Dutch BEV policy in an international perspective

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The aim of this report, which is part of the EU projects proEME and SolutionsPlus, is to put Dutch BEV policy in perspective with foreign policies. To do so, Dutch BEV policy is compared with policies in Norway, Germany, and France, but also with Belgium, Sweden, Austria, and Denmark. This research was led by FIER Automotive & Mobility and is part of a continues research theme (since 2010) on the development of the BEV market and the effectives of national governmental incentives.

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Contents

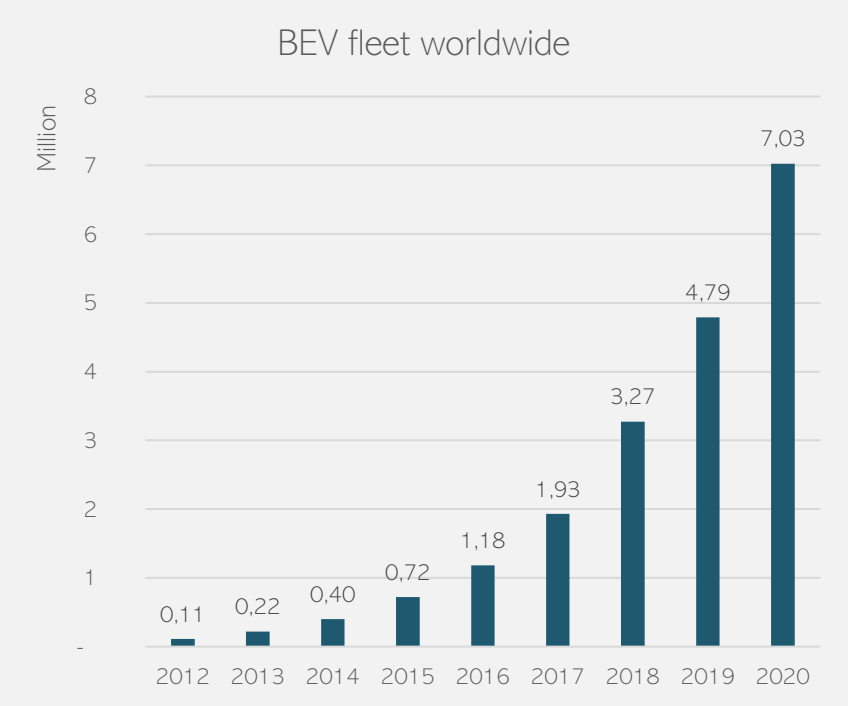
- Success of BEV sales + Effect of BEV policy
- Differences in incentive budgets
- Deep dive in effect of BEV policy

  The Netherlands, Norway, France, Germany
- Benchmarking the Netherlands
- Outlook 2020 – 2025
- Observations & findings
- Definitions, methods and source references

Success of BEV sales
+
Effect of BEV policy

Success of BEV sales – which factors play a role?

The success of BEV sales is determined by various factors influencing buying behaviour. For governmental organisations it is possible to steer purchase behaviour, mainly by financial policy.

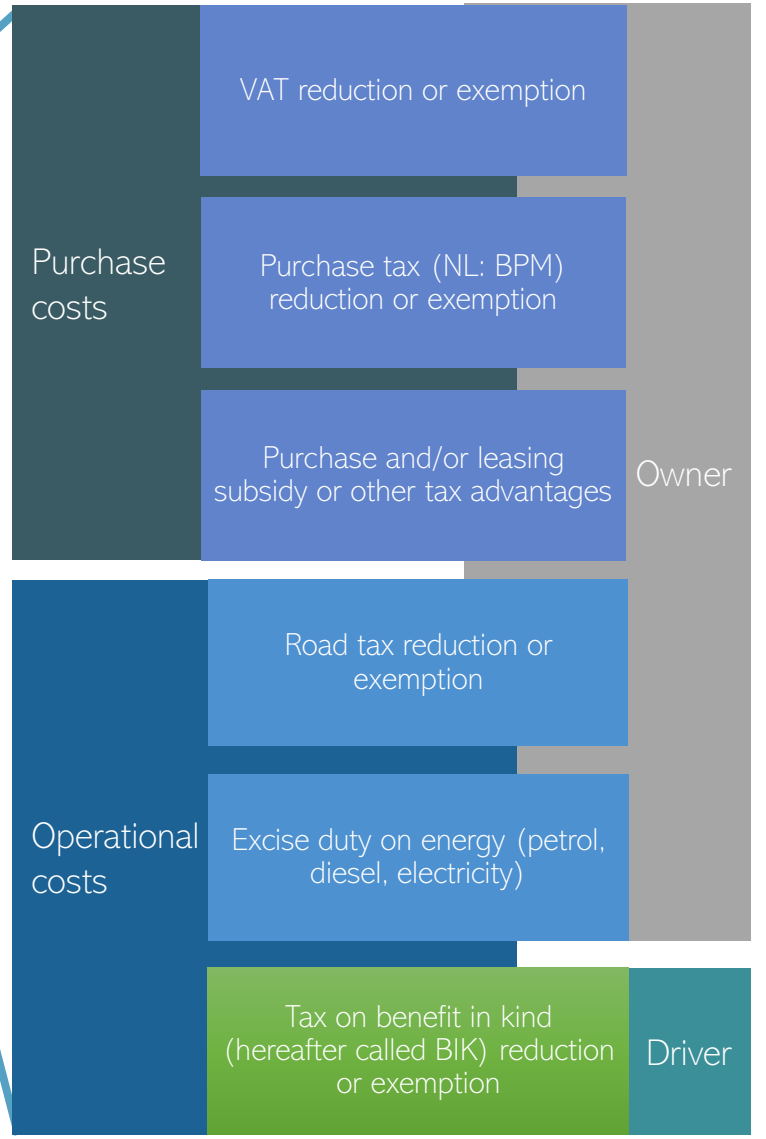


Source: IEA (2020) & EV Volume (2021)

General factors in purchasing behaviour

There are different (eco)systems in the countries discussed in this report, and therefore these factors play a different role when countries are compared.

