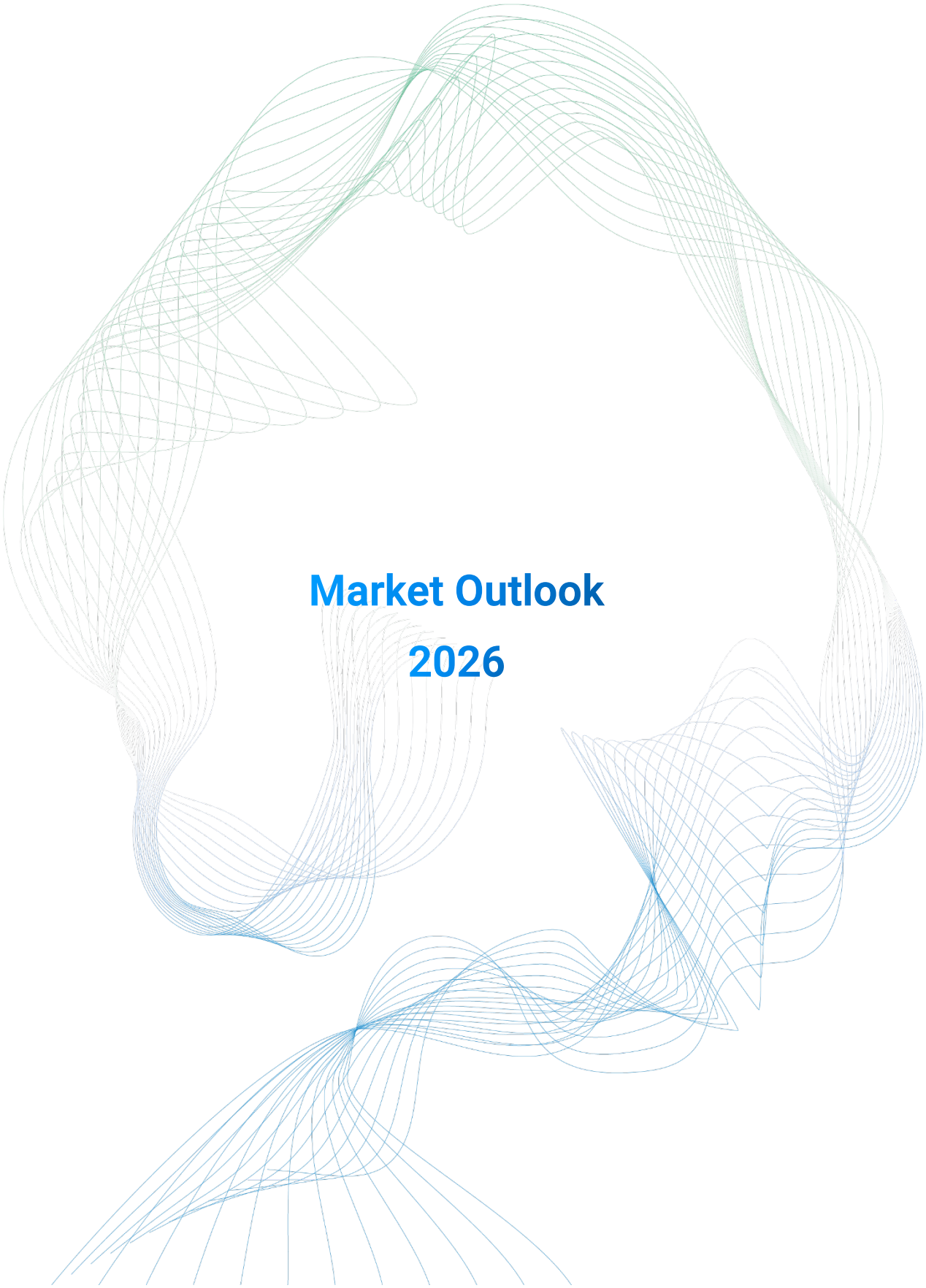

Market Outlook

2026

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21 pages

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Executive Summary

This market research has been thoroughly compiled, leveraging insights from a wide range of reputable sources such as BloombergNEF, Rho Motion, the International Energy Agency (IEA), IDTechEx, Gartner, Research and Markets, and other leading companies. The inclusion of reports from these respected institutions ensures the findings are based on rigorous analysis, up-to-date information, and industry expertise.

The research aims to provide a comprehensive and detailed understanding of electric vehicle market dynamics and its forecast for the future.

EV Market Performance in 2025

Global demand for electromobility continued to grow strongly in 2025, broadly in line with expectations formed at the beginning of the year based on first-quarter sales results.

IEA expected global electric car sales to exceed twenty million in 2025 (+25% YoY), with China surpassing fourteen million, Europe around four million, and the rest of world reaching about 1.8 million.[1]

In the end, the world sold 20.7 million EVs in 2025 – hitting record high, - 3.6 million more EVs than it did in the previous year, according to a new report by Rho Motion.

This performance confirms that, despite regional differences in adoption speed and emerging policy uncertainties, electromobility remains on a long-term growth trajectory and continues to reshape the global automotive and energy landscape.

EV sales by region (2025 vs 2024)[2]:

- **Global:** 20.7 million**, +20%**
- **China:** 12.9 million, **+17%**
- **EU & EFTA & UK:** 4.3 million, **+33%**
- **North America:** 1.8 million, **-4%**
- **Rest of World:** 1.7 million, **+48%**

EV sales in the **United States** declined in 2025 due to an unstable policy environment and the expiration of the USD 7,500 federal EV tax credit on October 1. While demand temporarily increased in Q3 ahead of the incentive expiry, sales fell sharply in Q4, reaching their lowest level since Q4 2022. The reported 4% decline is partly influenced by a change in regional definition, as 2024 figures covered the U.S. and Canada, while 2025 data refer to North America as a whole. This development was broadly in line with the Qoolers Market Outlook for 2025, which anticipated short-term demand volatility following reduced policy support.

China's EV market continued to grow strongly, supported by aggressive pricing, intense domestic competition, and a broad model offering, although growth moderated in the second

[1] https://www.iea.org/reports/global-ev-outlook-2025

[2] https://rhomotion.com/news/global-ev-sales-reach-20-7-million-units-in-2025-growing-by-20/

