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Title: Mind the gap: Tuning the BEV incentives to specific market-segment and user needs, to bridge the final years until price-parity and TCO-advantages is reached market-wide.

A study, based upon the vehicle sales data and policy overviews on the European Alternative Fuels Observatory (EAFO, [European Alternative Fuels Observatory \(europa.eu\)](https://european-observatory.europa.eu))

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Executive Summary

European countries are “banning” ICE (Internal Combustion Engine) vehicle sales at the 2035 deadline, proposed by the European Commission. In line with this, most manufacturers are also announcing phase out targets for ICE sales in Europe, as early as 2027. TCO (Total cost of ownership) parity and advantages of BEV’s (Battery Electric Vehicles) over ICE’s as well as the expected overall price parity of BEV’s over ICE’s, will make consumers and companies choose for purchasing BEV’s even without tax and other financial advantages. 100% zero emission vehicles sales are expected to take latest till 2030 and maybe even some years earlier. However, till that time the speed of market uptake will still depend to public policies, incentives, and regulations on national level. Capitalizing on the European Alternative Fuels Observatory (EAFO), our research shows, that of the current incentives portfolio of various EU countries it has become clear that the range of policies is much more diverse and finer grained tailored than some years ago. To maximize impact, well targeted interventions are needed considering user segment. This paper offers a user centric policy inventory for decision makers in the public sector. globally, based on good European practices. From this inventory, can choose the instruments most suitable for the country specific situation, to bridge the gap until the moment that the market is ready for incentive-free 100% EV sales.

1 Introduction

Recent policies, legislation, and regulation by the European Commission¹ have worked as a multiplier for policies of the EU member states on stimulating the uptake of zero emission vehicles as well as that it has been decisive for the strategies of the vehicle manufacturers. Resulting in countries “banning” ICE (Internal Combustion Engine) vehicle sales at or some years ahead of the EC 2035 deadline (although there is still a loophole for eFuel powered ICE’s). In anticipation of the legislation, most manufacturers having announced phasing out ICE sales for Europe, some even as early as by 2027.

In parallel existing and upcoming TCO (Total cost of ownership) parity and advantages of BEV’s (Battery Electric Vehicles) over ICE’s as well as the expected overall price parity of BEV’s over ICE’s, will make consumers and companies choose for purchasing BEV’s even without tax and other financial advantages. Which resulting in fast growing sales percentages of BEV’s driven by market-pull instead of “public policy push” and will result in fast decline of ICE sales. Although this will differ from country to country, between

¹According to EU data, transportation is the only sector in which greenhouse gas emissions have increased in the past three decades, rising 33.5% between 1990 and 2019 (EEA, 2021). The EU wants to drastically reduce emissions from transportation by 2050 and promote electric vehicles. Passenger cars are a major polluter, accounting for 61% of total CO2 emissions from road transport (IEA, 2022). Carmakers will be required to reduce the emissions of new cars sold by 55% in 2030, compared to 2021, before reaching a 100% cut five years later (EP, 2022). See for more information: The European climate law makes and its legal obligation to reduce EU emissions by at least 55% by 2030 as part of the fit-for-55 package; the Effort Sharing regulation; the Clean Vehicle Directive; The upcoming EU ZEV Mandate (The European Parliament and Council agreement to ensuring all new cars and vans registered in Europe will be zero-emission by 2035); as well as other facilitation regulations like the Alternative Fuels Infrastructure Regulation Clean Vehicles Directive (europa.eu); https://ec.europa.eu/commission/presscorner/detail/en/IP_22_6462 ; https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3543

market-segment and between vehicle segments, and will depend on vehicle supply. The general believe is that this market driven transition period towards 100% zero emission vehicles sales will be take latest till 2030 and maybe even some years earlier.

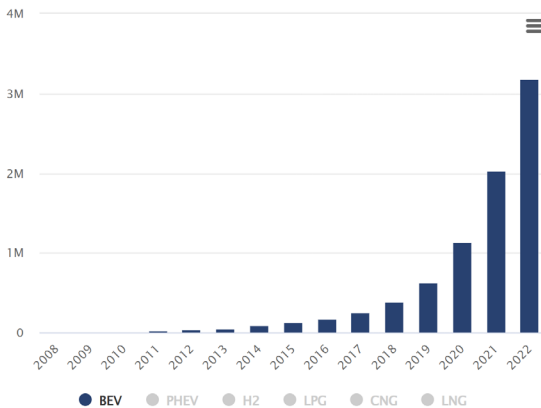
However, till that time the speed of market uptake will still depend to public policies, incentives, and regulations on national level. Whereas the mainstream incentive policies which have been adopted and studied from the “early years of BEV-sales” onwards, are well known, public policy makers are searching for guidance on which incentive policies suit their specific targets best, in terms of reaching the targeted market/vehicle/application/user-segments. From our quick scan of the current incentives portfolio of various EU countries it has become clear that the range of policies is much more diverse and finer grained tailored than some years ago. At the same time, while smaller subsidies are required per vehicle sold, the size of the market will lead to increased overall public budgets to be assigned to these incentives, making it ever more important for governments to choose for the best value-for-money incentive measures.

