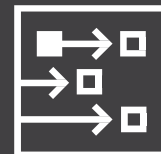


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Germany's Path to E-Mobility Excellence.

February 2025



Driving the future: Objectives & Insights

Energy Transition Tracker: Objectives

- **Review** of current **registration figures** for BEVs and prospected **demand in charging points (CP)**
- “Kicking the tires”: **Evaluation** of corresponding expansion **targets by the German Federal Government**
- **Identification of** market **developments**, interdependencies **and** regulatory **obstacles** to overcome

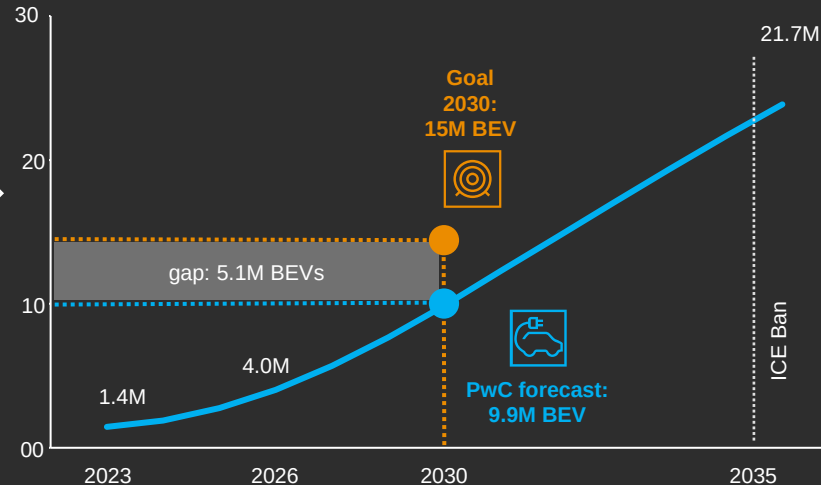
Energy Transition Tracker: Insights

- **Slowdown in BEV Adoption:** Despite technological advancements and improved charging infrastructure, the adoption of BEVs in Germany has significantly slowed down.
- **Forecast for BEV Registrations:** PwC forecasts that approximately 9.9 million BEVs will be registered in Germany by 2030, falling short of the government's target of 15 million BEVs by more than 5 million.
- In the medium and long term, considerable growth is still expected – driven by the ICE ban in 2035.
- **Technological advancements:** BEV have improved remarkably, with vehicle ranges tripling over the past decade and charging times significantly reduced.
- **Cost Parity:** BEV total ownership costs are nearing ICE vehicle costs, with full parity expected by 2030.
- **PwC suggestion:** reducing the target from 1,000,000 to 700,000 charging points due to tech advancements and usage patterns.
- **Electricity Demand & effects on the public grid:** BEV electricity demand will remain manageable, supported by renewable energies and **bidirectional charging** – reducing public grid reliance while supporting and stabilizing grid integration of renewables through flexible flow of electricity.
- **Regulatory Challenges:** A fragmented and opaque tariff system for BEV charging complicates acceptance. Standardizing tariffs is essential to simplify access and increase acceptance.
- **Political Uncertainties:** The unclear and often changing regulatory landscape, along with debates over alternative propulsion technologies, creates uncertainties for charging infrastructure providers and slows progress.
- **Future Outlook:** Despite current challenges, a market turnaround is anticipated in Germany as manufacturers strive to meet stringent emission targets. Government support for e-mobility remains crucial for success.

Germany's transition from Internal Combustion Engine (ICE) powered vehicles to Battery Electric Vehicles (BEV) has again slowed down considerably



Expected BEV passenger car park in Germany until 2035 (in millions)



Key Takeaways

- Germany's BEV market share is **declining in 2024** compared to 2023, as shown by sales figures from H1 2023 vs. H1 2024. The drop may be partly due to the end of purchase incentives, but this reason alone cannot be identified as the decisive factor.
- The transition to BEVs is complex and not straightforward. **PwC experts foresee a potential trend shift around year-end**, as stricter EU CO2 targets take effect in January 2025. To comply and avoid fines, many OEMs will likely boost BEV sales in 2025 and cut combustion vehicle inventories in Q4 2024.
- Despite this, **PwC forecasts that 9.9 million BEVs will be registered in Germany by 2030, falling more than 5 million short of the Government's 15 million BEV goal.**