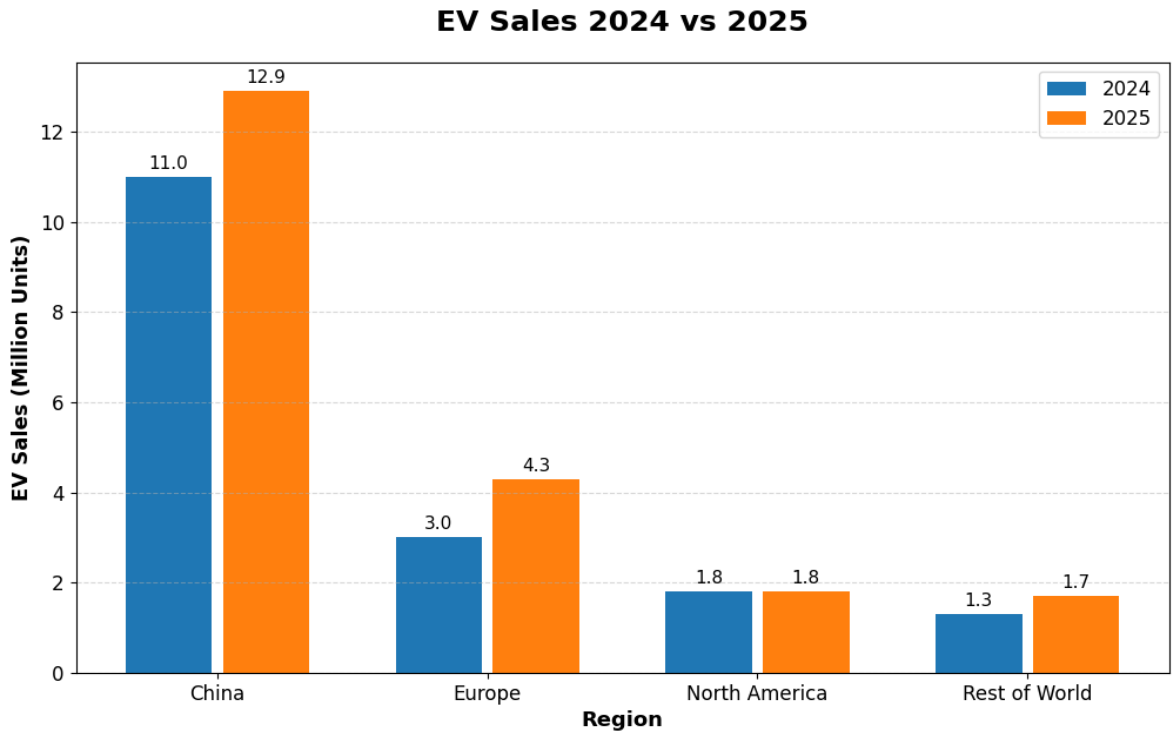
half of the year due to a high comparison base. Chinese OEMs further expanded exports, strengthening their presence in Europe and emerging markets.

Europe emerged as the fastest-growing major EV market in 2025, with sales rising 33% year on year, driven by rapid growth in Germany and particularly in Norway. Fully electric vehicles accounted for 95.9% of new car registrations in 2025, rising to nearly 98% in December. Total new car registrations reached 179,549 units, representing a 40% year-on-year increase, according to the Norwegian Road Federation (OFV).[3]

Despite softer EU emissions targets, manufacturers largely maintained planned EV rollouts. Notably, Jaguar completed its transition to an all-electric brand in December 2025, while several other OEMs revised earlier electrification targets. [4]

EV sales in the **rest of the world** grew by 48%, led by Southeast Asia and South & Central America, where Chinese imports accounted for a dominant share of sales. While Japan continued to lag in EV adoption, South Korea recorded solid growth supported by new domestic models and government incentives.[5]

Figure 1: Electric vehicle sales 2024 vs 2025[6]



2025 as the third hottest year on record

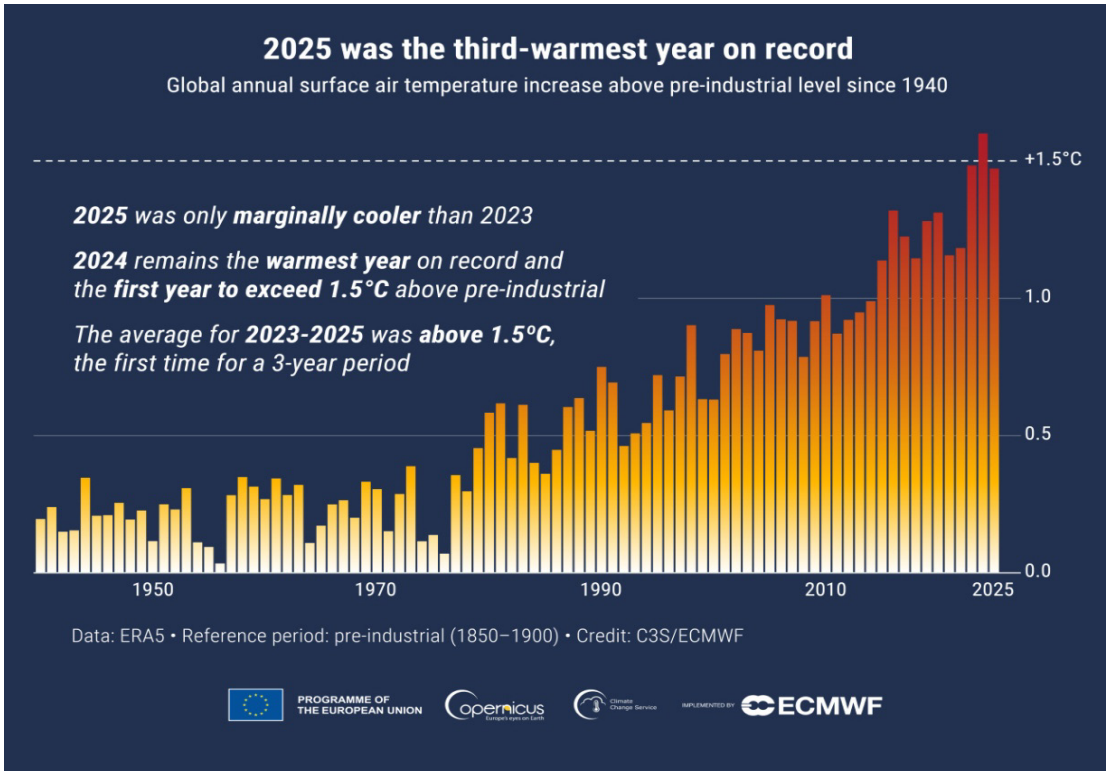
According to the Copernicus Climate Change Service, 2025 was the third warmest year on record, following 2024, the warmest year to date, and 2023, which ranked second. However,

[3] https://www.cnbc.com/2026/01/02/evs-norway-new-car-sales-hit-96percent-electric-in-2025-as-tesla-dominates.html
[4] https://www.carexpert.com.au/car-news/last-petrol-powered-jaguar-built
[5] https://rhomotion.com/news/global-ev-sales-reach-20-7-million-units-in-2025-growing-by-20/
[6] Qoolers internal analysis (2026), based on Rho Motion data.

global average temperatures in 2025 were only 0.01 °C lower than in 2023 and 0.13 °C lower than in 2024, indicating that the apparent stabilization remains marginal.

Overall, the trend remains concerning. The past eleven years have been the warmest on record, reflecting persistent long-term global warming. In 2025, land surface air temperatures ranked as the second warmest globally, while Antarctica experienced its warmest year and the Arctic its second warmest, highlighting continued and accelerated warming in polar regions.[7]

Figure 2: Global surface air temperature increases above the average for the 1850–1900 designated pre-industrial reference period based on the ERA5 dataset, shown as annual averages since 1940[8]



EU Regulatory Update

The year 2025 marked a period of regulatory adjustment within the European Union, reflecting sustained pressure from the automotive industry and several Member States, including Germany and Italy. While the EU's long-term decarbonisation objectives remain unchanged, selected measures were introduced to ease short-term compliance pressure.

CO_2 Emissions Targets

Road transport is a major source of greenhouse gas emissions in the EU, prompting the introduction of binding CO_2 performance standards for new passenger cars and light commercial vehicles under Regulation (EU) 2019/631, aligned with the EU's 2050 climate neutrality goal.