On top of many market niches, it is for example clear that the most difficult vehicle/user group segment to have converted to zero-emission vehicles are private buyers for small cars, with low yearly mileage. Same counts for the vast market of second-hand car buyers, and the almost dominantly second-hand car markets in Central and Eastern European countries. Moreover, with the average life span of a new ICE car of almost 20 years (in case of the Dutch market), the focus will need to shift from stimulating BEV to also avoiding ICE sales, already ahead of the upcoming “bans”.

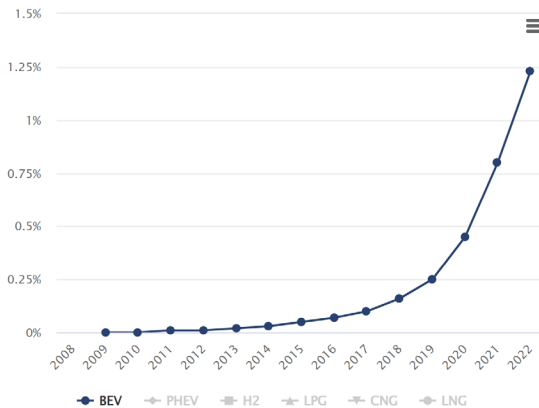
2 Current uptake of BEVs in Europe

To analyze the challenges of electrifying electric passenger vehicles our research focuses on the frontrunning countries with the largest fleets already in operation. Our report focuses only on the full electric passenger vehicles (BEV’s) and not on plug-in hybrid vehicles (PHEV’s). Within the European Union, already more than 3 million BEV’s are in the fleet by the end of 2022. This is a share of 1,2% of the passenger vehicles fleet (almost 300 million passenger cars).

Total number of alternative fuelled (BEV, PHEV, H2, LPG, CNG, LNG) passenger cars (M1).

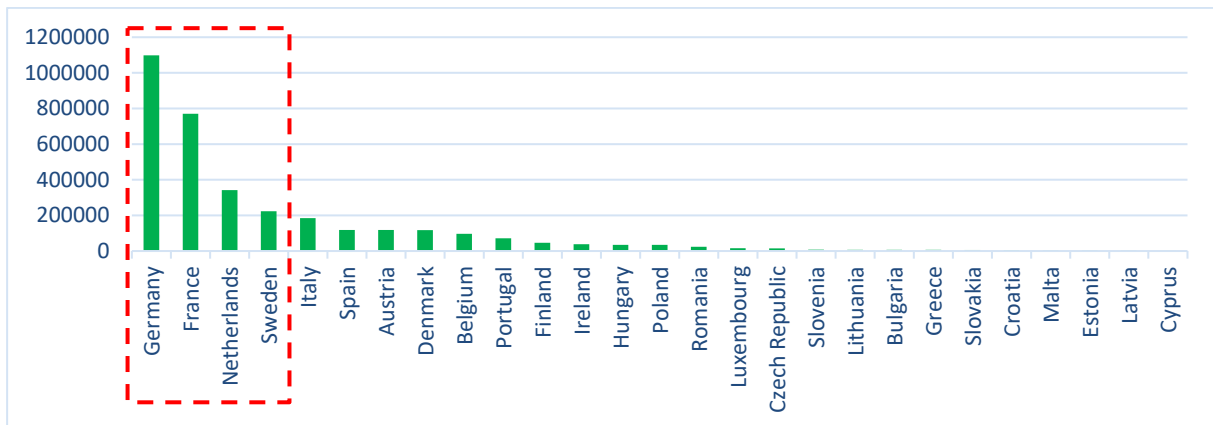


Fleet of alternative fuelled (BEV, PHEV, H2, LPG, CNG, LNG) passenger cars as a percentage of the total fleet.



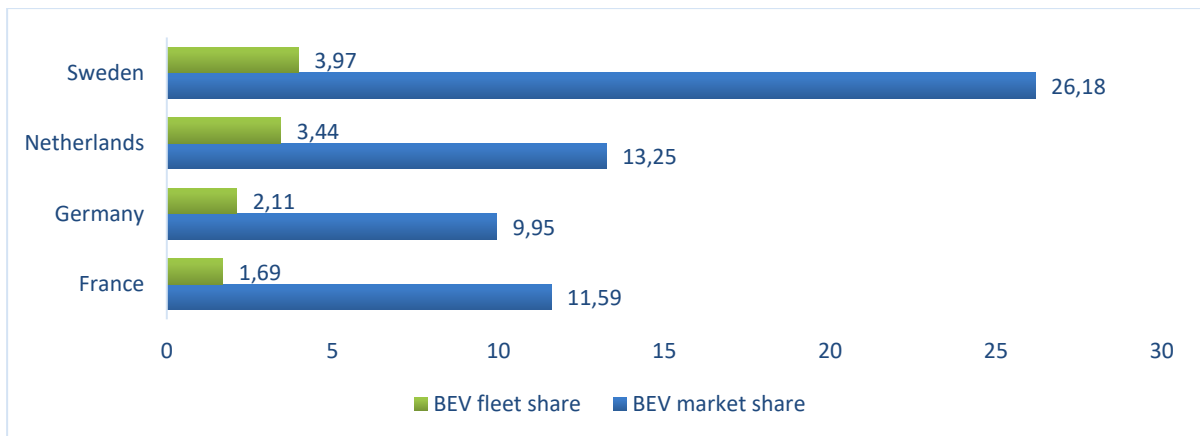
1. Figure Total BEV fleet in EU and fleet percentage BEV in EU

