A POLICY EVALUATION OF ELECTROMOBILITY IN GERMANY

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Overview

Over the past 30 years, Germany has failed to lower the carbon intensity substantially despite more energy-efficient drive technologies and exhaust gas purification. In order to achieve the climate protection goals set by the Federal Government, 15 million electric passenger vehicles are needed on Germany's roads by 2030, with 1.3 mio electric passenger vehicles registered as of February 2022.

In this study, we evaluate the policies applied for the market ramp-up of battery-electric passenger vehicles (BEV) as well as of battery-electric and fuel cell busses in Germany.

Methods

Electromobility is a key component in achieving climate protection goals. The National Innovation Programme for Hydrogen and Fuel Cell Technology (NOW) supports the German Federal Ministry of Digital Affairs and Transport (BMDV) in implementing the Electromobility Funding Directive, which is driving the ramp-up of electric mobility and paving the way for the complete market penetration of electric vehicles. The climate policy objective of NOW is to (co-)shape an energy-efficient and environmentally compatible transport sector by developing renewable energy sources in transport.

The policy instruments scrutinized in this study include purchase subsidies, fleet electrification concepts, as well as research and development for passenger BEV as well as of battery-electric and fuel cell busses. Analyses are based on fleet sizes and subsidies spent.

As of February 2022, there are 1.3 mio electric passenger vehicles registered in Germany (50% BEV and 50% plug-in hybrid electric vehicles (PHEV)).

As for busses, there are approximately 80,000 busses registered in Germany in total, around 50% of which are used for public transport. With 1,3000 battery and 60 fuel cell busses, the share of zero emission vehicles is rather negligible at this point. However, given regulative measurements such as the EU Clean Vehicles Directive (CVD) and a vast amount of purchase subsidies by the German Federal Government, we expect a substantial uptake in e-busses within the next five years. In a first wave the Federal Government has granted subsidies for 1,600 zero emission busses, which alone means doubling the total amount of ZEB on German streets.

If we investigate the average share of zero emission busses in monthly registrations, we find that it has risen substantially from below 0.5% in January 2018, over 6.4% in January 2021, to 11.2% in March 2022. Still this share has to continue rising in order for the quota defined by the CVD to be met by 2025.

Results

In order to achieve the climate targets, the greatest lever is that (1) the EU CO_2 fleet emissions thresholds are complied with and that the de facto bans on the registration of combustion engines in the EU are taken seriously. Two-thirds of the vehicles produced in Germany are exported to EU countries that are already issuing national plans for bans on the registration of combustion engines. To this end, (2) the production capacities of electric vehicles should be increased, the product range multiplied and the distribution of electric vehicles strengthened, including training and further education of personnel. In addition, (3) customer requirements for climate-friendly drives should be given greater consideration and cost, tax, and environmental advantages should be used as sales arguments. To illustrate the financial advantage of electric vehicles over combustion vehicles, the total cost of ownership (TCO) should be shown instead of the purchase price. (4) the sales focus should not solely be set on large vehicles with long ranges. Rather, vehicles should be developed that meet market requirements. On average, 37.8 km per day are covered by car in Germany. Long ranges are rarely needed. This requires (5) the participation of the industry in the strategy platform "Transformation Automotive Industry" agreed in the coalition agreement. (6) the further development of the recycling of components and systems of battery-electric vehicles as well as innovative charging technologies is indispensable for a long-term sustainable circular economy (keyword resource availability). In

addition, (7) bidirectional charging and the use of e-vehicles as energy storage systems will make an important contribution to sector and grid coupling within the power grids.

Conclusions

As for passenger vehicles, results suggest that CO_2 fleet emissions thresholds and a carbon tax have a bigger impact than purchase subsidies on reaching a fleet size of 15 million passenger electric vehicles needed to achieve CO_2 emission reduction targets. As for e-busses, CVD-based predictions of electrification of bus and municipal fleets suggest a combination of CVD, purchase subsidies, and fleet electrification concepts as successful drivers of the electrification of those transport modes.

Overall, it is now up to the industry to translate the economies of scale of the now extensive and appealing range of products into lower customer prices. The offer and the availability of charging infrastructure must be expanded nationwide. Only with a well-developed infrastructure users will switch to electromobility. In addition to the broad market ramp-up of battery-electric electromobility, renewable fuels are a decisive lever for reducing greenhouse gases in transport. These should be used in particular in transport sectors that are difficult to electrify, such as air and maritime transport. At the same time, a central part of reaching the climate goals is traffic avoidance and traffic relocation which entails a shift to a then decarbonized public transport. The industry is challenged throughout the EU, because mobility does not stop at borders. A broad openness to technology is now required.

References

NOW (2020): Annual Report. NOW GmbH Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie. Berlin. https://www.now-gmbh.de/wp-content/uploads/2021/04/NOW-Jahresbericht-2020.pdf.

Wolff, Stefanie (2022 forthcoming): Elektromobilität – zentraler Baustein der Verkehrswende, published in: Klimaschutz und Energiewende in Deutschland, Herausforderungen – Lösungsbeiträge – Zukunftsperspektiven, Ed: Sahling, Udo (2022), Springer Spektrum, Berlin, Heidelberg.

Wolff, Stefanie (2022 forthcoming): Stated Preferences Concerning Private Passenger und Light-Duty Electric Vehicles in Germany. Dissertation, RWTH Aachen University, E.ON Energy Research Center, Institute for Future Energy Consumer Needs and Behavior (FCN), Aachen.

Wolff, Stefanie; Madlener, Reinhard (2019a): Charged up? Preferences for Electric Vehicle Charging und Implications for Charging Infrastructure Planning. In *FCN Working Paper* 3/2019. https://ssrn.com/abstract=3491629.

Wolff, Stefanie; Madlener, Reinhard (2019b): Driven by change: Commercial drivers' acceptance und efficiency perceptions of light-duty electric vehicle usage in Germany. In *Transportation Research Part C: Emerging Technologies* 105, S. 262–282. DOI: 10.1016/j.trc.2019.05.017.

Wolff, Stefanie; Madlener, Reinhard (2020): Willing to Pay? Spatial Heterogeneity of e-Vehicle Charging Preferences in Germany. In *FCN Working Paper* 9/2020. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3676410.