[7] https://climate.copernicus.eu/copernicus-2025-was-third-hottest-year-record
[8] Source: Copernicus

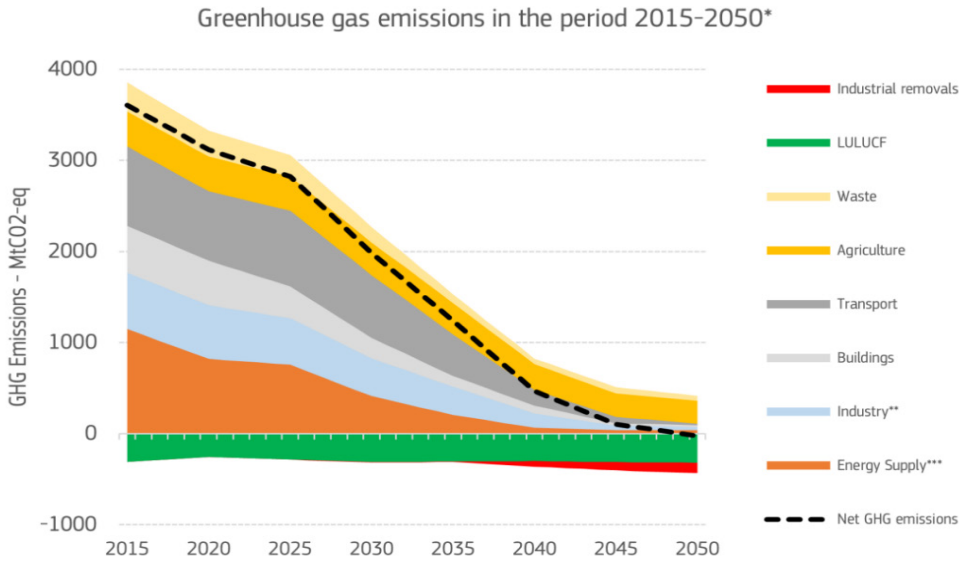
From 2025, average CO_2 emissions from new cars and vans must be 15% lower than 2021 levels, corresponding to fleet-wide targets of 93.6 g CO_2/km for passenger cars and 153.9 g CO_2/km for vans for the 2025–2029 period. The regulation continues to require a 100% reduction in CO_2 emissions from new cars and vans by 2035, effectively mandating zero-emission vehicles.

In May 2025, the EU approved temporary compliance flexibility, allowing manufacturers to meet the 2025 targets based on average performance over the 2025–2027 period rather than on an annual basis. This adjustment reduces near-term pressure while preserving the long-term decarbonisation trajectory.[9]

Climate Target

The European Union advanced the European Climate Law by progressing toward a new 2040 climate target, building on its existing goal of reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990. The proposed target aims for a 90% reduction by 2040, reinforcing the EU's legally binding objective of achieving climate neutrality by 2050.[10]

Figure 3: Greenhouse gas emissions in the period 2015-2050[11]



*Source: PRIMES, GAINS, GLOBIOM
**Excluding non-BECCS industrial removals
***Including Bioenergy with carbon capture and storage (BECCS)*

Automotive Support

In December 2025, the European Commission introduced an **Automotive Package** aimed at supporting the sector's transition to clean mobility while enhancing competitiveness.

While existing legislation required all new cars and vans to be fully zero-emission from 2035, the Commission proposes a more flexible approach. Manufacturers would need to achieve a

[9] https://climate.ec.europa.eu/eu-action/transport-decarbonisation/road-transport/cars-and-vans_en
[10] https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2040-climate-target_en
[11] Source: PRIMES, GAINS, GLOBIOM (European Commission official website)

90% reduction in tailpipe emissions from 2035, with the remaining 10% offset through mechanisms such as the use of low-carbon EU-produced materials or alternative fuels, including e-fuels and biofuels. This approach allows a limited role for technologies such as plug-in hybrids, range extenders, and combustion-engine vehicles beyond 2035, alongside electric and hydrogen vehicles.

Additional flexibility is proposed ahead of 2035, including **super credits** for small, affordable EU-produced electric vehicles and banking and borrowing mechanisms for the 2030–2032 period. For vans, the 2030 CO_2 reduction target is lowered from 50% to 40%, reflecting slower electrification progress. Similar targeted adjustments are proposed for heavy-duty vehicles.

To accelerate demand, Member States will be required to set mandatory targets for corporate fleets to increase the uptake of zero-and low-emission vehicles. The package also includes measures to strengthen Europe's battery industry, notably the €1.8 billion **Battery Booster initiative**, including €1.5 billion in interest-free loans to support EU battery cell manufacturing and reduce strategic dependencies.[12]

Battery Recycling

In July 2025, the European Commission adopted new rules to improve battery recycling efficiency and material recovery across the EU. Effective from 24 July 2025, the measures introduce harmonised methodologies for calculating and verifying recycling efficiency and define recovery requirements for key materials such as lithium, cobalt, nickel, copper, and lead across all major battery types.

The framework also standardises documentation and reporting requirements to ensure consistent implementation across Member States. These measures support the EU Batteries Regulation's recycling and recovery targets, strengthening Europe's transition toward a circular battery value chain and reducing dependence on primary raw materials.[13]

The Future of EV Market Share

Looking ahead to 2026, electric vehicles are expected to maintain solid global momentum, with growth driven primarily by markets outside the United States, where policy direction will continue to play a decisive role.

The electric car market in 2026 will be shaped by faster charging capabilities and an expanding pipeline of more affordable EV models, alongside the rollout of previously announced vehicles and selected model refreshes. These developments are expected to support continued adoption across a broader range of customer segments.

BloombergNEF expects global sales of passenger EVs to reach 24.3 million this year, representing a 12% year-on-year growth, a moderation compared to the 23% growth recorded in 2025.[14]

[12] https://ec.europa.eu/commission/presscorner/detail/en/ip_25_3051
[13] https://environment.ec.europa.eu/news/new-rules-boost-recycling-efficiency-waste-batteries-2025-07-04_en
[14] https://www.bloomberg.com/news/newsletters/2026-01-06/electric-vehicles-have-a-bumpy-road-ahead-in-2026

According to Gartner, Inc, an estimated 116 million EVs (including cars, buses, vans, and heavy trucks) are expected to be on the road in 2026. Despite higher tariffs and fewer incentives, EV numbers are forecast to increase by 30% in 2026, with global PHEV ownership rising 32% year over year as drivers value the backup petrol engine.

Table 1: Electric vehicle installed base by vehicle type, worldwide, 2025-2026 (single units)[15]

	2025 Installed Base	2026 Installed Base
BEV	59.480.370	76.344.452
PHEV	30.074.582	39.835.111
Total	**89.554.951**	**116.179.563**

United States

U.S. electric vehicle sales are expected to stagnate in 2026, primarily due to policy-related factors.

The withdrawal of consumer tax credits combined with the weakening of fuel economy and emissions standards, has significantly reduced regulatory support for EV adoption. As a result, passenger EV sales in the United States are forecast to decline by 15% in 2026, according to BloombergNEF.[16]

Trade policy is adding further pressure. Since August 2025, a 15% tariff has applied to passenger vehicles, light trucks, and selected components imported from the European Union, while 100% tariffs on Chinese-made EVs remain in place. These measures increase production costs and final vehicle prices, weighing on consumer demand.