In the last 2 years (2021, 2022) the fleet of BEV’s in the EU grew by appr 1 million vehicles each year, with an average sales share of 9% in 2021 and 12% in 2022. However, if we compare the 27 different EU member states it shows that only the absolute frontrunners in Europe already have a decent fleet of BEV’s. There are two countries with an already large fleet of BEV’s in absolute numbers with a fleet of over 1 million BEV’s in Germany (2,1% fleet share) and 750.000 in France (1,7% fleet share). Both these countries together have 60% share of the total EU BEV fleet. Two countries with a relatively large fleet are The Netherlands (330.000 BEV’s, 3,5% fleet share) and Sweden (220.000 BEV’s, 4,0% fleet share). These two countries have the largest BEV fleet share within the EU, together with Denmark and Luxembourg, but those countries have a small total fleet of passenger vehicles.



2. Figure: Total number of electric (BEV) passenger cars (M1) in 2022.

Among the European countries, Germany, France, Netherlands, and Sweden stand out as the most successful in terms of BEV uptake. With over 1,098,752 registered electric vehicles in 2022, Germany has the largest BEV fleet in Europe, while France and the Netherlands follow closely behind with 770,771 and 341,988 registered electric vehicles, respectively. Sweden has a remarkable 26.18% BEV market share of total registrations, the highest among all European countries. These numbers suggest that these four countries are leading the way in EV adoption, making them particularly interesting to analyze in terms of the factors contributing to their success, especially as government incentives. Therefore, understanding the strategies employed by Germany, France, Netherlands, and Sweden could be key in shaping policies and strategies for other countries looking to follow their lead and accelerate their transition towards a greener transport sector.



3. Figure: BEV Market share (%) and Fleet share (%) of selected countries

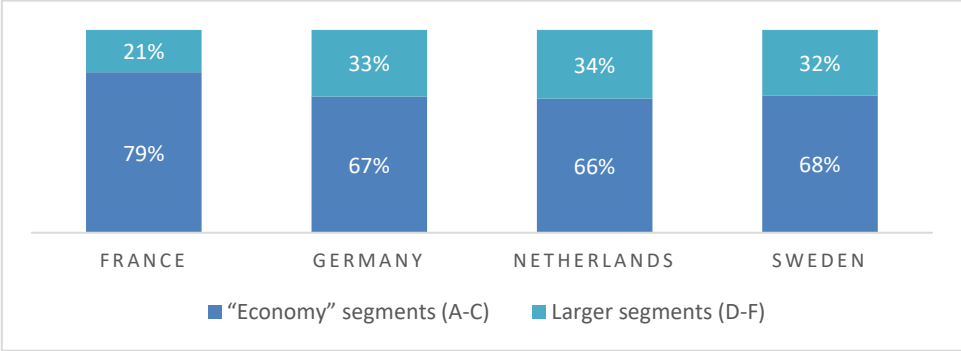
It is important to note that these rankings can vary depending on the time frame and data analyzed, but as of 2022, these four countries stand out as leaders in the BEV uptake in Europe.

3 Presenting a Policy Inventory Tool on BEV policy incentives

To reach a higher impact, a larger range of target audience needs to be reached. The smart adoption of incentives needs a proper segmentation of the target market. We already saw in previous publications, that the different segments of society, based on their position in the innovation adoption curve, react differently to different type of incentives [1]. Previous publications, focused on classifying interventions based on policy types [2-3]. In this paper we present a policy inventory tool, for policy makers to decide, which areas they want to incentivize. A tool based upon a user centric approach, and segmented into BEV user (sub) groups, mileage, and vehicle segment.

The results will in general be based upon a incentives studies which we (FIER Sustainable Mobility) have done yearly since 2014 on the effectiveness of BEV incentives, and more specific on an ongoing study for the national authorities on which current and announced incentives policies in the various EU member-states

are best fit-for-purpose to reach specific stimulation targets (for instance stimulating the “Economy” vehicle segment, or the business drivers, or the second hand market). The study is intended to support public authorities in the short – be bridged - time span in mind until TCO advantage and price-parity is reached in the majority of the two market (“Private” and “Business”) and vehicle segments (“Economy” and “Larger”). To achieve that, we propose a policy inventory tool we split the markets in business (company cars) and private (household users). On the BEV vehicles we split the vehicles in “Economy” car segments and “Larger” or “Luxury” car segments. The different incentive policies can be divided in the tool according to these elements, and grounded based on empirical evidence on countries which implemented them.