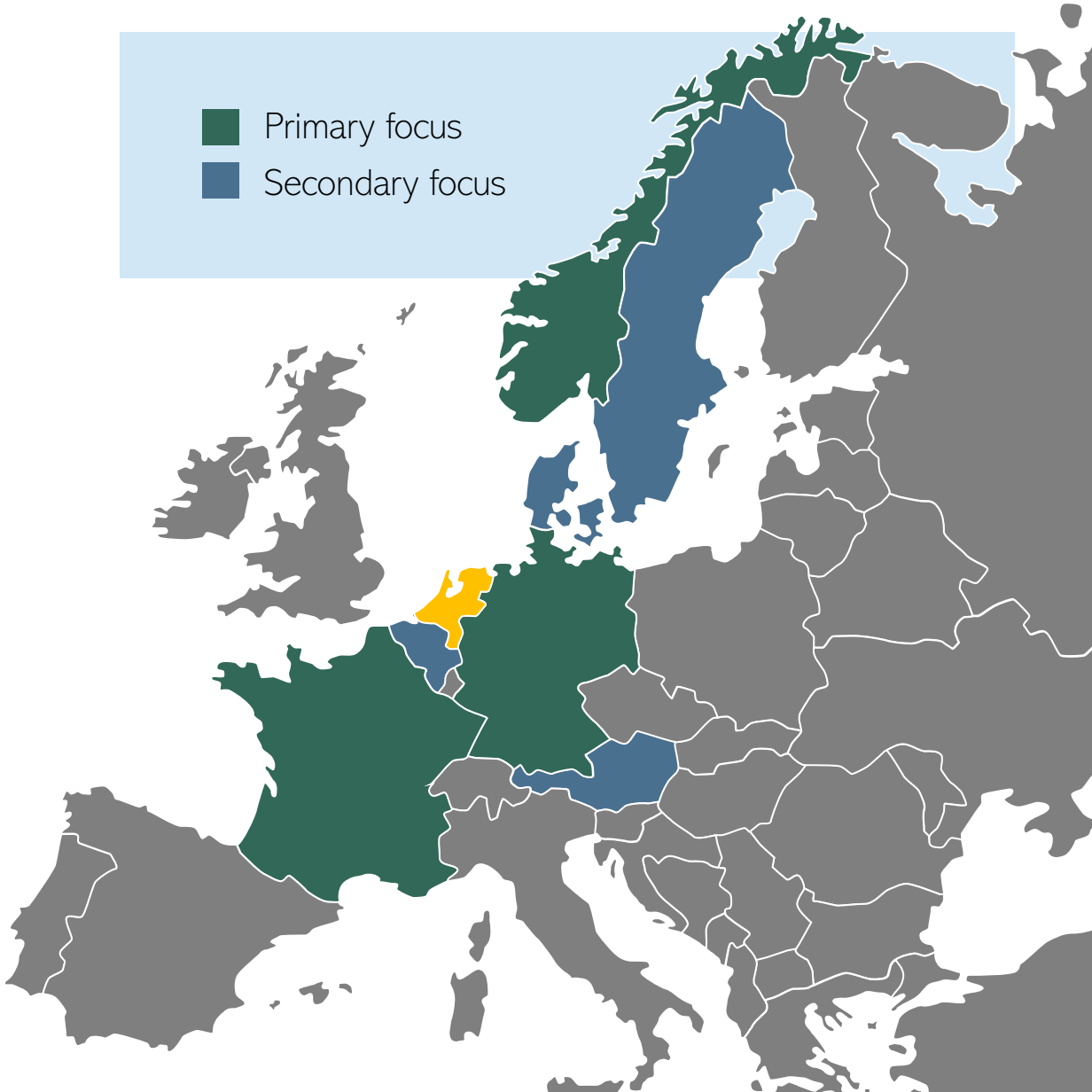
Financial Policy



Effect of BEV policy abroad

The report starts with a general overview of the different countries (primary and secondary focus). This general overview includes the current applicable incentives, the EV uptake over several years, the growth of public available chargers as well as the top 5 BEVs sold.

This is followed by an in-depth analysis of the Netherlands, Norway, France, and Germany (primary focus). Here we discuss the chronology, purchase costs, and the "Total Cost of Ownership" (TCO) in depth. Within the chronology, the BEV sales per month are plotted against the change in financial incentives or other relevant events. The current financial incentives are put in to perspective by calculating the purchase costs and TCO of BEVs and petrol cars.



The Netherlands Overview

Purchase subsidy

From July 2020, BEVs in the Netherlands were beckoned by a subsidy of €4,000 for the purchase of a new BEV with a list price of between €12,000 and €45,000 and a minimum range of 120 kilometers. There was a limited budget for this subsidy. The subsidy budget for '20 and '21, enough for 6.100 cars, was exhausted on January 4th, 2021.

Road tax

BEVs are exempted from road taxes.

Recharging infra

There is no incentive for individuals, but companies can make use of the MIA (see 'profit tax')

Profit tax

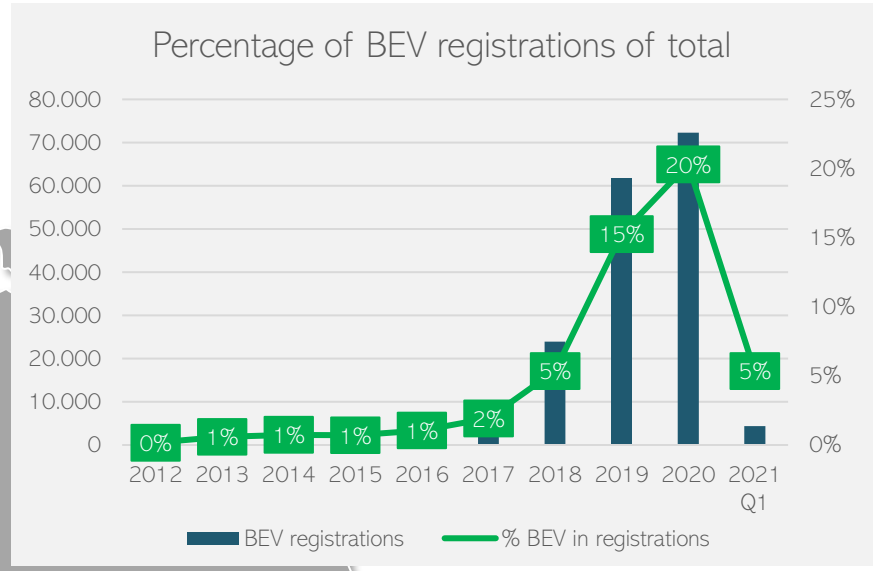
The Netherlands have the 'MIA' regulation in which investments in cleaner technology (BEVs) are being encouraged by making them deductible in profit tax. This advantage has significantly decreased over the last years.

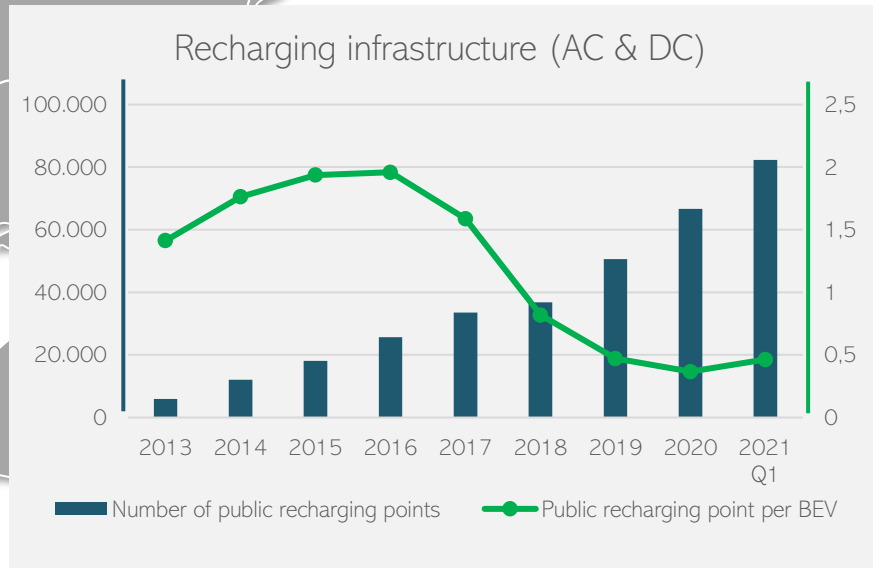
BiK taxation

Individuals with a BEV have a lower percentage of the list price added to their income when using their company car also privately. For petrol cars this is 22%. For BEVs it was 4% in 2019, 8% in 2020, and 12% in 2021. This will further increase to 16% in 2022 and 17% in 2025.

Registration tax

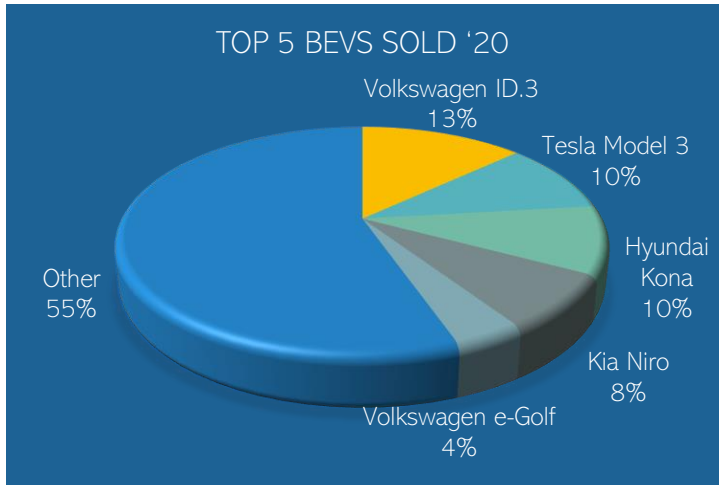
Zero emission cars are exempt from paying registration tax. For other cars, the system is progressive, with different levels of CO_2 emissions that are due different amounts of registration tax.