In parallel, the rollback of EV-supportive policies introduced under the previous administration has reduced compliance pressure on manufacturers. Weaker tailpipe emissions and fuel economy standards are enabling OEMs to slow EV plans, extend the lifecycle of internal combustion engine models, and redirect investment toward hybrid and plug-in hybrid vehicles rather than full electrification.

This shift is already reflected in OEM strategies. Ford Motor Company, for example, has announced a restructuring of its electrification plans, placing greater emphasis on hybrid vehicles and cancelling the next generation of large all-electric trucks in favour of smaller, more affordable EVs.[17]

[15] Source: Gartner, December 2025
[16] https://www.bloomberg.com/news/newsletters/2026-01-06/electric-vehicles-have-a-bumpy-road-ahead-in-2026
[17] http://cnbc.com/2025/12/15/ford-ev-pullback.html

Canada

In January 2026, Canada announced a significant shift in its trade policy toward Chinese electric vehicles, diverging from the United States' stance. Under a new trade agreement with China, Canada will allow an annual quota of 49,000 Chinese EVs to enter the market at a reduced tariff rate of 6.1% with the quota gradually increasing to approximately 70,000 units over the next five years.[18]

This change is expected to support higher EV sales in Canada, particularly through improved availability of more affordable models, while reinforcing a growing policy divergence within the North American EV market.

Europe

The European EV market is expected to continue expanding in 2026, though at a more moderate pace than in previous years. Regulatory flexibility around the 2035 zero-emission target is easing near-term compliance pressure on manufacturers and may marginally slow BEV adoption. At the same time, competitive pressure from Chinese manufacturers continues to intensify.

Several key markets are extending or adjusting incentive schemes. France has refined its purchase bonus framework, while Germany has introduced a €3 billion EV subsidy programme running through 2029, primarily targeting low-and middle-income households.[19]

Combined with increasing competition and cost optimisation, vehicle prices are expected to decline in certain segments, supporting continued demand.

China

Even in China, the world's largest electric vehicle market, analysts expect sales growth to moderate as government support is gradually reduced. From 2026, electric vehicles will be subject to a purchase tax for the first time, with exemptions reduced to 50% compared to full exemption previously.

Slowing domestic demand is accelerating the overseas expansion of Chinese EV manufacturers. Combined sales of battery-electric vehicles and plug-in hybrids are expected to rise by around 10% this year, according to China's Passenger Car Association.[20] Bloomberg Intelligence projects sales growth of 13% for 2026.[21]

Upcoming EV Portfolio

The upcoming EV pipeline reflects a clear shift toward broader market coverage, with manufacturers expanding portfolios across both affordable mass-market segments and premium niches.

[18] https://electrek.co/2026/01/16/canada-breaks-with-us-slashes-100-tariffs-chinese-evs/
[19] https://eletric-vehicles.com/general/germany-to-launch-e3-billion-ev-subsidy-program-targeting-800000-vehicles/
[20] https://www.bloomberg.com/news/articles/2026-01-09/china-s-ev-sales-momentum-to-slow-in-2026-as-subsidies-fade
[21] https://www.bloomberg.com/news/newsletters/2026-01-06/electric-vehicles-have-a-bumpy-road-ahead-in-2026

Several OEMs are preparing new compact and affordable EVs, including small hatchbacks and SUVs, as brands such as Cupra, Dacia, Kia, Renault, and Škoda target higher-volume segments. At the same time, premium manufacturers are broadening their electric offerings, with BMW expanding its Neue Klasse lineup and Mercedes-Benz preparing its most extensive EV rollout to date across multiple core model lines.

High-performance and luxury EVs are also gaining traction, highlighted by Ferrari's first fully electric model and upcoming electric sports cars from Porsche. Chinese manufacturers, led by BYD and Geely Group brands, continue to raise competitive pressure through larger batteries, faster charging technologies, and expanding premium sub-brands.

Driving Diversity: The Evolution of EVs Across Market Segments

Electric vehicles continue to show strong potential for market expansion, while sustainability efforts are increasingly extending beyond passenger cars to traditionally fossil-fuelled transport modes such as buses, maritime vessels, and aviation.

Bus market

Electric public transportation is no longer a future vision – it is already becoming reality. Between 2025 and 2030, the sector is set to undergo its most significant transformation, driven by climate targets, supportive government policies, and rapid technological progress.

Demand is primarily fuelled by efforts to reduce urban air pollution, lower dependence on fossil fuels, and modernize public transport fleets. China remains the world's largest electric bus market, where domestic manufacturers benefit from integrated supply chains, lower component costs, and competitive pricing. Chinese OEMs typically offer broad portfolios covering both fully electric and hybrid buses across mid- and large-size segments.

Key players in the global electric bus market include AB Volvo, BYD, CAF, VDL Groep, and Yutong.

According to Research and Markets, the global electric bus market is expected to grow from USD 44.81 billion in 2025 to USD 51.78 billion in 2026, and to expand at CAGR of 16.38%, reaching USD 129.65 billion by 2032.[22]

Based on internal **Qoolers** market mapping conducted in 2025, approximately 70 manufacturers are currently active in the electric bus segment, representing a potential customer base for Qoolers.

Two-Wheeler Market

Electric two-wheelers are increasingly adopted as a sustainable alternative to conventional motorcycles and scooters, particularly in urban areas. Rising emphasis on emissions reduction, and cost-efficient mobility is driving adoption across both developed and emerging markets.

[22] https://www.researchandmarkets.com/reports/4896531/electric-bus-market-global-forecast-2026-2032?srsltid=AfmBOop5-FIcQlpx_s972gCtLFyf9PKq7yZePhRJq2Is8oW4DEusaTiB

Technological progress in batteries—especially improvements in energy density, charging speed, and reliability—has significantly enhanced vehicle performance and usability. Asia-Pacific dominates the global electric two-wheeler market, supported by high population density, and strong policy support. Electric two-wheelers offer a practical solution for simpler and more cost-effective transportation.

Key market players include Yamaha, Yadea, Gogoro, Giant Bicycles, and Jiangsu Xinri E-Vehicle.

According to Global Market Insights, the global electric two-wheeler market was valued at USD 78.6 billion in 2025 and is expected to grow from USD 82.6 billion in 2026 to USD 143.9 billion by 2035, representing a CAGR of 6.4%.[23]

Qoolers has identified nearly 150 manufacturing brands in this segment, highlighting a substantial opportunity for potential partnerships.

Boat Market

Electric boats are gaining traction as regulatory pressure and environmental concerns increase across the maritime sector. Europe currently represents a significant share of the market, supported by favourable regulation and a strong base of established manufacturers.

Demand today is concentrated in smaller recreational vessels (up to 20 feet), while larger boats and commercial vessels are expected to drive future growth as operators seek zero-emission solutions. Although lead-acid batteries remain in use due to lower costs, lithium-ion batteries are expanding rapidly, driven by higher efficiency, lower weight, and longer range.