4. Figure: Share of “Economy” and “Larger” segments in BEV passenger car sales of the sample countries in 2022

The data shows that the share of BEVs sold in small segments (A, B, C) is higher than in large segments (D, E, F) in all four countries. The highest share of BEVs in small segments is in France (79%), followed by Sweden (68%), Germany (67%), and the Netherlands (66%). In contrast, the highest share of BEVs in large segments is in the Netherlands (34%), followed by the Germany (33%), Sweden (32%), and France (21%). The difference in the share of BEVs in small and large segments indicates the effectiveness of policies in promoting the adoption of BEVs in different segments. For instance, France provides different amounts of purchase subsidies to households and companies, and this could be one reason for the higher share of BEVs in the small segments in France. Additionally, both France and Germany cap the maximum amount of subsidy based on vehicle price, which was also introduced by Sweden, but only at a later stage.

The business market is an important segment for countries to incentivize zero emission because on average company cars drive more kilometers per year as private cars and company cars have a higher fleet percentage in the larger car segments with on average higher emissions from ICE vehicles. The private market is important for countries to incentivize zero emissions because in total fleets of passenger cars in a country the number of private cars is much higher than company cars. Incentives for zero emission vehicles in the business market are different from the incentives for zero emission vehicles in the private market. In the business market governments can decide to incentivize the owner of the vehicles (company) and/or the driver of the vehicles (employee), while in the private market in almost all cases the owner and driver are within the same household. For the private market it is an option to not only focus on incentives for new cars but also for zero emission secondhand cars.

The following table (Table 1.) represents a user-centric policy inventory designed for public authorities to fine-tune their incentives for different car segments and different battery electric vehicle (BEV) drivers.

	Company cars		Private (household users)		Regulated & public fleets	Others
	Owner	Driver	High mileage	Low mileage		
“Economy” segments (A-C)						

“Larger” or “Luxury” segments (D-F)						
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1. Table: User-centric policy inventory framework for electric vehicles (BEVs)

The user-centered policy inventory framework for electric vehicles (BEVs) can be an effective tool for policy makers in several ways. First, this framework could help public authorities to fine-tune incentives for different vehicle segments and different types of BEV drivers. By analyzing the data for different types of BEV users (company cars, private users, and regulated & public fleets), policy makers can identify the incentives that are most effective in increasing the uptake of BEVs in each segment. On the other hand, the framework can help policy makers to ensure that incentives are targeted at the segments that are most in need of them. For instance, if the data shows that BEV uptake is already high in the private household segment but low in the company car segment, policymakers can adjust incentives accordingly to increase BEV uptake in the company car segment.

In addition, policymakers can evaluate the effectiveness of their incentives using the user-centered policy inventory. Policymakers can assess which incentives have been most effective in promoting BEV adoption and which need to be revised by comparing the adoption rates of different segments before and after the introduction of specific incentives. Finally, the framework can also be used to assess the impact of BEV adoption on different segments of society. For example, policy makers can analyze the impact of BEV incentives on low mileage drivers, who may be less likely to adopt BEVs due to concerns about range anxiety. By identifying the specific needs of low mileage drivers, policy makers can design targeted incentives to encourage their adoption of BEVs. The “Regulated & public fleets” and “Others” categories are out of scope of this paper. Some examples of interesting incentives specified for selected segments will be discussed in the next chapter.

4 BEV incentives overview in selected countries

In this chapter we show some interesting examples of incentives specified for segments as presented in the tool in chapter 3. Most of these examples are from the 4 EU countries with a front running position, the focus of this chapter is not on giving a full overview of incentives from countries, but it shows relation between a specific incentive and the results in specific segments. The incentives presented in this paper are the situation of incentives active at the end of 2022 and compared with sales data of 2022. Any changes after 2022 are not included.

Germany, high incentives package for all segments private and business

According to the 2022 sales data, Germany is successful in incentivizing the smaller electric car segments (A, B, and C). These segments constitute a significant portion of the total battery electric vehicle (BEV) sales in Germany, with a total share of 65%. This is a positive sign for the German government's efforts to promote the uptake of BEVs in the country. Specifically, in the A segment, which includes the smallest cars, the share of BEV sales was 10%. In the B segment, which includes small family cars, the share was 12%. In the C segment, which includes medium-sized cars, the share was 43%. This suggests that German policies, such as purchase subsidies and tax incentives, may be successfully targeting these smaller segments and making BEVs more accessible and attractive to households and companies.

	Company cars		Private (household users)	
	Owner	Driver	High mileage	Low mileage
“Economy” segments (A-C)	Purchase subsidy max. 9.000 € EUR for BEV, (industry and government contribution) until end of 2022. Germany does not differentiate amount to households or companies.	BIK BEV until list price of EUR 60.000 only 25% of BIK from ICE vehicle There is no cap in time for Benefit in Kind taxation.	Purchase subsidy max. 9.000 € EUR for BEV, (industry and government contribution) until end of 2022. Germany does not differentiate amount to households or companies. Germany has a 10-year exemption for BEVs, also for circulation tax.	

	Germany has a 10-year exemption for BEVs, also for circulation tax.		
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France, differentiation incentives focusing more on small vehicles and private owners

Based on the sales data from 2022, France has been successful in supporting the purchase of smaller vehicles, as the majority of electric cars sold were in the small segments (A-C), which accounted for 73% of the total share. In contrast, only 27% of electric cars sold were in the larger segments (D-F). This clearly indicates that the incentives in France were likely targeted towards smaller vehicles, as explained in the table below, that were more attractive to consumers purchasing smaller cars. This could have been a conscious decision made by policy makers to encourage the adoption of smaller, more efficient electric cars to achieve the country's emission reduction targets.