Source and Info: PwC Autofacts Mobility Demand Model, S&P Global Mobility

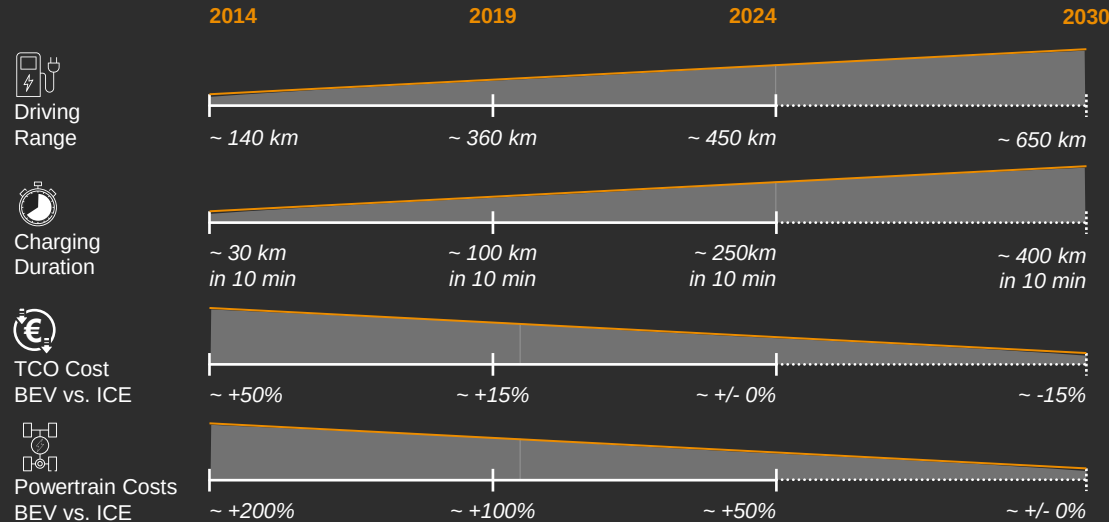
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PwC

The number of BEVs in Germany has stagnated, despite a decade of technological advancements that should have alleviated consumers' vehicle-related concerns



Average Data & Development



Tech & Future Outlook



Key Takeaways

- Over the past decade, the average **range of BEVs has tripled**, making them practical for daily use. **By 2030**, realistic **ranges +600 km** are expected.
- BEV **charging times have improved over eightfold efficiency**, enabling a 250 km range in 10 mins, eliminating long waits and enhancing user comfort.
- TCO analysis shows significant recent cost savings for BEVs**, which is **already partially achieved** and is **forecasted to be reached** in all segments and ranges **by 2025**, surpassing ICEs in 2030.
- The **vehicle powertrain** (i.a. engine, transmission, BEV battery) is a major cost factor. While ICE powertrains face cost pressure due to regulations (e.g. Euro 7) **cost parity between BEV and ICE powertrains is expected by 2030** due to tech advancements and economies of scale.