Research and Markets projects that the global electric boat market will expand from USD 6.01 billion in 2025 to USD 20.1 billion by 2035, representing a compound annual growth rate (CAGR) of 11.59%.[24]

Qoolers´ internal research identified approximately 60 marine industry brands involved in electric propulsion. It is a great opportunity to Qoolers to try to deliver its advanced thermal management solutions, helping these brands achieve greater efficiency and innovation.

Aircraft Market

Electric aviation remains at an early stage of development, with battery weight and range continuing to limit large-scale deployment. Fully electric aircraft are therefore expected to remain focused on short-range and lightweight applications rather than long-haul aviation.

Advances in battery technology are enabling progress in electric vertical and conventional take-off and landing aircraft (eVTOL/eCTOL), particularly for four-seater aircraft, pilot training, urban air mobility, and short regional routes.

Growing environmental concerns and rising investment in experimental platforms are supporting gradual market development, although widespread commercial adoption is expected to remain limited in the near term.

[23] https://www.gminsights.com/industry-analysis/electric-two-wheeler-market

[24] https://www.globenewswire.com/news-release/2026/01/13/3217994/0/en/Electric-Boat-Market-Worth-6-Billion-in-2025-is-Projected-to-Exceed-20-Billion-by-2035-Driven-by-Demand-for-Eco-Friendly-Zero-Emission-Vessels-Bolstered-by-Advancements-in-Technolo.html

Significance of Batteries for Electric Vehicle Market

Batteries represent the core enabling technology of the EV market and will remain a critical growth driver as electrification expands across other market segments. It can therefore be assumed that battery production will increase rapidly to meet rising global demand.

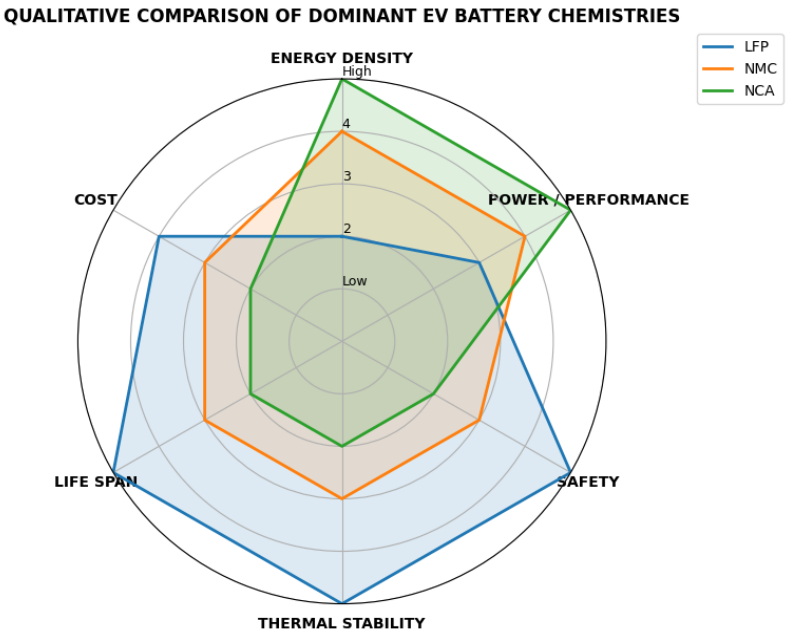
At the same time, intensified research and development efforts are reshaping the battery value chain. OEMs and suppliers are investing heavily in raw materials security, supply-chain diversification, and sustainability, spanning mining, processing, and recycling. Concerns over the availability of lithium, nickel, and cobalt, combined with geopolitical risks and environmental impacts, are accelerating innovation in alternative battery chemistries, including LFP, sodium-ion, solid-state, and post-lithium technologies. Parallel development efforts focus on increasing battery capacity to enable longer driving ranges, faster charging, and improved vehicle performance.

Beyond technology, batteries have become a strategic asset influencing cost competitiveness, supply-chain resilience, and geopolitical positioning. Manufacturers with strong control over battery chemistry development and localized production are gaining a structural advantage. Consequently, battery innovation and industrial scaling will play a decisive role in shaping EV market dynamics, determining which regions and players emerge as long-term leaders.

Key Players: LFP, NMC and NCA

In 2025, the most widely used cathode materials in EV batteries were LFP, NMC and NCA, consistent with the situation observed in 2024, according to market research conducted by Qoolers.

Figure 4: Qualitative comparison of dominant EV battery chemistries[25]



[25] Source: Qoolers, 2026

Lithium Iron Phosphate (LFP)

LFP batteries are characterized by long cycle life, strong thermal stability, and high safety levels, making them well suited for electric vehicles and energy storage applications. By eliminating the need for costly and scarce materials such as cobalt and nickel, LFP offers a cost-effective and more sustainable solution.

Their main limitation remains lower energy density compared with nickel-based chemistries, which can restrict driving range and performance. To achieve comparable energy capacity, LFP systems typically require larger or heavier battery packs, increasing overall weight and volume.

Despite these limitations, LFP adoption continues to expand as OEMs focus on affordable EV segments. This trend is most pronounced in China, the global leader in LFP deployment, and is gradually gaining traction in Europe and North America.

Nickel Manganese Cobalt (NMC)

NMC batteries offer a balanced combination of energy density and durability, making them a preferred choice for electric vehicles. Higher nickel content supports longer driving ranges but requires advanced thermal management to ensure safe and stable operation.

They are commonly used in EVs across Europe and North America and also in energy storage systems, particularly where high energy density is a critical requirement.

Nickel Cobalt Aluminium (NCA)

NCA technology provides very high energy density, supporting demanding applications that prioritize extended range and high performance. While increased nickel content enhances energy capacity, it also reduces thermal stability, necessitating sophisticated thermal management systems.

They are primarily used in premium EVs, most notably by Tesla, and are also considered for specialized lightweight applications. However, their broader adoption remains limited due to higher costs and stricter safety requirements.

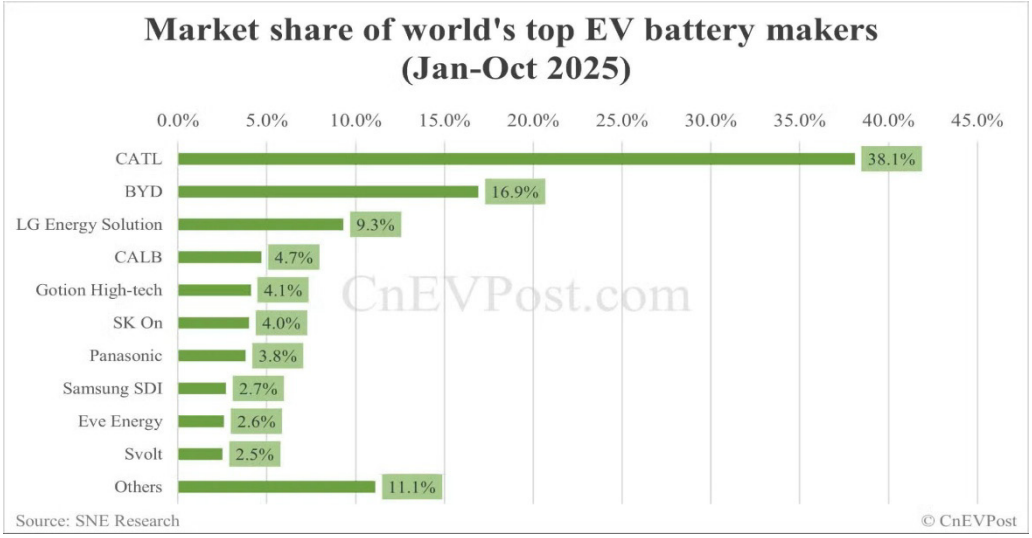
Leading Battery Manufacturers

The total energy capacity of batteries installed in electric vehicles (EVs, PHEVs, and HEVs) worldwide reached approximately 933.5 GWh from January to October, representing year-on-year growth of 35.2%, according to data by company SNE Research.