	Company cars		Private (household users)	
	Owner	Driver	High mileage	Low mileage
“Economy” segments (A-C)	Purchase subsidy max. 4.000 EUR for BEV new cars (max 45.000 EUR price). 1000 EUR bonus for cars below 50K EUR.	BIK reduced by 50% compared to ICE car. Exemption from CO ₂ -based tax for vehicles below 60g CO ₂ /km.	Purchase subsidy max EUR 6.000 (up to 27% of list price). Purchase subsidy for secondhand BEV EUR 5.000 for cars below EUR 60K purchase price. Scrappage bonus max. 5000 EUR below 60K EUR and income.	
Larger segments (D-F)	Purchase subsidy max. 2.000 EUR for BEV when list price between 45-60k EUR. 1.000 EUR above 50.000 EUR.	BIK reduced by 50% compared to ICE car.	Purchase subsidy max EUR 6.000 (up to 27% of list price). Purchase subsidy for secondhand BEV EUR 5.000 for cars below EUR 60K purchase price. Exemption from mass-based malus.	

Sweden, differentiation between emission rates, not vehicle size or income

According to the sales data of 2022, Sweden had a larger share of electric vehicles sold in the larger segments (D-F), with a total of 41%. In contrast, the share of electric vehicles sold in the smaller segments (A-C) was only 59%, which is lower compared to other countries like France, Germany, and the Netherlands.

	Company cars		Private (household users)	
	Owner	Driver	High mileage	Low mileage
“Economy” segments (A-C)	70.000 SEK purchase bonus for BEVs.	BiK benefits, based on car price and income (on average 5.500 EUR for 4 years)	70.000 SEK purchase bonus for BEVs.	
Larger segments (D-F)	70.000 SEK purchase bonus for BEVs Max. 700.000 SEK purchase price	BiK benefits, based on car price and income (on average 7.400 EUR for 4 years)	70.000 SEK purchase bonus for BEVs Low annual road tax (360 SEK). Max. 700.000 SEK purchase price	70.000 SEK purchase bonus for BEVs Max. 700.000 SEK purchase price

Incentivize the private usage of company cars

Based on our empirical investigation, a 10% discrepancy in Benefit-in-Kind (BiK) taxation between Battery Electric Vehicles (BEVs) and Internal Combustion Engine (ICE) vehicles is required to facilitate greater adoption of BEVs. In countries where no net financial benefit is afforded to the BEV driver or where a net disadvantage is present, only the vehicle owner experiences a net financial gain. Nonetheless, in numerous instances, the decision-making process is ultimately determined by the driver. As examples, Denmark plans to introduce a surcharge on the BiK tax for ICE vehicles. Germany has no cap on BiK for BEVs and may

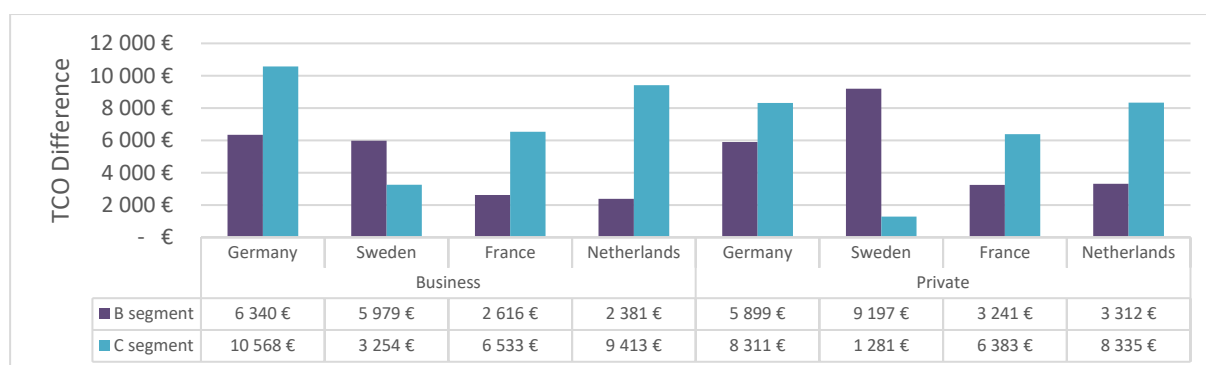
consider removing or increasing it. The Netherlands had previously implemented a policy of lowering BiK for BEVs.

5 Total cost of ownership analysis

“Economy” or small car segment

Looking at the TCO differences of BEVs in the B and C segment (“Economy”) of the selected countries, we can observe, that in most of the cases, despite significant difference of purchase prices, the parity is existent. Our analysis shows the Total Cost of Ownership (TCO) difference (in EUR) between BEVs and petrol cars across the four countries and two different car segments, B and C in the “Economy” category. Positive numbers indicate that the TCO of BEVs is more cost-effective than petrol cars over a four-year timeframe.