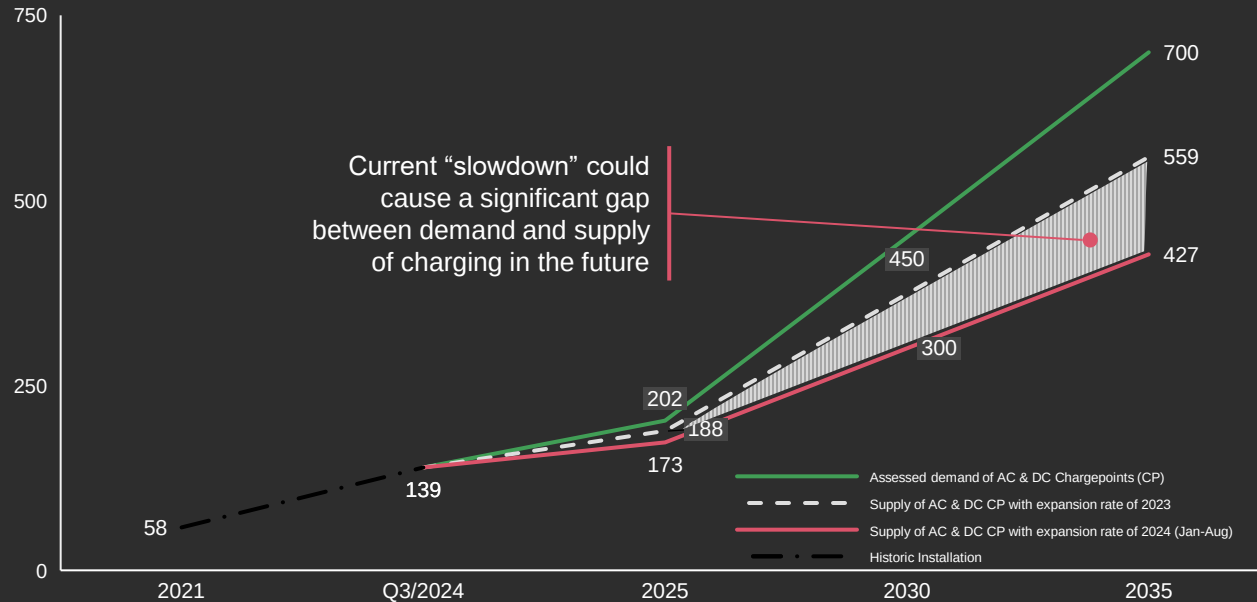
Source and Info: PwC Analysis and real-world driving data

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PwC

Ambitious goal of 1,000,000 public charging points by 2030 in Germany seems to be too high, evaluating the decreasing pace of construction

Public Charge Point Demand vs. Availability in Germany until 2035 (in thousands)



Key Takeaways

- The **average expansion rates for 2024** are markedly **slower compared** to those observed in **2023**.
- The recent significant decline in the 2024 expansion rate raises concerns that the **supply of charging stations may not align with projected BEV sales** if the current pace persists.
- The German Federal Government's objective of establishing **1,000,000 charging points** to support 9.9 million BEVs by 2030 appears increasingly **unattainable in light of the present expansion rate**.
- Concurrently, the **government's target warrants reconsideration**. PwC's future demand assessment of considering technological advancements in both BEVs and charging infrastructure, **suggests a need for slightly over 700,000 charging points**.

Sources and Info: PwC Analysis, Data on AC & DC charging points (CP) based on "Nationale Leitstelle Ladeinfrastruktur" (National Centre for Charging Infrastructure)

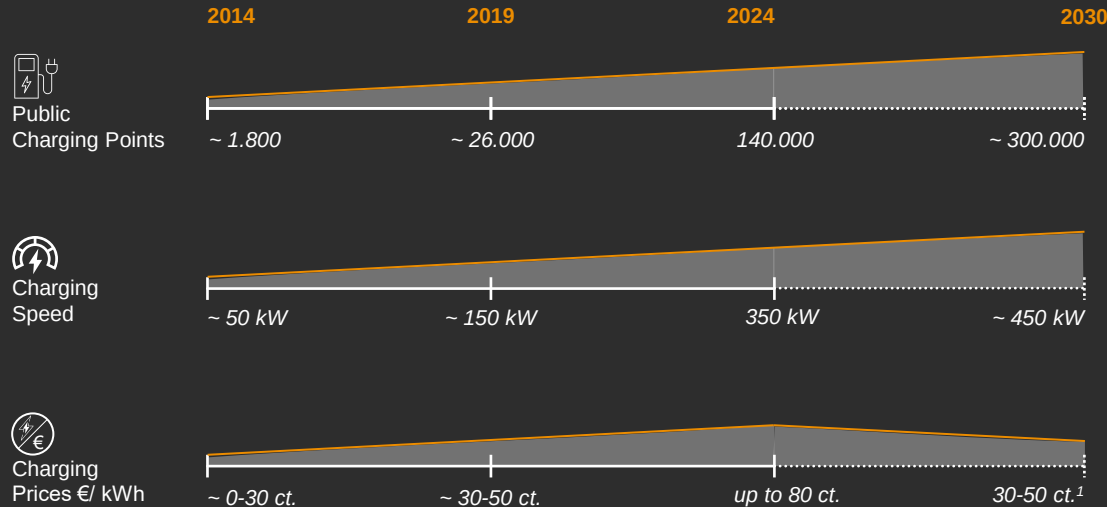
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PwC

