

The EV revolution: Accelerating change through tech & transformation

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Executive Summary

The global transport sector is undergoing a period of significant transformation as governments, manufacturers and consumers respond to decarbonisation targets, technological innovation and changing energy markets. Electric vehicles (EVs) are becoming an increasingly important part of this transition, supported by advances in battery technology, expanding charging infrastructure and a growing range of policy measures designed to accelerate adoption.

However, the pace of change is not uniform. Differences in consumer demand, infrastructure availability, trade policy and industrial strategy have resulted in significant variation in EV uptake between regions. This report examines the latest developments in the global EV market, assessing adoption trends, policy developments, battery innovations and charging infrastructure requirements, while highlighting the key challenges and opportunities shaping the sector's future.

EV adoption continues to increase, but growth is becoming more uneven

Despite many industry commentators expecting PHEV (Plug-in Hybrid Electric Vehicle) registrations to decline sharply ahead of 2030, the market remains buoyant and will continue to show growth on a global scale through to end 2028. However, PHEV registrations are still set to see decline towards the end of our forecast period (2031), as manufacturers begin to phase out or decrease production of these vehicles in many markets. Compared with our previous outlook, forecasts have been revised upwards across most regions, driven primarily by stronger-than-expected growth in markets within Asia Pacific.

We expect the reduction in new Internal Combustion Engine (ICE) vehicle registrations to increase at pace, likewise sales of BEVs will gather

momentum across the period. To support adoption, governments should look at policy changes. Detailed country-level policy assessments are included in the full report.

Trade policy is reshaping the EV industry

There has been a global response to the growing dominance of (the often significantly cheaper) Chinese-produced BEVs (Battery Electric Vehicle), in the form of tariffs. China has seen rapid development in its EV market, growing from exporting \$400mn USD of EVs in 2019, to becoming the world's largest car exporter in 2023, shipping an estimated \$34bn USD of vehicles, and is now home to three of the five largest EV manufacturers.

Governments are increasingly seeking to develop domestic EV manufacturing capability and reduce dependence on external supply chains. This has resulted in a growing use of tariffs, localisation requirements, subsidies and investment incentives.

Battery innovation remains a key catalyst

One of the major barriers to EV adoption is concern over battery range. So called 'range anxiety' relates to concern around the distance an EV can travel on a single charge, alongside the worry of getting stranded during the journey should battery power run out. Other fears exist around the safety of current EV batteries, their weight, and their cost (the majority of these batteries presently being lithium-ion).

Improvements in battery performance, energy density and charging speed have the potential to reduce several barriers to EV adoption. While lithium-ion batteries remain dominant, growing interest in solid-state batteries, sodium-ion batteries and next-generation battery chemistries could improve vehicle range, lower costs and strengthen supply chain resilience.

Introduction to EVs and charging infrastructure

Driving change

As pressures around fossil fuel use and climate change increase, our world is shifting to become 'greener', with governments mindful of making changes that align with the concept of a green economy. The green economy, according to the UN, is defined as being: "low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services."

One key component of the greening economy is transport, a sector which presently accounts for 20% of global carbon dioxide. In 2022, global transport CO2 emissions grew by almost 5%, with most of these emissions stemming from road vehicles, which alone produced 12% of total global greenhouse gas (GHG) emissions in 2021. The primary source of transportation emissions are light duty vehicles (LDVs) and passenger cars, whose emissions have increased by an average of 1% per year since 2010 to more than 3.5 GtCO₂ (Gigaton of CO₂).

Figure 1: The top 5 polluting industries

Industry	Proportion of global CO2 emissions
Built environment	40%
Energy	38%
Agriculture	22%
Manufacturing	20%
Transport & logistics	20%

Source: ZCA. Note: Figures are higher than 100% due to significant overlap between industries – largely the 'built environment' which encompasses construction and real estate.

Over the past decade, the adoption of electric vehicles has grown rapidly. As we move towards the next decade, numerous countries and regions including the European Union, the United Kingdom, Canada, Norway, and Chile, have introduced policies aimed at accelerating the transition from ICE vehicles towards zero-emission vehicles. These measures range from sales targets and emissions standards to proposed phase-out dates for new petrol and diesel vehicles.

Light duty vehicles: passenger cars, small trucks and small vans

The segment for purely electric LDVs (BEVs) has shown strong growth over the past decade and will continue to do so with our forecasts showing a Compound Annual Growth Rate (CAGR) of 7.2% globally between 2026 and 2031, with total vehicle unit sales reaching 27.5 million annually by 2031, up from 19.4 million in 2026.