Ambitions

- The Netherlands aims for 100% BEV sales by 2030.



Observations

- The nature of the incentives regarding BEVs have caused heavy fluctuations in BEV sales month on month;
- The five most sold BEV models account for only 45% of the BEV sales, showing great diversity in the offering of BEV models, which is different from previous years.

Norway Overview

Price benefit BEV

BEVs are exempt from VAT, effectively creating a discount of 25% for private purchase.

Bik taxation

Taxation of benefit in kind is for BEVs reduced to 40%

Polluter pays

There are heavy taxes on ICE powered cars in Norway. These are:

- No CO_2 tax,
- No No_x tax,
- No weight tax,

Recharging infra

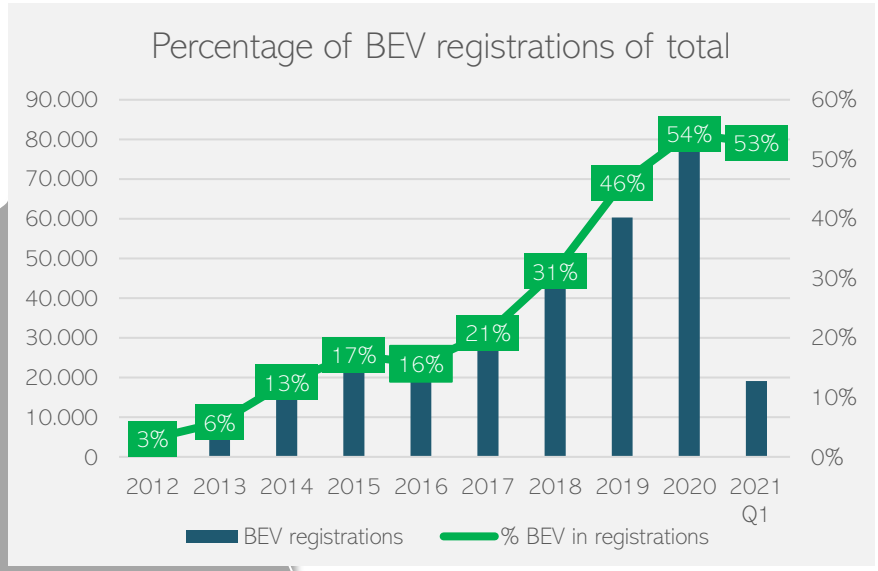
There are no federal incentives, only local. Local incentives housing associations are all around €500, with an upper limit (€ 20k-100k).

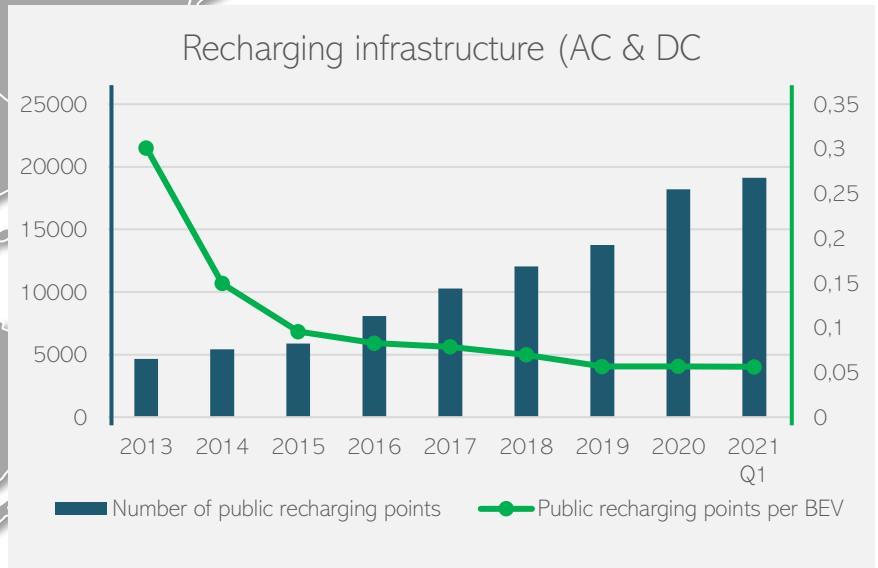
Motor insurance tax

In 2018, the road tax was replaced by the traffic insurance tax. BEVs were exempted of this tax. As of March 1, 2021, BEVs must pay a discounted rate instead of being exempted. The amount is € 0,58 per day for BEVs, for ICEVs this is € 0,83 per day.

Ownership / circulation tax benefits

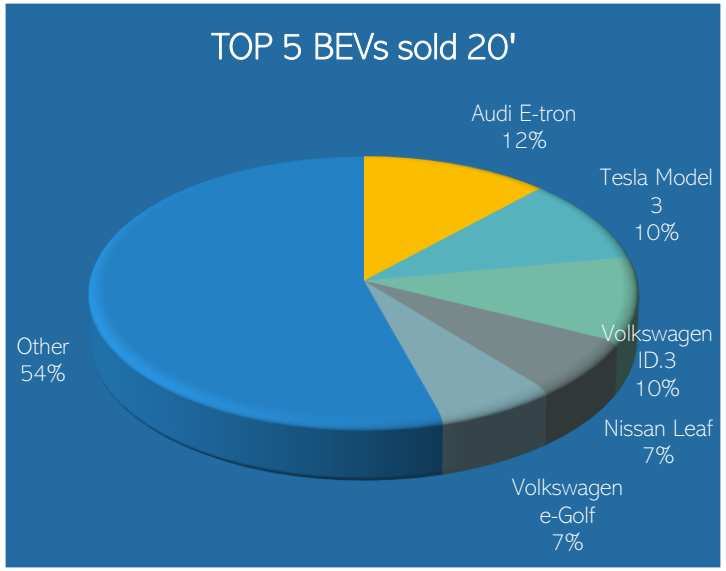
Norway bases circulation taxes on the type of fuel. BEVs are granted a reduction and only pay a scrapping fee, 249 Euro. The ownership tax will increase to 70% of that of petrol cars.





Ambitions

- All new passenger cars and light vans sold should be zero-emission by 2025



Observations

- The national BEV incentives policies are expected to be revised after the next elections (2022) where it is expected that the benefits of BEVs are continued to be gradually reduced.
- The number of models on the market grew significantly. There were no dominant models in 2020.
- All cars purchased by governmental bodies, must be emission free from 2022 on.

France Overview

Purchase subsidy

BEVs receive a bonus of max. €7,000 (up to 27% of the acquisition cost), when the list price of the car is below €45.000. The subsidy is €3,000 when the list price is between €45.000 and €60.000.
Since December 2020, there is a bonus of €1.000 for used electric cars.

Registration tax benefits

BEVs are eligible for, either a 50% discount, or are fully exempt (most regions) from paying the license plate registration (carte grise) depending on the region.

Recharging infra

€300 tax credit and 20% VAT reduction on the purchase and installation of a home- recharger, maxed at 75%. For recharging infrastructure in collective living situations, 50% is covered with a maximum of €1,660 (ex.)

Conversion bonus

There is a conversion bonus of €2,500 when scrapping a petrol car from before 2006, or a diesel car from before 2011. This bonus is €5,000 for low-income households. Extended until 30 June 2021.