When we compare the results across countries, it is evident that Germany has the highest TCO difference for the B and also the C segment in the business category. In contrast, the Netherlands has the lowest TCO difference for the B segment, while Sweden has the lowest TCO difference for the C segment. In the private category, Sweden has the highest TCO difference for the B segment (9.197 EUR), while the lowest (1.281 EUR) for the C segment. Germany and Netherlands have the highest TCO difference (8.311, 8.335 EUR respectively) for the C segment. The Netherlands has a lower level of TCO difference for the B segments in both categories, while Germany has outstanding difference for both segments and categories. When it comes to the comparison of B and C segments, the TCO differences are higher for the C segment than the B segment in both business and private categories. The only exception is that of Sweden.



5. Figure: TCO difference (EUR) in the "Economy" segment for private and business use cars in selected countries (Source: own analysis)

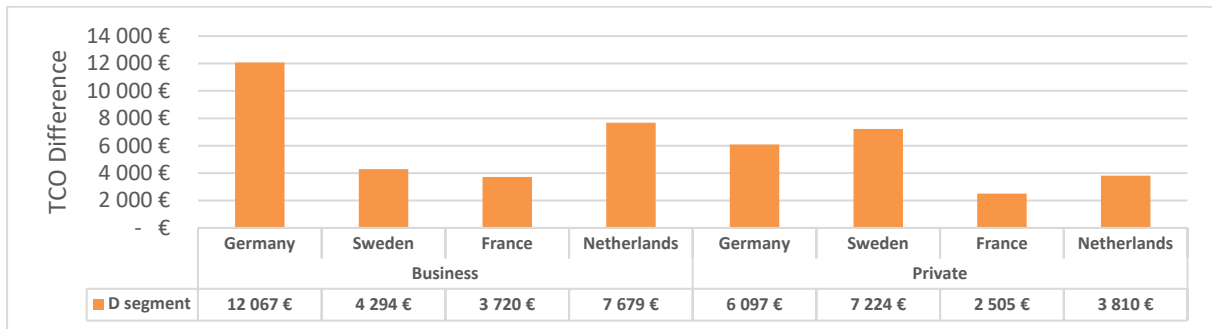
The data highlights that there are significant differences in the TCO of BEVs compared to petrol cars across different countries and car segments. The impact of purchase subsidies and tax benefits are reflected on the TCO differences and the sales figures in the countries. Additionally, the TCO differences are higher for the C segment than the B segment in both business and private categories, suggesting the medium family cars are more incentivized, than compact city cars. The very low share of Sweden’s registration in the “Economy” B segment (6%), is not well reflected on the high TCO difference of B segment cars, both business and private markets. This means that other preferences and conditions drove the consumer’s purchase decisions such as recharging infrastructure, mobility patterns or availability of models.

These findings could help policymakers fine-tune their incentives for “Economy” segment cars to encourage the uptake of BEVs in specific car segments and countries where they are most cost-effective.

“Large” or “Luxury” car segment

Looking at the Total Cost of Ownership (TCO) differences for the D segment, Germany has the highest TCO difference for business users, while Sweden has the lowest TCO difference for business users. France and the Netherlands fall somewhere in between. For private users, the Netherlands has the lowest TCO difference for the D segment, while Sweden has the highest.

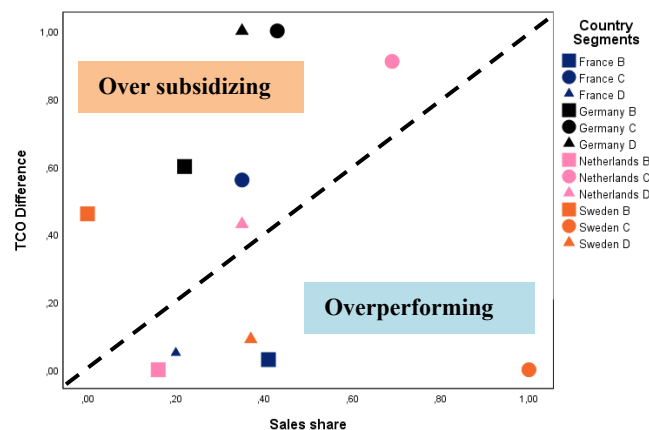
It is interesting to note that Germany has a higher TCO difference for the D segment compared to the B and C segments, both for business and private users, yet the registrations are much higher for the lower segments. This may suggest that Germany's incentives and policies are not as effective in promoting the uptake of BEVs in the larger car segments.



6. Figure: TCO differences in the D, “Larger” car segment (Source: own analysis)

Overall, the data suggests that France has been more successful in incentivizing the uptake of BEVs in the smaller C segment, as it has a relatively high TCO differences. Sweden had a high TCO difference in the private D segment, which suggests the association with the higher share of “Larger” car registrations.

If we look at how the TCO difference (figures are normalized) and the sales share compared to each other, we can identify patterns. Some countries and car segments have relatively high TCO difference, but limited sales share, such as the B segment in Sweden, while some others have a relatively high sales share (mostly C segment cars) with a low TCO difference, for instance the C segment in Sweden.