Chinese manufacturers continue to dominate the global EV battery market, with CATL maintaining its leading position. BYD, which manufactures both – electric vehicles and batteries – ranked second.[26]

[26] https://www.sneresearch.com/en/insight/release_view/545/page/0

Figure 5: Market share of world´s top EV battery makers (January-October 2025)[27]



Moreover, BYD and CATL are investing heavily in localized battery production in Europe to mitigate the impact of European tariff. Both companies are developing battery manufacturing facilities in Hungary. CATL already operates a plant in Germany and is planning an additional facility in Spain.

This localization strategy reflects the growing strategic importance of battery supply chains, as discussed in Chapter 7.

Developments in Battery Chemistry

Growing demand for electrified powertrains continues to drive rapid innovation in battery chemistry, as manufacturers balance cost, performance, safety, and sustainability.

LFP has become a mainstream battery chemistry, driven by its low cost, high safety, and cobalt-free composition, alongside strong growth in EV and energy storage applications. China remains the global leader in LFP adoption: total EV battery capacity in the country reached 769.7 GWh in 2025, a 40.4% year-on-year increase, with LFP accounting for roughly 80% of installed capacity.[28] According to Benchmark Mineral Intelligence, global lithium-ion battery demand grew 29% year on year in 2025, totalling 1.59 TWh.[29] While **NMC** and **NCA** chemistries continued to grow in absolute terms, their market share declined as LFP remained the fastest-growing chemistry.

Lithium manganese iron phosphate (LMFP) remains a niche but fast emerging cathode chemistry in 2025, offering higher energy density than LFP without the use of cobalt or nickel, although its current market share is still limited. By combining LFP's cost advantages with improved performance through the addition of manganese, LFMP could help narrow the gap between LFP and NMC-based batteries.

[27] Source: CnEVPost, based on SNE Research data
[28] https://cnevpost.com/2026/01/16/china-ev-battery-installations-in-2025/
[29] https://source.benchmarkminerals.com/article/global-lithium-ion-battery-demand-rose-29-in-2025

In parallel, **lithium manganese-rich (LMR)** batteries continue to attract interest for their potential to combine extended driving range with reduced material costs. OEMs such as General Motors and Ford are actively developing LMR technology, although challenges related to cycle life and voltage stability have delayed large-scale commercialization.

Sodium-ion batteries represent another potentially disruptive development. CATL introduced its Naxtra sodium-ion battery brand, offering energy density comparable to high-performance LFP, alongside lower cost, improved safety, and better cold-temperature performance. Large-scale deployment is planned from 2026 across EV, commercial vehicle, and stationary energy storage applications.[30]

Solid-state batteries also remain a key long-term focus, particularly among Chinese manufacturers. Dongfeng Motor is advancing solid-state development to improve energy density, safety, and low-temperature performance[31], while Geely, the parent company of Volvo, is accelerating its own solid-state development, with initial battery packs expected to be installed in pilot vehicles later this year. [32]

Both sodium-ion and solid-state battery chemistries exhibit distinct thermal behaviours and operating temperature requirements, increasing the need for tailored BTMS solutions.

What Lies Ahead?

The global EV battery market is expected to continue growing in terms of installed capacity, driven by rising electric vehicle adoption and ongoing electrification policies. However, the market is likely to remain under strong price pressure, particularly due to manufacturing overcapacity in Asia.

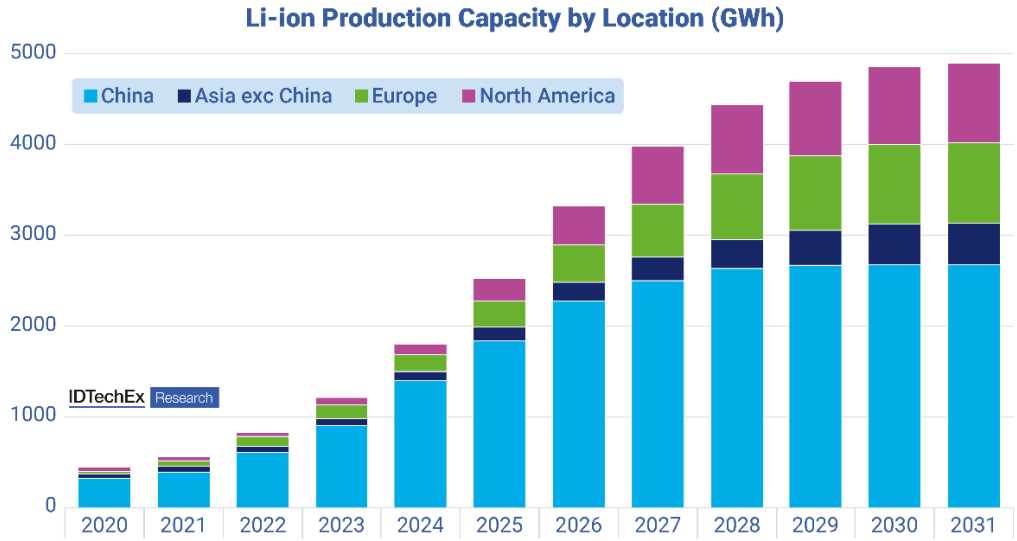
According to BloombergNEF, average battery pack prices are expected to decline by 3% in 2026, reaching approximately $105 per kilowatt-hour.[33]

Looking ahead, the International Energy Agency (IEA) estimates that global production capacity for batteries and key components could increase by 40–190% by 2030. Despite growing geographic diversification, China is expected to retain a dominant position, with at least 85% of capacity for most battery components still concentrated in the country by the end of the decade.[34]

IDTechEx forecasts that China is expected to retain a dominant share of global battery production capacity, even as Europe and North America significantly expand local manufacturing capabilities over the coming decade.

[30] https://electrek.co/2025/12/29/ev-battery-leader-catl-launching-new-cell-technology-2026/
[31] https://electrek.co/2026/01/15/chinese-ev-giant-tests-solid-state-batteries-with-620-miles-range/
[32] https://insideevs.com/news/785243/volvo-geely-solid-state-batteries-2026/
[33] https://www.bloomberg.com/news/articles/2025-12-09/bnef-why-global-battery-prices-are-expected-to-fall-in-2026?utm_source=chatgpt.com
[34] https://www.iea.org/reports/what-next-for-the-global-car-industry/present-and-future-prospects-of-electric-car-manufacturing

Figure 6: Li-ion Production Capacity by Location (GWh)[35]



Battery Thermal Management System (BTMS)

With growing global demand for electric vehicles and energy storage systems, alongside rising performance requirements for modern battery packs, effective Battery Thermal Management System (BTMS) is becoming increasingly critical.