BiK taxation

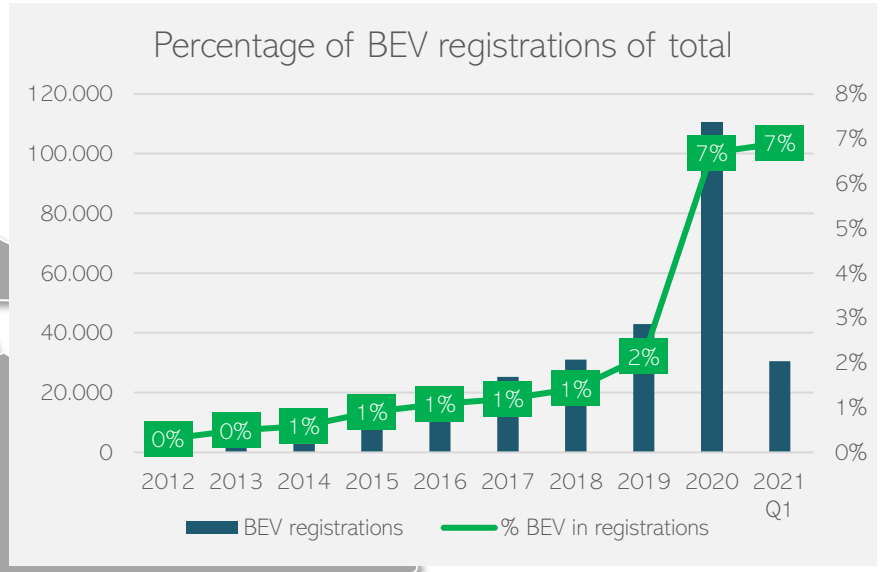
The calculated benefit in kind is reduced by 50%, the yearly maximum advantage is set at €1.800.

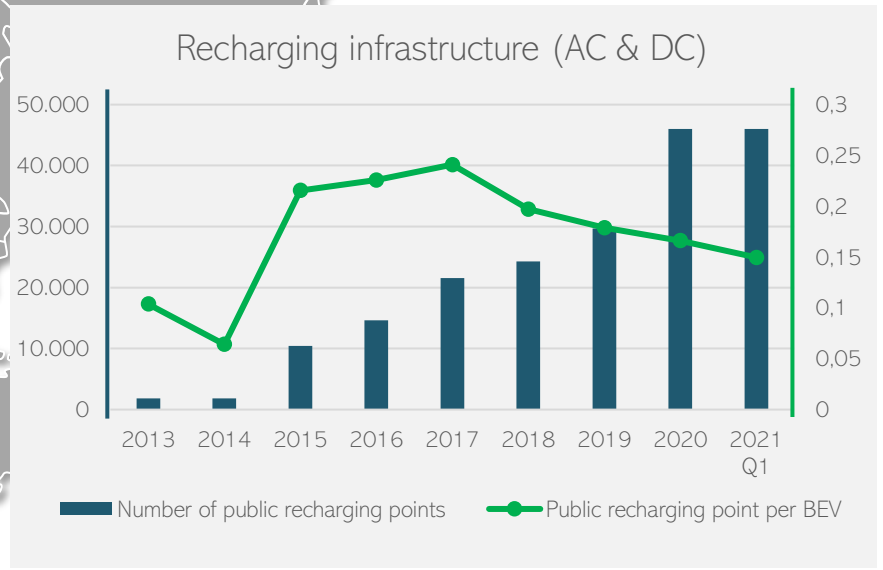
Company profit tax

TVS Tax (Taxe sur les véhicules de société) is applicable to all corporate passenger cars, except for BEVs. This saves companies a couple of hundred euros. Depreciation deductibility ceiling of 30.000 EUR in 2021.

Special COVID incentive

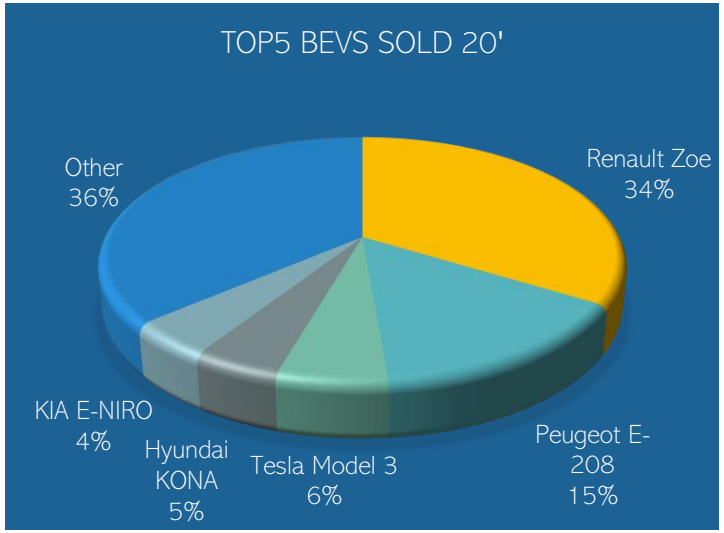
France increased the purchase subsidy from €6,000 to €7,000 due to the COVID-19 crisis. Also, the income limits for the conversion bonus were loosened, however, this was turned back in August 2020. Automotive support plan was extended until June 2021.





Ambitions

- The French government's Multiannual Energy Programme aims to increase the current size of the national e-mobility market twelvefold. The goal is to have 1,3 million electric vehicles and plug-in hybrid electric vehicles on the road by 2023, and 5,3 million by the end of 2028.
- New public fleet procurements must consist for at least 50% of zero emission vehicles.



Observations

- French cars dominate the BEV market, but the model offering is much diversified than in 2019.
- The purchase subsidy will be reduced by €1.000 starting July 1st, 2021 and again on January 1st, 2022.

Germany Overview

Purchase subsidy

For BEVs and fuel-cell vehicles the total bonus is €9.000, This consists of a federal share (€6.000) and a manufacturer share (€3.000).
For BEVs with a net list price between €40.000 and €65.000 (nett list price), the total bonus is €7,500. When adhering to certain conditions, car leasing is also eligible.
As of November 2020 it is possible to combine the federal subsidy with other, local incentives.

Road tax

BEVs are exempted from road tax during the first five years after the first registration date.

BiK taxation

BEVs with a maximum list price of €60,000 (increased from € 40.000 in June 2020) are only due a quarter of the BiK tax (0.25%) compared to petrol cars (1%).

Recharging infra

There is a subsidy of €900 for purchase and installation of charging stations in privately used parking spaces.

