizing significant emissions savings, with some achieving a 90% or greater reduction.[12] The largest emissions reduction potential is found in countries with high levels of renewable sources of energy, such as Canada, New Zealand, Norway, and France.

12 EV emissions account for the emissions generated to produce a unit of electricity. Average grid emissions factors for each country are used.

Recommendations

Transitioning a fleet from ICE to EVs is not an overnight proposition. Thorough change management planning is required to ensure the electrification initiative will be successful.

1. Create a roadmap for fleet decarbonization
2. Assess EV readiness
3. Apply telematics data to enable EV transition and operations
4. Design first EV deployment to inform wider fleet's needs

1. Create a roadmap for fleet decarbonization

Exhibit 11 outlines a phased approach that gives any organization the best chance for success.

Exhibit 11: Fleet transition approach

Phase	Prepare	Plan	Pilot or smaller-scale deployment	Scale	Monitor, evaluate, and optimize
Description	Take stock of existing operations to develop a baseline, understand fleet and driver needs, and identify potential opportunities for decarbonization	Develop roadmaps, (i.e., plans to electrify the fleet that include timebound implementation activities)	Consider a small-scale deployment of decarbonization tactics to test new operations and/or vehicles in the fleet	Expand electrification and other decarbonization activities to the full fleet	Continue to monitor fleet use and implement recommendations to improve operations
Actions	▪ Baseline existing fleet, including emissions profile ▪ Increase familiarity with decarbonization tactics for drivers ▪ Discuss desired outcomes for the transition ▪ Develop an inclusive stakeholder process to set company key performance indicators (KPIs) ▪ Identify and engage decarbonization champions	▪ Develop fleet roadmaps detailing electrification implementation strategies ▪ Include implementation activity timelines, parking and charging plans, infrastructure requirements, and detailed budgets ▪ Identify potential challenges and draft preliminary recommendations	▪ Develop pilot plans, including goals, objectives, monitoring and evaluation ▪ Perform preliminary infrastructure upgrades ▪ Monitor vehicles and operations while soliciting feedback from users ▪ Capture lessons learned to inform larger-scale deployment	▪ Update rollout plans based on learnings from test deployment ▪ Continue to expand decarbonization tactics for use cases that are technologically ready ▪ Expand infrastructure upgrades ▪ Perform analytical activities to support adoption	▪ Continue to optimize operations, leveraging data sources like vehicles and smart chargers ▪ Explore and test new technologies, from vehicles to charging
Outcome(s)	▪ Increased awareness and familiarity with approach and technology ▪ Understanding of use cases and "first movers" for electrification ▪ Understanding of client goals, from savings to sustainability	▪ Informed and lowest-cost transition strategy with specific actions to facilitate implementation ▪ Training and other supporting materials in development to aid tactic (e.g., EV) rollout ▪ Decision makers and users are involved in the transition process	▪ Lessons learned and user feedback that can inform updates to rollout plans and streamline larger-scale adoption	▪ Larger-scale or full-fleet EV deployment achieved in alignment with client goals	▪ Decarbonization KPIs reached ▪ Continual improvements to fleet operations and vehicle use ▪ New opportunities for cost and/or emissions saving identified and implemented ▪ Deployment of new technologies

Source: EAGA and RMI

2. Assess EV readiness

EV readiness plans help to outline and assess the EV-related policies, infrastructure, services, and other factors that organizations need to have in place to support a scaled rollout of EVs in their fleets. Building on the roadmap phases in Exhibit 11, several important considerations to gauge EV readiness include:

- Alignment of transition roadmap with company sustainability and other goals;
- Appropriate use case(s) identified for electrification and charging scenarios;
- Knowledge of applicable replacement vehicles and associated charging infrastructure requirements;
- Updates to driver and other policies for EV-specific considerations;
- If applicable, reimbursement mechanisms for charging infrastructure and energy;
- Development of charging strategy; and
- Deployment of EV-related education for drivers, fleet managers and other stakeholders.

Organizations should also assess how mature a region's EV market is to future-proof investments and to ensure the long-term success of EV deployments. To help assess market maturity in a region:

- Perform a TCO comparison between ICE vehicles and EVs available in the region or for import.
- Assess availability of public charging infrastructure or ease of installing home charging or other charging solutions based on the use case of the vehicle.
- Assess market availability of EVs, both current and forecasted, to understand general trends in electrification, along with what vehicle types have applicable EV models. Also, technology trends such as charging standards and availability should be considered.