Within the light duty vehicles segment, the term used for the purpose of this research, we include private cars, small trucks (e.g. Pick-ups) and vans. At present the market for both BEV and PHEV sales is fragmented, with manufacturers varying their approach to electrification. For example, Tesla only sells BEVs and Chinese car company BYD which traditionally sold ICE vehicles, switched in March 2022 to produce only full electric and heavily electrified plug-in hybrid cars. Other manufacturers, such as Toyota, are exploring not only electric, but alternative fuels such as hydrogen.



Source: Envato

Commercial vehicles: electric HGVs, large vans & trucks, and buses

Whilst LDVs are responsible for a significant contribution to global GHG emissions, road freight and public transport are also notable contributors to pollution too. According to a 2022 study by McKinsey, road freight now accounts for 53% of CO2 emissions within global trade-related transport, and this share is expected to rise to 56% by 2050 if current trends continue. As a result, the introduction of zero emissions vehicles in these segments is becoming of greater urgency, as governments look to reduce emissions and meet climate targets. The main issue is that at present, HGVs remain largely dependent on diesel to run them.

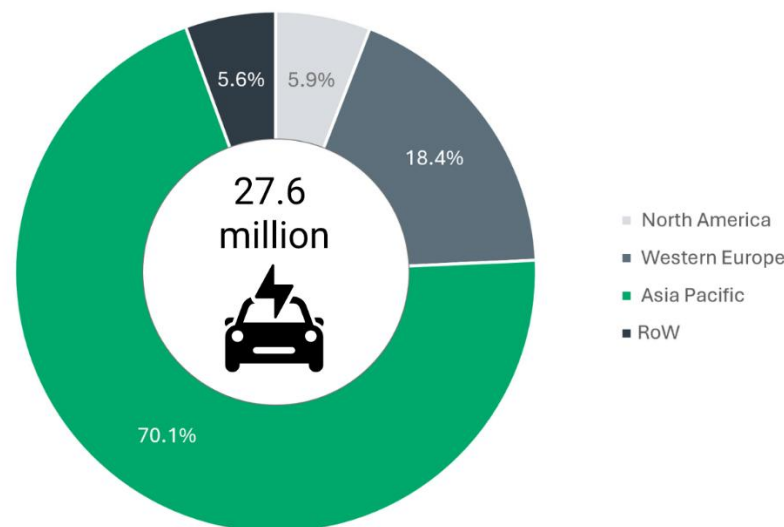
Leading OEMs are investing considerably in electric HGVs, looking to meet and even excel the range, payload and efficiency credentials of traditional HGVs. The global electric truck market, which was valued at just under \$1.2 billion in 2023, is projected to grow at a CAGR of 41.8% from 2023 to 2030, driven by stricter emissions regulations and advancements in battery technology. Whilst still relatively small-scale in most markets, fleet electrification of HGVs is gathering pace.

Forecast summary

EV market set to continue growth despite recent BEV sales slowdown

- ZCA's 2025 edition of this research saw BEV numbers reduced as sales slowed or even fell in many regions. However, recent sales figures show a dramatic turn around to this trend, allowing us to significantly revise our outlook for the market. Recent sales performance has exceeded expectations in several key markets, resulting in a significant upward revision to our previous outlook.
- The changing mix of BEV vehicles is seeing a greater offering of more affordable models, and our study has revealed a wide variation in both sales trends and average EV pricing between regions and even neighbouring countries.
- While overall global ICE numbers will decline from 2025 to 2031, several markets will continue to see growth - these include Latin America, Russia & Eastern Europe, Middle East & North Africa and Sub-Saharan Africa, as these vehicles remain the more accessible and affordable option for consumers.
- PHEV registrations are still set to see decline towards the end of our forecast period, as manufacturers begin to phase out or decrease production of these vehicles in many markets, with regulation on the sale of polluting vehicles coming in. As PHEVs still use an element of traditional fossil fuel combustion, these vehicles are in line to be phased out.

Total annual EV sales globally in 2031: 27.6 million, split by region



Source: Zero Carbon Academy

Key Insight

Despite a slowdown in some Western markets, global EV sales continue to grow, with China expected to remain the dominant force across vehicle manufacturing, battery production and charging infrastructure deployment.

For in-depth analysis, including our full suite of market forecasts, industry-specific trends and recommendations, vendor leaderboards, as well as insight into country-specific policy, ZCA's full research can be purchased here: [Electric vehicles & charging infrastructure \(zerocarbonacademy.com\)](https://zerocarbonacademy.com)