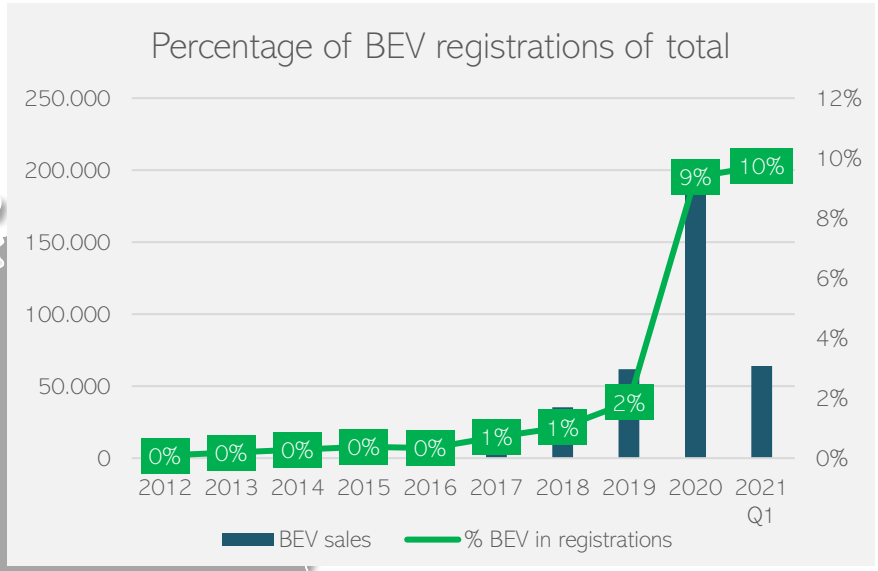
Ownership tax benefits

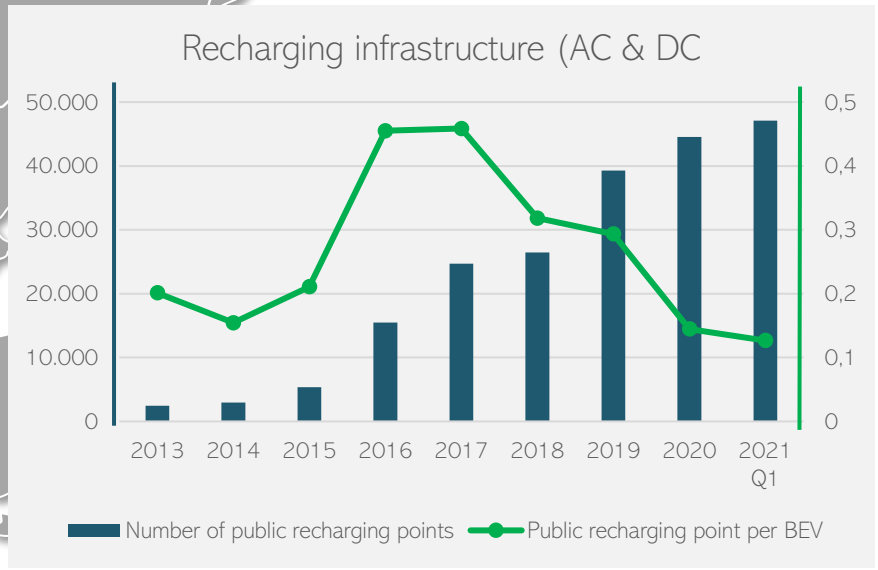
For initial registrations from 1 January 2016 until 31 December 2025, there is a tax exemption of 10 years for BEVs. After that, the tax amounts to 50%.

Special COVID incentive

Germany temporarily reduced the VAT rates from 19% to 16% (regular VAT rate) and from 7% to 5% (reduced VAT rate) for the period from 1 July 2020 to 31 December 2020.

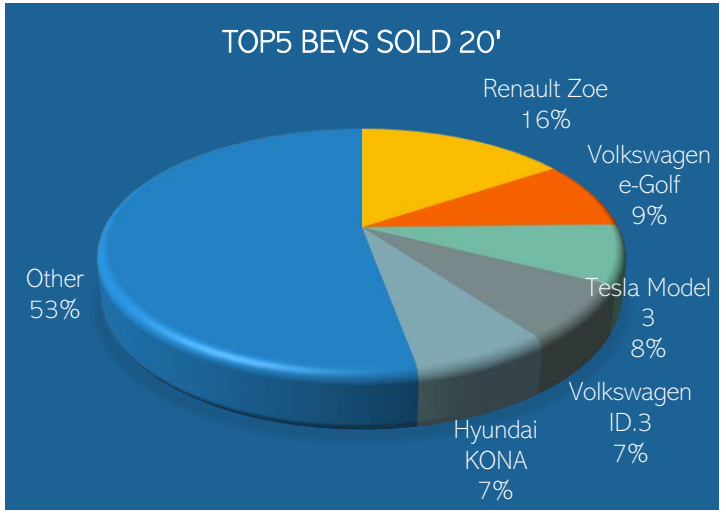
This has not been extended into 2021.





Ambitions

- The German government aims to have up to 10 million EVs and 1 million recharging stations on German roads by 2030.



Observations

- Due to low taxes on car purchases, Germany can't give BEVs a lot of tax breaks and must resort to purchase subsidies for incentivizing BEVs.
- The high growth of BEV registrations is most likely caused by the high Covid-incentives.
- The share of other models, than the top 5, grew significantly in 2020.

Belgium Overview

Purchase subsidy

Currently there is no purchase subsidy for zero emission vehicles. In Flanders there was a subsidy until January 2020.

Road tax

BEV ownership tax €0 or €83,56 (Wallonia, Brussels), compared to diesel € 1.900.

Registration tax

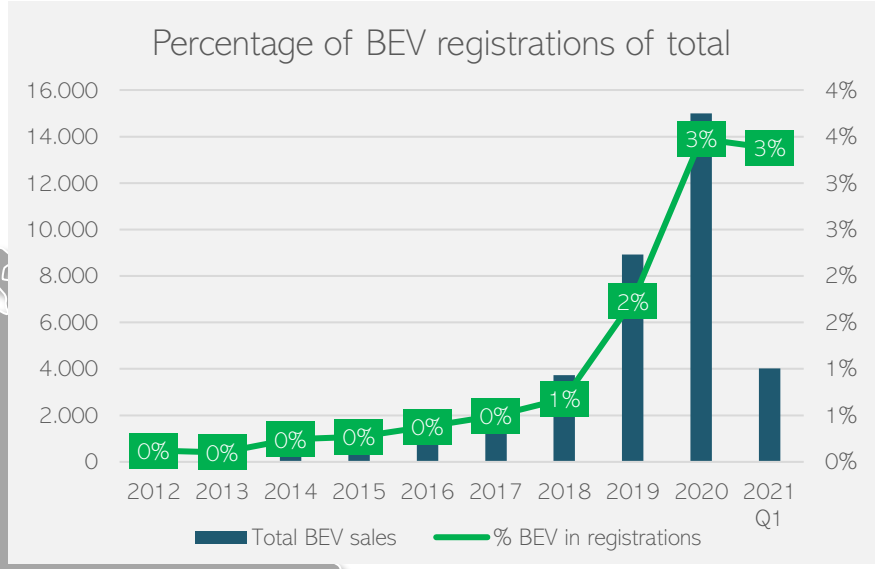
BEV (PHEV also until 2021) is exempted from registration tax (Flanders) or a reduced amount applies € 61,50 (Wallonia and Brussels)

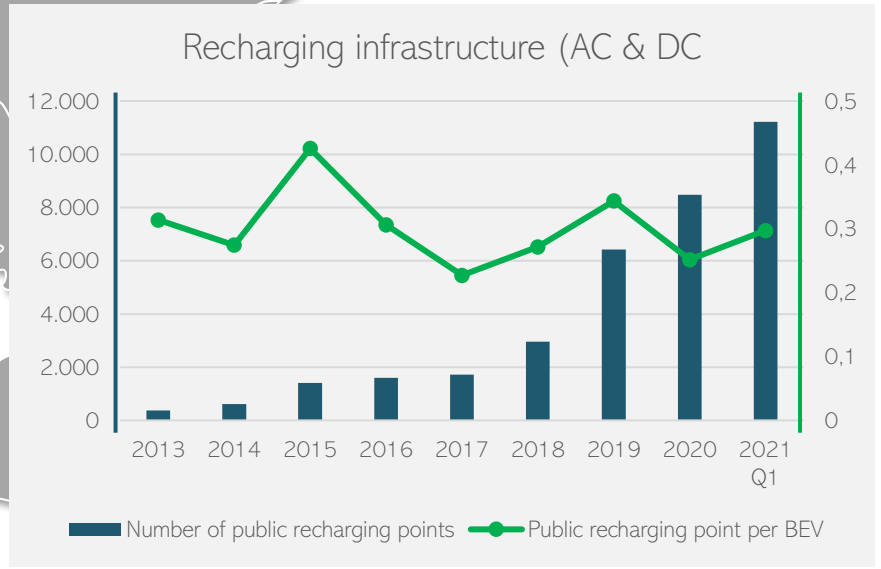
Parking space tax exemption

Companies in the Brussels region with parking space for staff/visitors are exempt from a 5 EUR/m2 tax, if charging points are available.