The charging infrastructure for BEVs has not only increased in sheer number but has also experienced significant technological advancements in recent years



Average Data & Development



Tech & Future Outlook



Key Takeaways

- Over the past decade, the **expansion rate of public charging stations has surged**, and if the 2024 growth rate persists, the number of charging points would reach around 300,000 by 2030.
- **Charging capacities have also improved significantly**, with some stations offering up to 350 kW by 2024, depending on vehicle technology.
- **Public charging costs in Germany have sharply increased to about 80 cents per kWh for ad-hoc charging, much higher than the European average of 55 cents, making it one of the most expensive countries for charging.**
- **Future costs in 2030 remain uncertain.** To keep BEVs competitive with diesel vehicles, electricity costs should not exceed 50 cents per kWh.

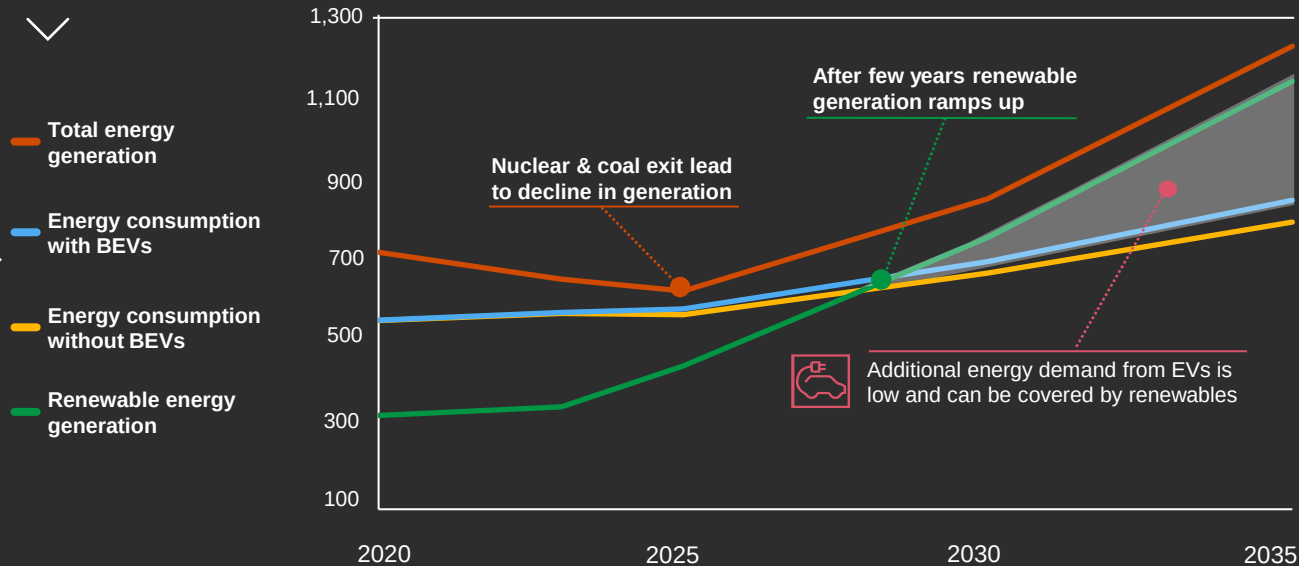
Sources and Info: PwC Analysis and real-world driving data; 1) Charging Prices for 2030 based on recommendation, to ensure cost-effectiveness compared to diesel vehicles.

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PwC

Renewable energy growth in Germany surpasses the electricity demand from new BEVs, ensuring a sufficient supply despite the increase in BEV numbers

Energy generation vs. demand – with and without BEVs in Germany until 2035 (in TWh)



Key Takeaways

- The deployment of millions of BEVs is expected to result in only a marginal increase in (green) electricity demand in Germany, which will remain below the overall supply capacity – offering opportunities for sustainable fleet charging.
- In view of the current challenges of the energy transition, amid cost fairness and **system stabilization**, smart and bidirectional charging technologies (e.g. V2G) can provide the needed **flexibility services** for the benefit of the grid.
- The expected growth of PV systems, high-performance energy storage systems and vehicle-to-home (V2H) applications will also further reduce dependence on the public electricity grid.