BTMS plays a key role in maintaining optimal battery performance and extending battery lifespan and improving overall system efficiency. Precise temperature control reduces battery degradation, lowers the frequency of battery replacements, and helps to decrease the environmental footprint of electric vehicles. Safety is another benefit, as effective thermal regulation mitigates the risk of thermal runaway, which can lead to battery fires or explosions.

To manage heat more effectively, modern EV battery systems increasingly rely on advanced thermal solutions such as Phase Change Materials (PCMs), liquid cooling, and system-level thermal integration. These technologies help stabilize battery temperatures under varying operating conditions, including fast charging and extreme climates. As battery energy density and charging speeds continue to rise, thermal management has evolved from a supporting function into a core design requirement.

The BTMS market is influenced by multiple factors, including volatility in the prices and availability of critical raw materials such as lithium and cobalt, which affect battery design and cost structures. In addition, propulsion architectures, charging behaviour, and the expansion of fast-charging infrastructure significantly shape BTMS requirements. As a result, automakers are investing heavily in advanced thermal management technologies to meet stricter safety standards.

[35] Source: IDTechEx

Market and Innovation Trends

Technology development in BTMS is primarily focused on the following areas:

- **Phase-Change Materials (PCMs)**

  These materials absorb and release heat through phase transitions, allowing them to temporarily store excess thermal energy and reduce temperature peaks within battery packs. In BTMS applications, PCMs are typically used in combination with liquid or air-cooling systems rather than as standalone solutions. Their main contribution lies in improving temperature stability and uniformity during transient operating conditions such as rapid acceleration, fast charging, or short-term high-power loads, thereby enhancing battery safety, and extending service life.

- **Active Cooling Systems**

  Advanced liquid cooling architectures and refrigerant-based solutions offer superior temperature control and improved thermal uniformity. These systems are particularly critical for high-energy-density and high-performance battery packs, where precise temperature control is essential.

- **System-Level Thermal Integration**

  A growing trend is the integration of BTMS with vehicle HVAC systems, often through shared heat pump architectures. This system-level approach enables coordinated thermal management across the vehicle, improving overall energy efficiency, battery lifetime, and driving range.

- **Emerging coolants & fluids**

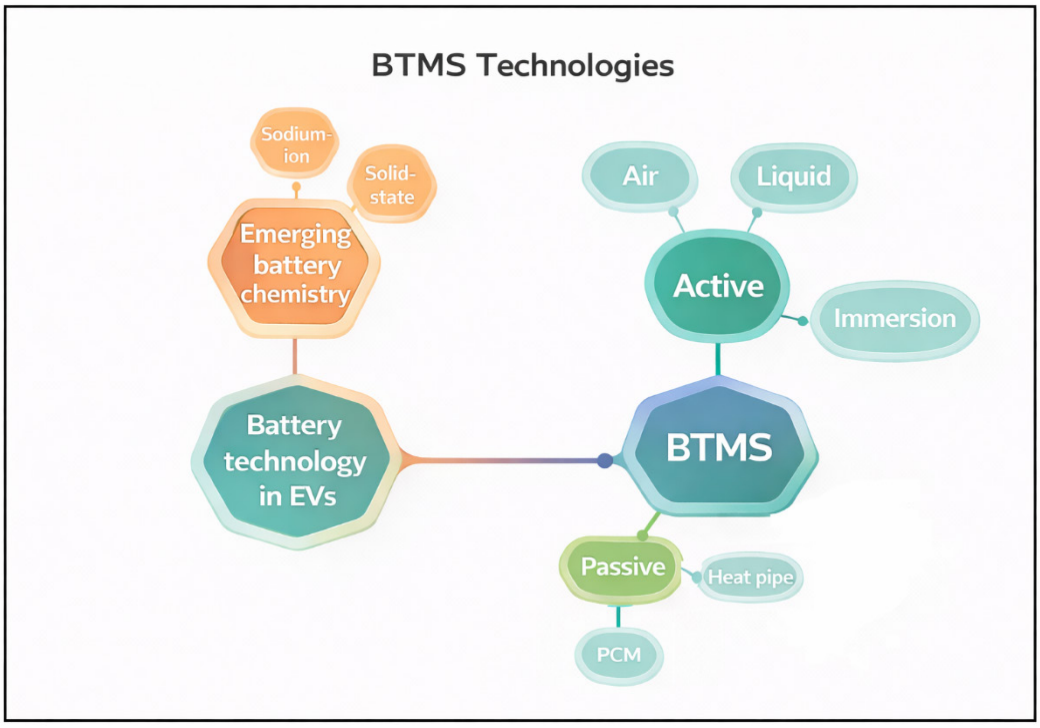
  Recent EU-funded research has focused on developing novel cooling fluids with optimized thermal and flow properties. The I-BAT project has explored mineral oil-based fluids enhanced with advanced additives to improve heat transfer and flow stability in liquid and immersion cooling applications. These engineered coolants are designed to meet the specific thermal requirements of modern battery systems and may further improve BTMS efficiency and reliability.[36]

Additionally, digitalization continues to play a growing role. AI-based control strategies, combined with advanced sensing, enable real-time thermal monitoring, predictive diagnostics, and adaptive cooling and heating strategies based on driving conditions, battery health, and environmental factors. These smart BTMS concepts support higher efficiency, improved reliability, and extended battery lifetime.

The global BTMS market is expected to grow from USD 4.42 billion in 2025 to USD 14.83 billion by 2034, at a CAGR of 14.4%, according to Research and Markets.[37]

[36] https://cordis.europa.eu/article/id/460119-novel-coolants-improve-performance-of-ev-batteries
[37] https://www.researchandmarkets.com/reports/6027451/battery-thermal-management-system-market?srsltid=AfmBOoo9zt7XFxBQmU8GhpIjnNMOllfD9QBLoRYEOm5XQ6xBl1EOlVGU

Figure 7: BTMS Technologies[38]



List of Key Players in Automotive BTMS market by Market Report Analytics[39]:

- MAHLE GmbH (Germany)
- Valeo (France)
- Hanon Systems (South Korea)
- Gentherm Incorporated (U.S.)
- Dana Incorporated (U.S.)
- Grayson Thermal Systems (UK)