Profit tax

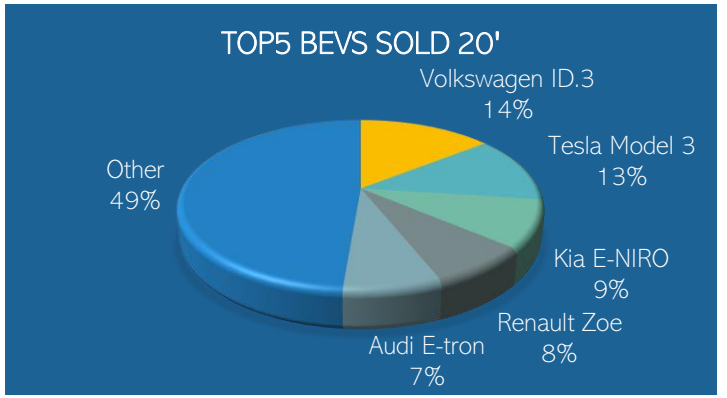
BEVs are deductible in profit tax for 120% until 2019 and for 100% from 2020 onwards. Eco-penalty tax above 145 g/km CO2 emission for PHEVs (distinguish "fake" hybrids)





Ambitions

- All new bought company cars must be zero emission vehicles from 2026 onwards.
- Only allowing the sale of zero emission vehicles for the entire market. No date is specified for this ambition.



Observations

- The ambitions with regards to BEV company cars are high, especially when compared to the relatively low BEV uptake.
- Charging point density has been relatively stable.
- Belgium has more governmental layers than other European countries, this can lead to different incentive programs in different parts of Belgium.

Sweden Overview

Purchase subsidy

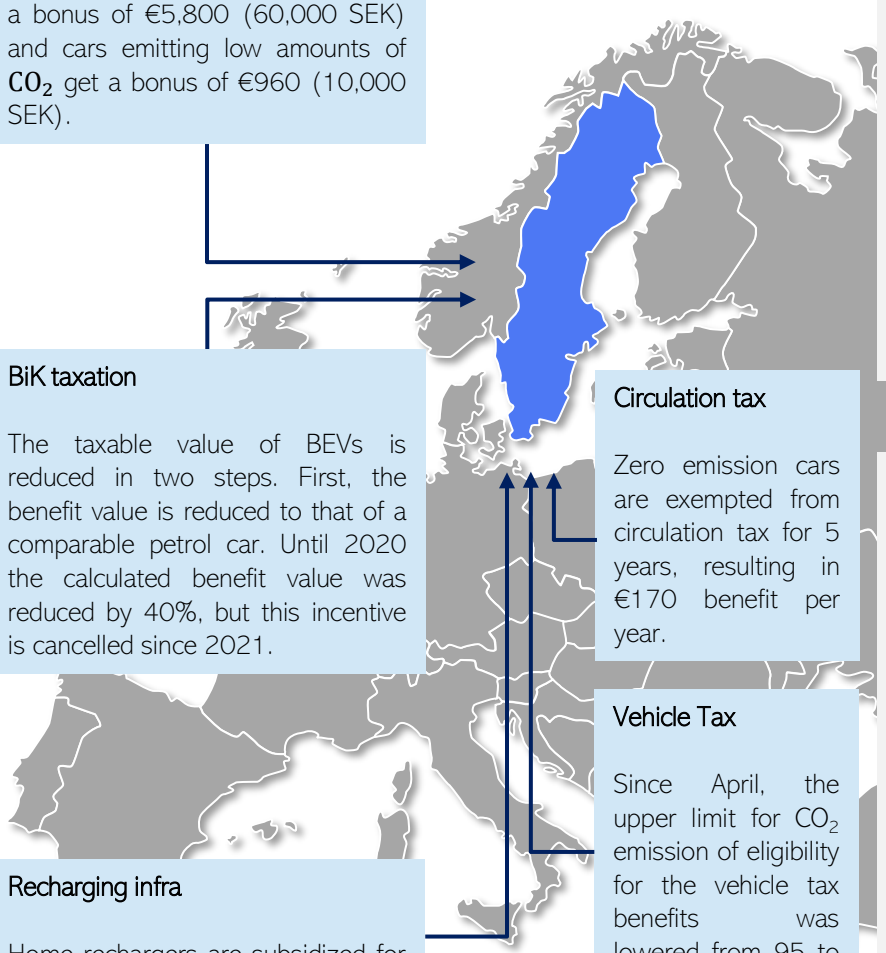
The so-called "super green car rebate" was replaced in 2018 by a bonus-malus arrangement. BEVs get a bonus of €5,800 (60,000 SEK) and cars emitting low amounts of CO_2 get a bonus of €960 (10,000 SEK).

BiK taxation

The taxable value of BEVs is reduced in two steps. First, the benefit value is reduced to that of a comparable petrol car. Until 2020 the calculated benefit value was reduced by 40%, but this incentive is cancelled since 2021.

Recharging infra

Home rechargers are subsidized for 50%, up to a maximum of €960.

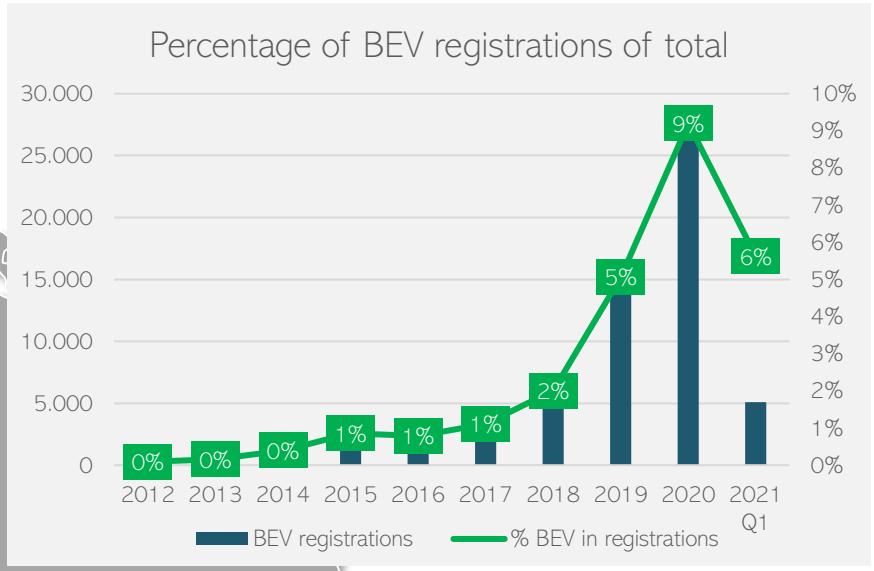


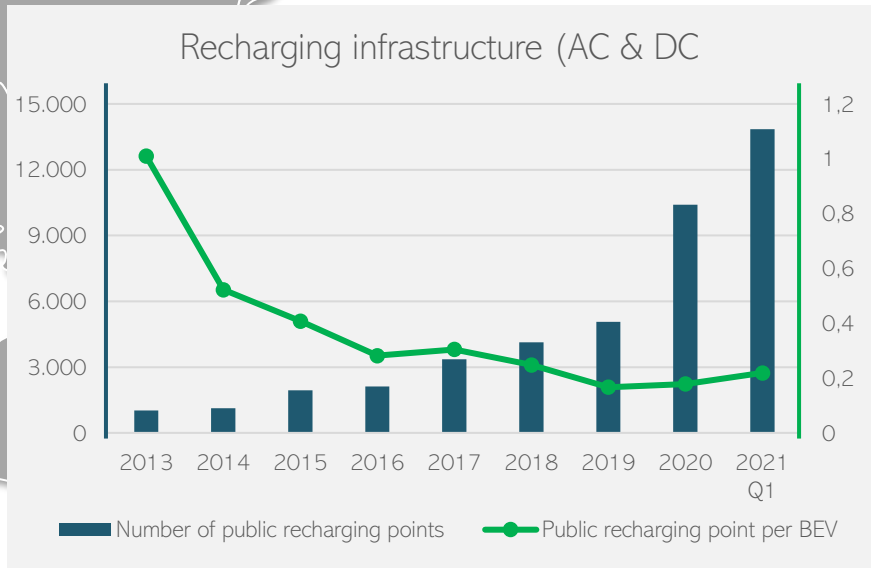
Circulation tax

Zero emission cars are exempted from circulation tax for 5 years, resulting in €170 benefit per year.