Sources and Info: PwC Analysis, BMWK (2023), NEP 2027/2045

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PwC

Despite advancements in BEV technology, charging infrastructure, and power supply security, new external factors hinder the electrification of cars in Germany

Subject Matter

Maturity Level

Driving Range	
Charging Duration	
Public Charging Stations	
(Renewable) Electricity Supply	
Available Vehicle Models	
Charging Prices & Tariffs	
Regulatory Framework	
Governmental Commitment	

 = steadily progressing  = needs improvement  = intervention needed



Key Takeaways

- ☒ With **cutting-edge technology** and **ongoing advancements**, **BEVs** have become a preferred choice, **nearing parity** with the performance of **ICE** vehicles
- ☒ A **strong charging infrastructure** and **state-of-the-art technology** effectively address and **eliminate** any **supply-related concerns**
- ☒ Despite the **increase in BEV** usage, **electricity demand** is expected to **remain below supply** levels. **Renewable energy sources** will **ensure** that BEVs are powered by **100% green electricity**
- ☒ The **limited diversity in BEV offerings**, focused on luxury and SUVs, highlights the **need for smaller, affordable car models** to meet broader consumer demands. By 2025, more models are anticipated to meet consumer needs and boost adoption
- ☐ The **adoption** of BEVs is **hindered by complex**, fragmented **charging tariffs** with many providers and unclear pricing. **Standardizing** these **tariffs** is essential to **simplify access**, boost acceptance, and speed up the transition to electric mobility
- ☐ The ambiguous and often **unclear regulatory framework**, along with constantly changing proposals, intensifies uncertainties for charging infrastructure providers and increases the complexity of the sector
- ☐ A **clear government commitment is essential**. Unproductive debates on alternative propulsion and support for combustion engines must end. **Germany's new government should decisively promote electric mobility** – including the **stronger representation of national interests towards the European Commission**

Challenges and Opportunities in Germany's BEV Market amidst Global Competition and Renewable Energy Goals

Key takeaways and implications



EV market

- Despite record production, Germany's BEV market faces challenges with declining domestic sales.
- In November 2024, about 35,200 BEVs were registered, a 22% drop from the previous year.
- Global competition is intensifying, particularly due to investment programs in the US and China.
- China's growing BEV exports may make Europe a net importer of Chinese cars by 2024.
- A market turnaround is anticipated in Germany as manufacturers work to meet stringent emission targets.
- To boost sales, some manufacturers are cutting prices or offering more attractive financing deals.
- Whether the German Federal Government can achieve its target of 15 million BEVs by 2030 remains to be seen.



Charging infrastructure and energy demand

- By 2030, Germany's energy generation capacity will be sufficient to meet the demands of 15 million battery electric vehicles (BEVs).
- The number of charging points affects user perception, but their low utilization rates suggest that effective application is more important than quantity.
- There is a growing need for regulatory measures to streamline the charging process, unify tariffs, and clarify pricing structures.
- As BEV charging capacities and speeds increase, Direct Current/High Power Charging (DC/HPC) will become increasingly important – and most likely replace public AC charging in the medium term.



CO₂-emissions and efficiency

- The German Federal Government aims for 100% renewable electricity by 2038.
- BEVs remain the most efficient individual transport compared to ICEs and FCEVs.
- CO₂ emissions will reflect the energy mix until it's 100% renewable.
- Currently, only BEVs offer a chance to meet climate targets for private transport.
- BEVs have the lowest local CO₂ emissions and may remain the most energy-efficient if Germany meets its 2038 renewable energy goal.



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Our PwC Germany E-Mobility team working exclusively on E-Mobility projects. We focus on commercial and financial advice for E-Mobility, BEV fleets and charging infrastructure. We offer M&A advice, benchmarking, valuation and financial modelling as well as strategic advice. Our clients include project developers, utilities, banks, strategic and financial investors.

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