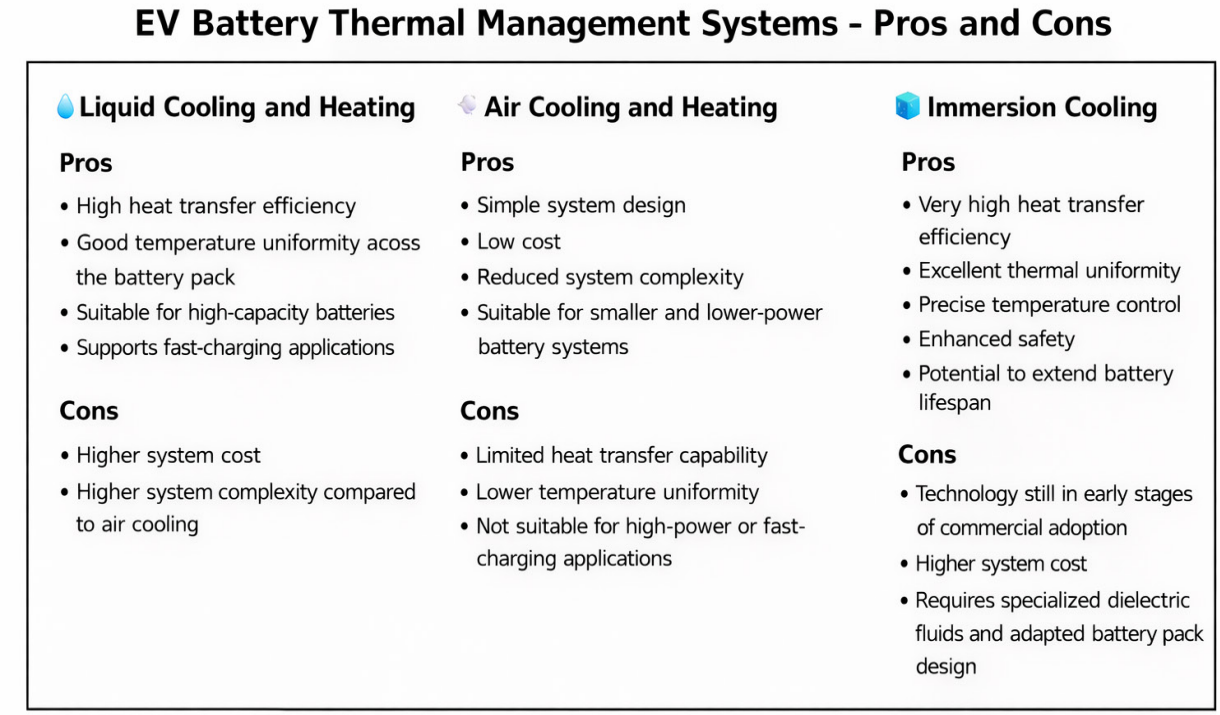
Developing efficient BTMS solutions for high-capacity batteries used in commercial electric vehicles and large-scale energy storage systems remains a significant technical challenge, particularly due to higher thermal loads and extended operating cycles.

BTMS by Technology

BTMS market for EVs can be segmented by technology, primarily into liquid cooling and heating, air cooling and heating, and immersion cooling. Each approach offers distinct advantages and addresses different performance and cost requirements within the market.

[38] Source: Qoolers, 2026
[39] https://www.marketreportanalytics.com/reports/automotive-battery-thermal-management-system-149119

Figure 8: EV Battery Thermal Management Systems – Pros and Cons[40]



Liquid Cooling and Heating

Liquid cooling and heating are a battery thermal management method that uses liquid as the primary medium. It includes both cooling and heating systems, where a pumped liquid circulates through the battery pack to absorb the heat generated by the batteries. This heat is then transported and released to a heat sink, effectively regulating the battery's temperature.

Due to their high heat transfer efficiency, good temperature uniformity, and ability to support high-capacity batteries and fast-charging applications, liquid-based BTMS solutions hold the largest share of the market.

Air Cooling and Heating

Air cooling and heating systems for battery thermal management rely on airflow to regulate battery temperature, using either cooling or heating modes depending on operating conditions. In cooling mode, air flows over the battery pack's surface to absorb and disperse the heat produced during operation, helping to prevent overheating and keep the battery within its ideal temperature range. In heating mode, warm air circulates around the battery pack to maintain an adequate temperature, ensuring the battery operates effectively and preventing performance issues caused by low temperatures.

These systems are valued for their straightforward design, low cost, and reduced system complexity, making them suitable for smaller and lower-power battery systems. However,

[40] Source: Qoolers, 2026

limited heat transfer capability and lower temperature uniformity restrict their use in high-performance and fast-charging applications.

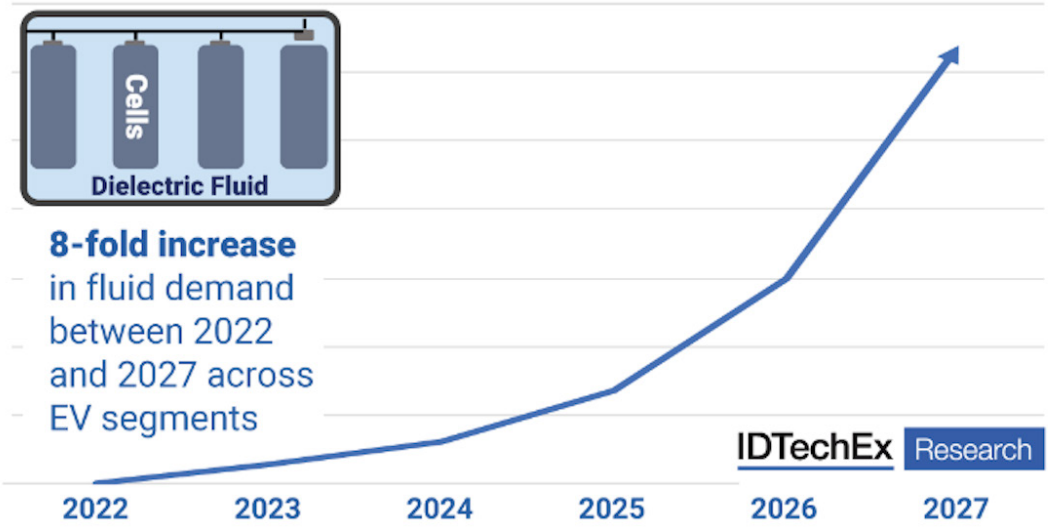
Immersion Cooling

This method is an advanced BTMS approach in which battery cells or modules are submerged in a dielectric fluid, enabling direct heat transfer and highly uniform temperature control. Immersion cooling offers excellent thermal uniformity, improved safety, and the potential for extended battery lifespan, making it well suited for next-generation EVs and large-scale energy storage systems.

In 2025, immersion cooling has continued to progress from research toward practical validation. Companies such as XING Mobility demonstrated immersion-cooled battery systems at major industry events, including CES 2025, highlighting Cell-to-Pack (CTP) and Cell-to-Chassis (CTC) architectures with integrated thermal management. These demonstrations indicate growing commercial readiness of immersion cooling for high-performance applications.[41]

Immersion cooling is expected to become a pivotal player in the battery thermal management system market, by IDTechEx.[42]

Figure 9: Market Share of Immersion Cooling in Electric Vehicles 2022-2027[43]



[41] https://www.xingmobility.com/en/news/1Ab8296E256B?utm
[42] https://batteriesnews.com/idtechex-discuss-why-immersion-cooling-might-not-final-battery-cooling-solution/#google_vignette
[43] Source: IDTechEx

Conclusion

The electric vehicle market continues to strengthen its position as a mainstream transportation segment, supported by sustained electrification policies, expanding model availability, and ongoing technological progress. As battery capacities increase and fast charging becomes more widespread, Battery Thermal Management Systems (BTMS) are emerging as a critical enabling technology, directly influencing vehicle safety, performance, and battery lifetime.

At the same time, the industry faces persistent challenges, including rising system complexity, cost pressures, evolving battery chemistries, and the need to manage higher thermal loads across diverse applications. Addressing these challenges requires continued innovation in BTMS architectures.

Overall, the analysis indicates that the BTMS market is well positioned for continued development, supported by the adoption of more advanced and intelligent thermal management solutions. Despite near-term technical and economic constraints, the long-term outlook for BTMS within electrified transport remains favourable.