Vehicle Tax

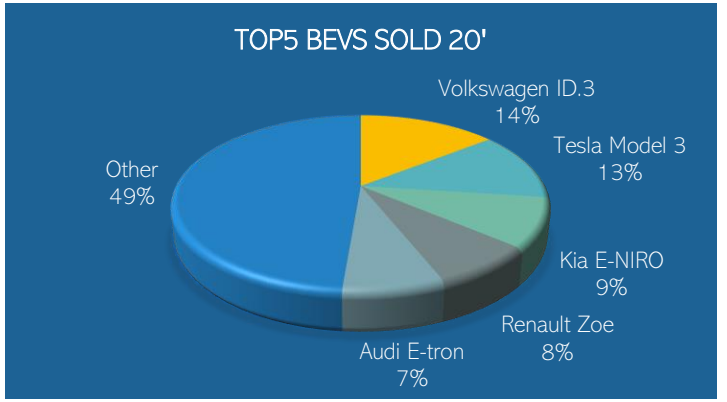
Since April, the upper limit for CO_2 emission of eligibility for the vehicle tax benefits was lowered from 95 to 90g/km.





Ambitions

- The Swedish government is banning the sale of combustion engines by 2030.
- The Swedish government presented the goal of net zero emissions by 2045.
- The government wants parity in costs between private and company cars.



Observations

- The benefit for BEVs in the taxation on BiK is reduced as of 2021.
- Sweden is reducing benefit of BEVs over petrol and diesel cars sooner than other countries.
- Luxury cars had an extra taxation, this will be removed as of July 2021, this benefits BEV company cars.

Austria Overview

Purchase subsidies

There is a purchase subsidy available of €5.000 for BEVs under €60.000. Electricity used must originate from renewables.

Other benefits

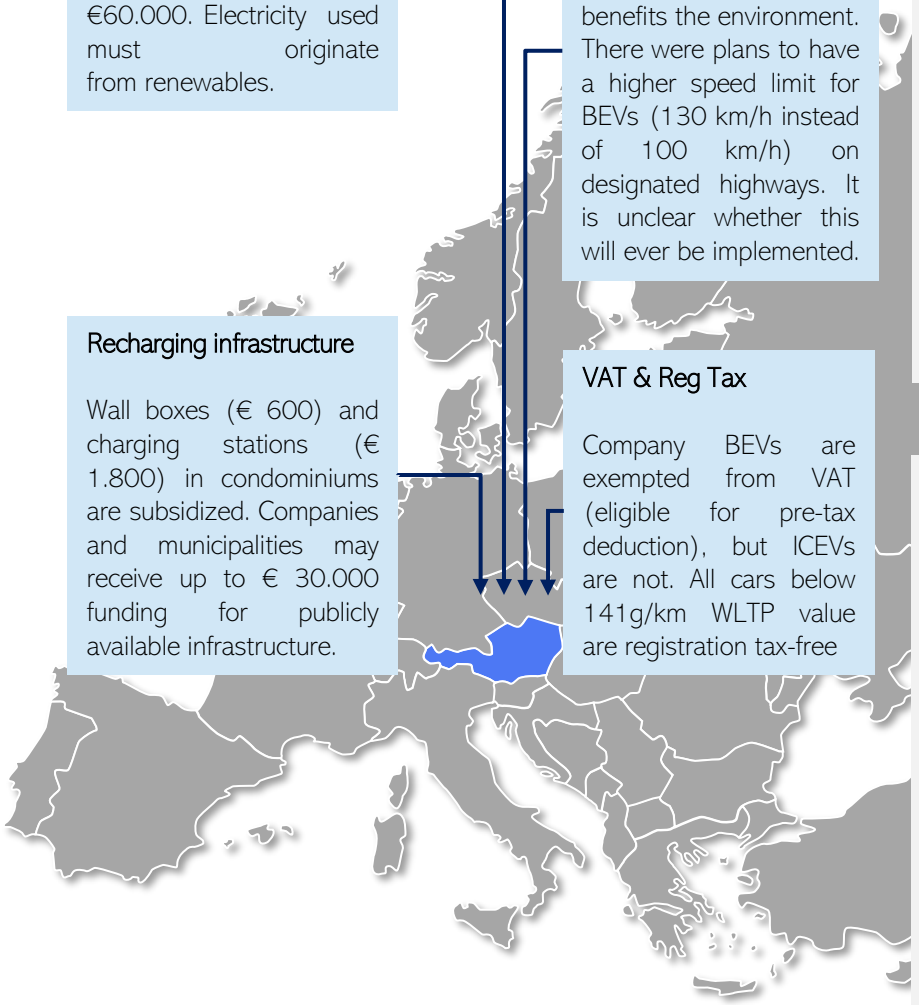
Companies could apply for an investment premium of 14% when it benefits the environment. There were plans to have a higher speed limit for BEVs (130 km/h instead of 100 km/h) on designated highways. It is unclear whether this will ever be implemented.

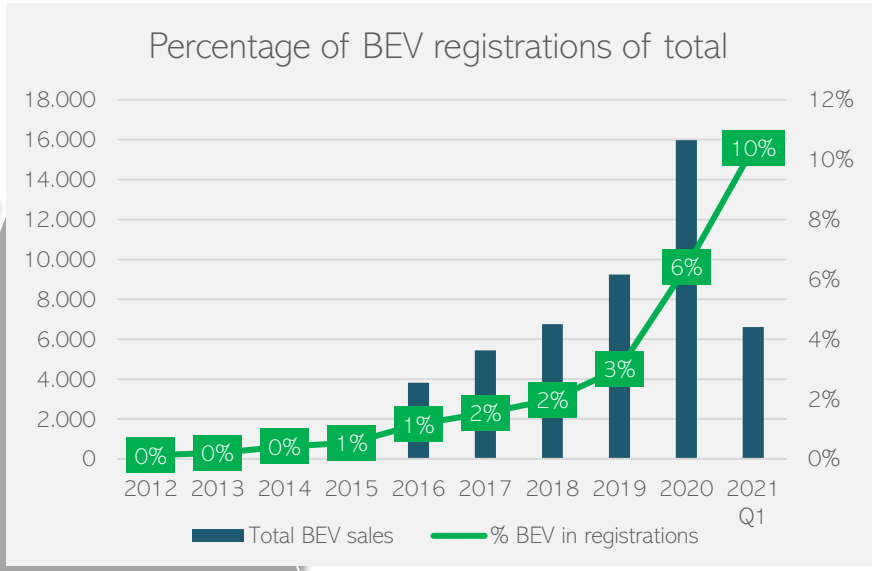
Recharging infrastructure

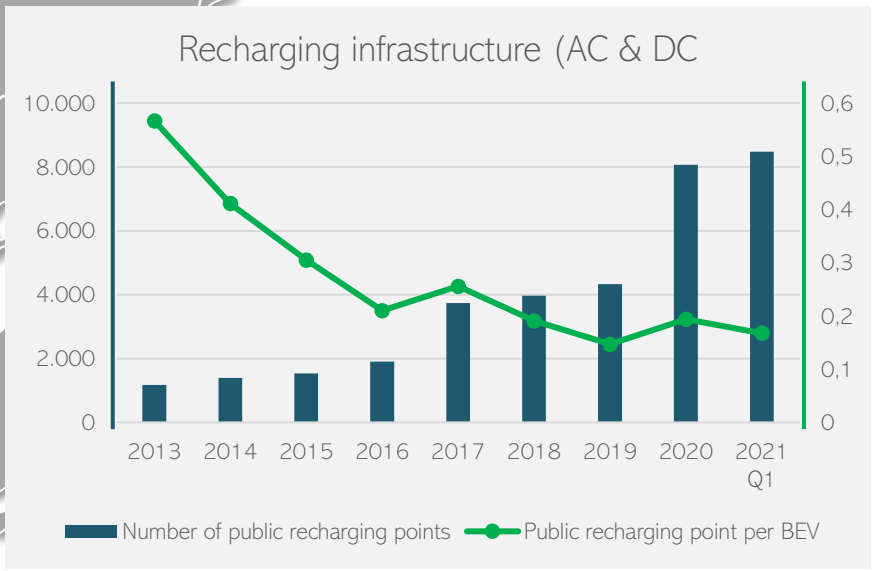
Wall boxes (€ 600) and charging stations (€ 1.800) in condominiums are subsidized. Companies and municipalities may receive up to € 30.000 funding for publicly available infrastructure.