7. Figure: Sales share compared to TCO difference (adjusted with average retail price for each segment) in the selected countries and car segments. (Source: own analysis)

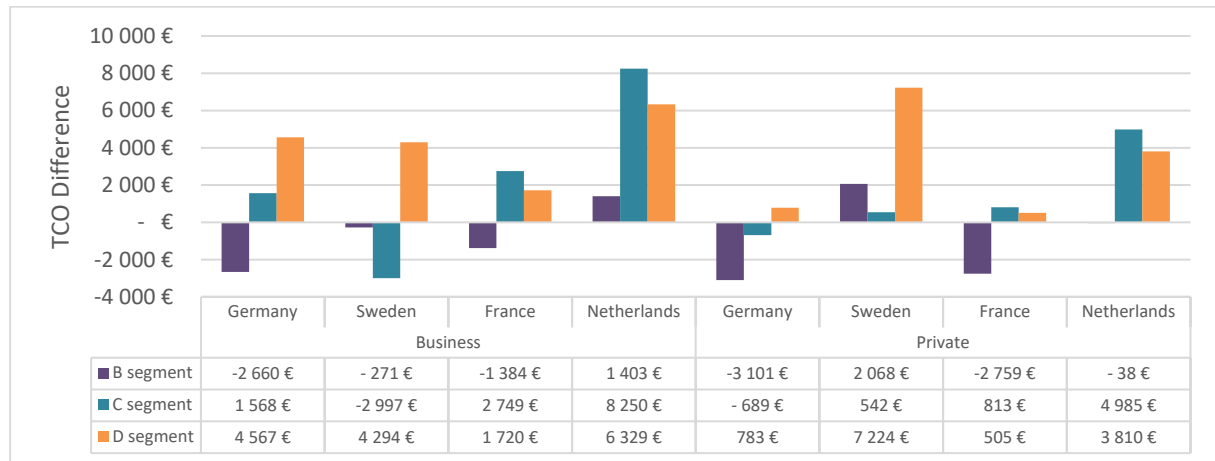
In general, we can expect higher sales, where TCO difference is more attractive for BEVs. On the other hand, lower sales, where the difference is lower. Those country segments, which best fit to the trend line plotted on the graph are incentivized the different segments most efficiently, therefore designed their policies in an optimal manner. Those above the line achieved less sales, than the attractiveness they provided in terms of costs. Those country segments below the line provided relatively lower cost attractiveness and achieved higher sales. It can be observed that, that B segment cars are both have a relative low share. In case of Germany and especially Sweden, they are they could have performed better in sales, while in the Netherlands and especially France, they outperformed their attractiveness. C segment cars have a relatively high TCO difference and medium to high sales share. While France and the Netherlands had an optimal performance, Germany achieved much less sales than expected, while Sweden achieved very high sales compared to their incentives. D segment cars have a high TCO difference in absolute values, but adjusted with vehicle prices, in Germany they are still over subsidized, while the Netherland show a good fit. In Sweden and France, their sales outperformed the expectations, meaning other factors affected purchase decisions than costs. It is interesting to see, that Sweden achieved very high sales for the C segment, while providing incentives,

resulting in a very low attractiveness for BEVs. On the other hand, Germany over subsidized especially the C and D segments.

No subsidies available scenario

Considering a scenario, where the financial incentives are removed from the TCO, the results show that in the absence of financial incentives, the TCO difference between BEVs and petrol cars varies significantly across different car segments and countries, and their significant role, especially for the “Economy” segment, particularly urban compact cars (B segment). For company cars in the B segment, only the Netherlands had a positive TCO difference of €1,403, while Germany, Sweden, and France had negative TCO differences of €2,660, €271, and €1,384, respectively. In the C segment, Sweden had the lowest negative TCO difference of €2,997, while the Netherlands had the highest positive TCO difference of €8,250. For the D segment, all four countries had positive TCO differences ranging from €4,294 in Sweden to €6,329 in the Netherlands.

For private users in the B segment, all four countries had negative TCO differences, ranging from €-3,101 in Germany to €2,068 in Sweden. In the C segment, the Netherlands had a high positive TCO difference of €4,985, while Germany had a low negative TCO difference of €-689. For the D segment, Sweden had the highest positive TCO difference of €7,224, while the Netherlands had a positive TCO difference of €3,810.



8. Figure: No financial incentives scenario applied to the TCO of selected countries and car segments (2022)

6 Conclusions – a user centric policy inventory

In this paper, we analyzed, the policies and attractiveness of BEVs in the European countries and zoomed in the top 4 performing countries to reveal, what how they perform in terms of fine-tuning their incentives for particular vehicle segments and target groups. Our study showed that adoption of BEVs in Europe is being driven by various state aid mechanisms, which have been differentiated across countries to target specific markets and user groups. The incentives include purchase subsidies, tax-based models, progressive purchase tax-systems, VAT exemptions, and disincentives for petrol cars and use of BEVs in regulated markets. The research reveals that financial incentives are still in need even in the top performing countries in Europe, although “Larger” or “Luxury” segments are already economically more attractive than the smaller “Economy” segments. Therefore, the optimal allocation of incentives is pivotal to support uptake until neutral TCO parity is achieved. Especially the “Economy” segments of low mileage vehicles need more specified support, otherwise petrol vehicles sold in 2023, will still be possible on the roads well after 2040.