- Assess how "clean" the electricity is to charge EV batteries. Though EVs emit no tailpipe emissions, eqCO_2 is produced when generating electricity, and the amount of emissions varies depending on the mix of fossil fuels (e.g., coal, natural gas, petroleum) and renewables.
- Understand why consumers (both individuals and companies) prefer to buy an EV over an ICE vehicle.

3. Apply telematics data to enable EV transition and operations

A fleet aiming to decarbonize should develop a scaled EV deployment plan, starting with a smaller scale EV deployment that aligns with the company's change management plan.

Current state of EV deployment	Recommended course of action
Planning to transition to EVs	Use existing trip, distance, fuel use, and amount of time spent parked in a particular area or location (dwell time) to identify which ICE vehicles are best suited for EV replacement.
Scaling EV deployment	Use location, distance, dwell time, and driver behavior to inform infrastructure planning, ensuring the right number and type of charging stations are installed at optimal locations.
Optimizing EV deployment	Once vehicles are deployed, telematics data can be used to continually optimize how the vehicles and other infrastructure are used by understanding driver and charging behavior, and monitoring vehicle performance.

Telematics can also be used to:

- Optimize charging schedules and reduce vehicle and charger downtime.
- Select efficient routes based on vehicle and energy usage patterns.
- Maintain vehicle and charging point uptime through predictive maintenance analytics.
- Provide continual operational cost assessments by leveraging real-time vehicle/fleet usage data.
- Validate vehicle performance in varying conditions (e.g., cold weather).
- Dispel common concerns around range anxiety or other performance elements. For example, clients currently running pilots with Element are seeing 96% of driving days have mileage lower than the actual range on a single charge.
- Monitor battery health to inform current vehicle range and potential resale value.
- Provide visibility into fleet charging behaviors, including:
  - Driving compliance to promote preferred behaviors
  - Charging at-home and overnight
  - Avoiding public charging to reduce costs and improve vehicle productivity during working hours

4. Design first EV deployment to inform wider fleet's needs

A fleet aiming to decarbonize should start with a smaller-scale EV deployment that aligns with the company's change management plan. A small-scale EV deployment is a valuable opportunity to learn more about how EVs impact fleet operations in real-world conditions. It is incredibly helpful not only in providing quantifiable data (operational impact, cost visibility, and effectiveness of charging) but also in alleviating potential concerns such as range anxiety amongst drivers. To secure commitment to the expansion of programs, driver feedback on all these data points will be critical.

The majority of EAGA clients interviewed shared a high level of driver satisfaction in terms of vehicle range, comfort, and overall reliability of their first EV experience.

Before launching a test case deployment, it is important to identify the routes that are easiest to electrify. The lessons learned in the initial test case will prove invaluable when moving on to more challenging use cases.

Upon completion of the initial test case, be sure to publicize those successes. The operational, cost, emissions, and other performance data collected during the initial deployment will also help inform and iterate the company's change management plan.

For the majority of EAGA fleet managers interviewed, the results for the test deployment were a critical success factor in getting a commitment to larger, and eventually full-scale EV deployment.

In addition to easy-to-electrify segments, explore electrifying more challenging use cases and duty cycles. EAGA interviews indicated that organizations tend to electrify vehicles that commonly have easier duty cycles, such as short-distance commuter vehicles. The next frontier of EV program test cases involves more challenging duty cycles, especially high-mileage applications. Ultimately, efficiency improvements, cost savings, and emissions reduction will be maximized when the approach is applied to the distance traveled.

Conclusion

Fleet and business leaders find themselves at a turning point. Once considered a future challenge, fleet decarbonization has become today's pressing issue. From corporate sustainability to regulatory compliance and shifting public attitudes, fleet electrification is an inevitable evolution for organizations around the globe.

There is no single correct approach to fleet decarbonization. Fleet and business leaders can take the following paths in their journey to reduce carbon emissions:

- Idle reduction
- Fleet size optimization
- Vehicle size optimization
- Shared vehicles and facilities
- Zero-emission vehicle deployment

Barriers to fleet electrification are shrinking, making a transition from ICE to EVs more feasible and remunerative. Driven by supportive policy and regulatory environments, a rapidly growing market, and improvements in battery technology, EVs are increasingly cost-competitive with ICE vehicles in the commercial LDV segment.

Already, some EAGA fleets see cost parity. Studies suggest that the commercial LDV segment (for vehicles less than 6 tonnes) EVs should be approximately level with ICE vehicles in terms of TCO by 2025.[lviiv] With expanding charging networks and improved vehicle performance characteristics, EVs can also meet the demands of more use cases and duty cycles.

The challenge facing fleet and business leaders is becoming increasingly manageable. By leveraging information and employing effective practices like the ones outlined in this report, organizations will be better equipped for a successful EV transition.

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