Therefore, this paper suggests a different topology to consider both vehicle sizes and target markets, where more nuanced interventions support an optimal allocation of public funding, and maximum sale of BEVs against petrol vehicles. A large spectrum of instruments is being used and/or announced to target specific markets and user groups. The effectiveness of these incentives varies, and public policy makers require a hands-on Policy Inventory Tool on BEV policy incentives to categorize them and assess their effectiveness. This tool can be useful in determining the most suitable incentives for specific markets and user groups, ultimately driving the adoption of BEVs in Europe.

Target	Affected	Type	Measure	Explanation	
Business market	Driver	Incentivize the private usage of company cars	Profit tax and VAT	<ul style="list-style-type: none"> Higher BiK for ICEs Lowering BiK for BEVs Remove/ change the cap for BEVs 	
				Remove cap on any BiK discount	
	Owner	Incentivize the ownership of company cars	Profit tax and VAT	Non-financial	Company pledges
				Direct and indirect purchase grants	Purchase grant
					Interest free loans / capped leasing price for BEV purchase
					Prolongation ownership tax exemptions
					Remove VAT deductibility for petrol vehicles
					Only allow cost deductibility for BEVs, exclude ICEs, PHEVs. Alternatively make these cost only partly deductible
	Tax exemption / reduction of private use of BEV on VAT compensation tax for private.				
Private (households)	High mileage	Price regulation	Electricity price cap	Energy price incentives	
			VAT exemption BEVs	Support private market (new and 2nd hand)	
		Direct and indirect purchase grants	Salary sacrifice	Tax credits	
			Purchase grant	Subsidize the deficit in the small segments	
			Interest free loans / capped leasing price for BEV purchase	Make BEV purchase affordable and achievable for otherwise ICE secondhand buyers	
	Low mileage (Economy)	Prioritize car sharing	Making ZE transport available to non-frequent users in smaller segments (A&B). Driver is not per se the owner anymore.	Subsidy at the user, for instance, a subsidy per km. Closure of certain road only for shared cars.	
		Road / circulation tax exemptions	Improve TCO of BEV for company cars	<ul style="list-style-type: none"> Tax based on CO2 emission, preferring BEV. Germany has a 10 year exemption for BEVs, also for circulation tax. 	

Various governments across Europe are implementing different state aid mechanisms to incentivize the adoption of battery electric vehicles. These policies can be broadly categorized into those targeting company drivers or private (household) drivers, as well as those incentivizing small economy vehicles or larger luxury vehicles. Key examples include:

- France and Austria offer different purchase subsidies to households and companies, while Germany does not differentiate. As a result, France is more successful in allocating funds and deliver a proportionate impact to the specific categories, especially in the “Economy” segment.
- Large grants in France and Germany have successfully stimulated smaller and larger segments, but Germany overall over subsidized most segments, while France favored smaller ones.
- Tax-based model in Norway, without progressive differentiation favors larger vehicle segments, such as SUVs, over smaller and more efficient vehicles. There is no financial incentive for consumers to choose smaller or more efficient vehicles over larger ones under this tax-based model in Norway, which is also reflected on sales figures.
- CO2-based progressive purchase tax systems in various countries tend to be more beneficial for larger luxury cars but have the unwanted side effect of overstimulating Plug-in Hybrid Vehicles (PHEVs). The cut back of PHEV incentives since 2023 clearly reflects the amendment of those countries who previously implemented such policies. Such policies also reflected in the sales of B segment vehicles in Sweden, despite very low cost benefits.
- In the Netherlands, cutbacks in incentives for businesses have resulted in larger TCO benefits for company car owners in larger segments, while the driver still benefits from incentives in lower medium segments.

- Norway's VAT exemption has proven effective in stimulating both the new and second-hand markets.
- Some countries (e.g., Belgium and Austria) are implementing disincentives for Internal Combustion Engine (ICE) vehicles by limiting VAT and/or profit-tax deductibles on private used ICE company cars, with the potential to steer the company car market towards BEVs.
- Denmark deducts a fixed amount of the list price to calculate income tax on private use, while others use surcharges on list prices. In Sweden, the company personal income for an employee who has access to a company car for private use is determined by several factors, including the base price, governmental interest rate, new price of the car, and vehicle tax.

Overall, a wide spectrum of instruments is being used and announced to target specific markets and user groups. This experience of leading European markets is being used as a guide by other countries to define specific measures to reach their own goals.

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For our analysis we will use the information on incentive policies and the vehicle sales data of the European Alternative Fuels Observatory (<https://alternative-fuels-observatory.ec.europa.eu/>) This the European Commission's key reference portal for alternative fuels, infrastructure, and vehicles in Europe. The authors are managing as lead partner in a consortium, the European Alternative Fuels Observatory, on behalf of the EC. To properly conduct analysis, we rely on primary data, sourced from the EAFO data portal, directly from Member States on policy and regulatory topics.

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The core of the work of Harm and his company FIER, is (EU and national) project initiation and business development in electric mobility for private companies, public authorities, and consortia. During recent years, the focus has been on: Stimulating electric vehicle (EV) uptake in fleet; Effectiveness of national EV incentives and policies; Stimulating electric trucks in distribution and inner-city freight and Electric car sharing and smart charging infrastructure.



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