VAT & Reg Tax

Company BEVs are exempted from VAT (eligible for pre-tax deduction), but ICEVs are not. All cars below 141g/km WLTP value are registration tax-free

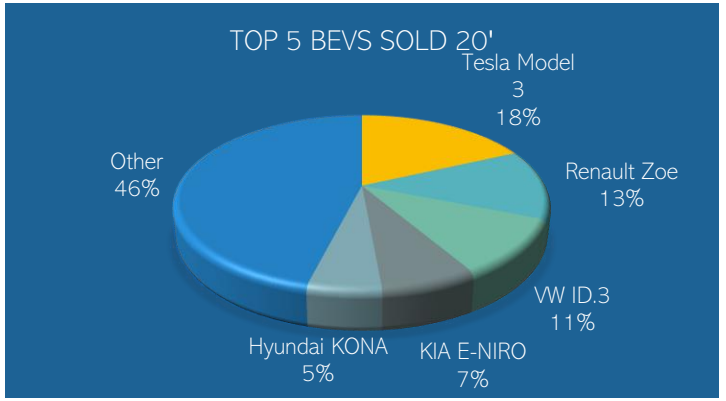






Ambitions

- The Austrian government aims to be carbon neutral by 2040. The ambitious plan includes heavy decarbonization of the mobility sector.



Observations

- The charging infrastructure almost doubled in 2020, catching up with BEV sales.
- The increase in incentives, such as the purchase subsidy and the incentive for recharging infrastructure, are paid for by an additional 46 million euros, made available in 2021 as "e-mobility offensive".

Denmark Overview

Registration tax

The registration tax is high in Denmark, often doubling the net list price. Battery electric vehicles (BEV) were granted a reduction in the calculated registration tax of up to €5.780 in 2020. BEVs are granted a reduction in the taxable value of the car for battery capacity of €230 per kWh until the end of 2022. In 2019 and 2020 battery electric-, and hydrogen vehicles up to €53.780 paid in practice €0 registration tax. Removal of this benefit has been delayed in 2021.

Road tax

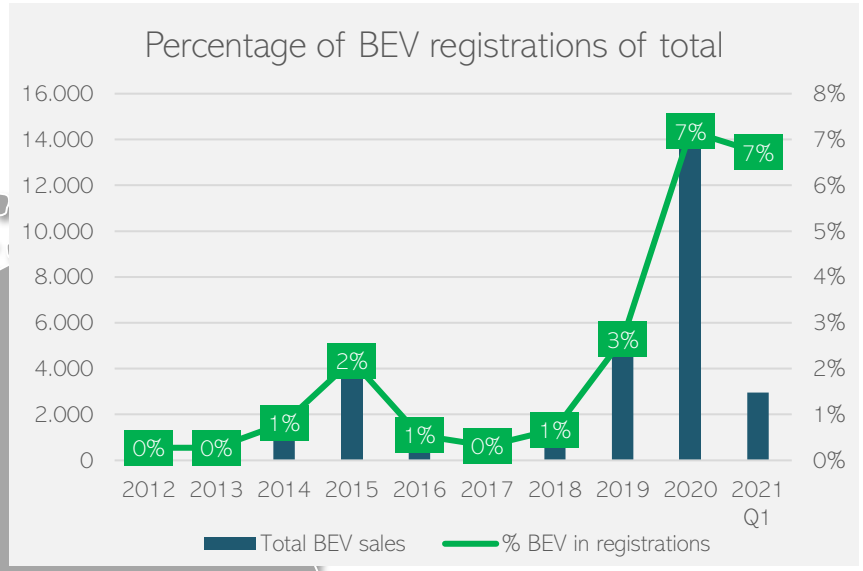
In Denmark, the road tax is based on fuel consumption and weight of the vehicle. BEVs pay the minimum amount.

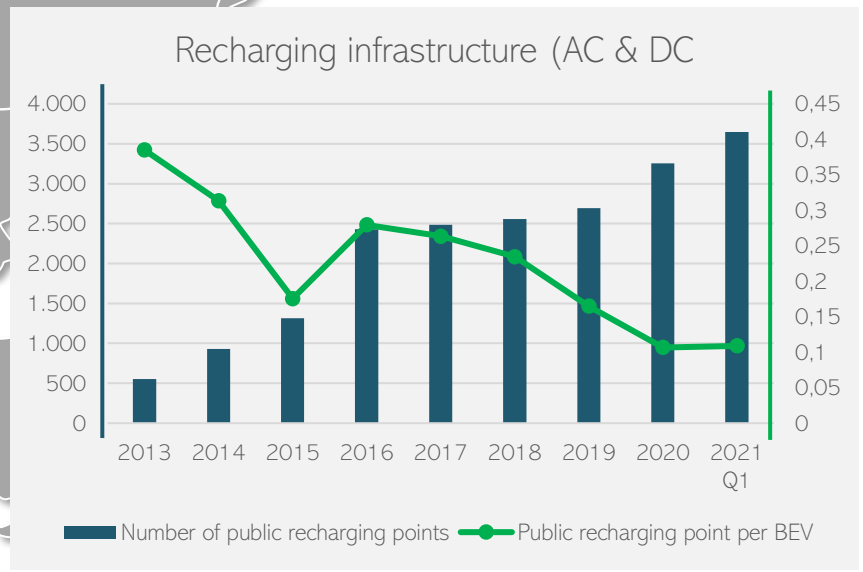
Recharging infra

There is an incentive for commercial charging that is exempted from taxes. Existing and new building must establish charging points per parking space.

Electricity tax

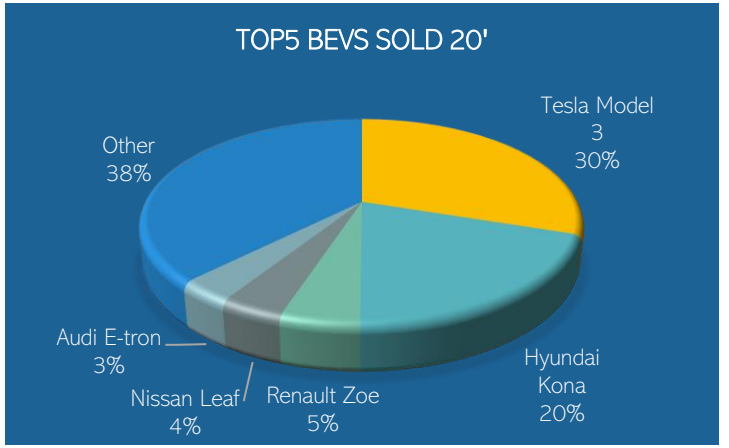
The electricity tax for charging the green cars will continue to be kept down in 2021





Ambitions

- The Danish government is aiming to put at least 1 million BEVs on the road by 2030. Currently the fleet of BEVs consists of around 20.000.



Observations

- As of now, there is no authority for municipalities to co-finance publicly available charging infrastructure.
- Instead of a purchase subsidy, the Ministry of Finance's interim report suggests an annual ownership subsidy of DKK 2,500 (340 EUR) for the period 2021-2030.

Emission reduction goals

Norway

Goals: 45% emission reduction by 2030*.

the Netherlands

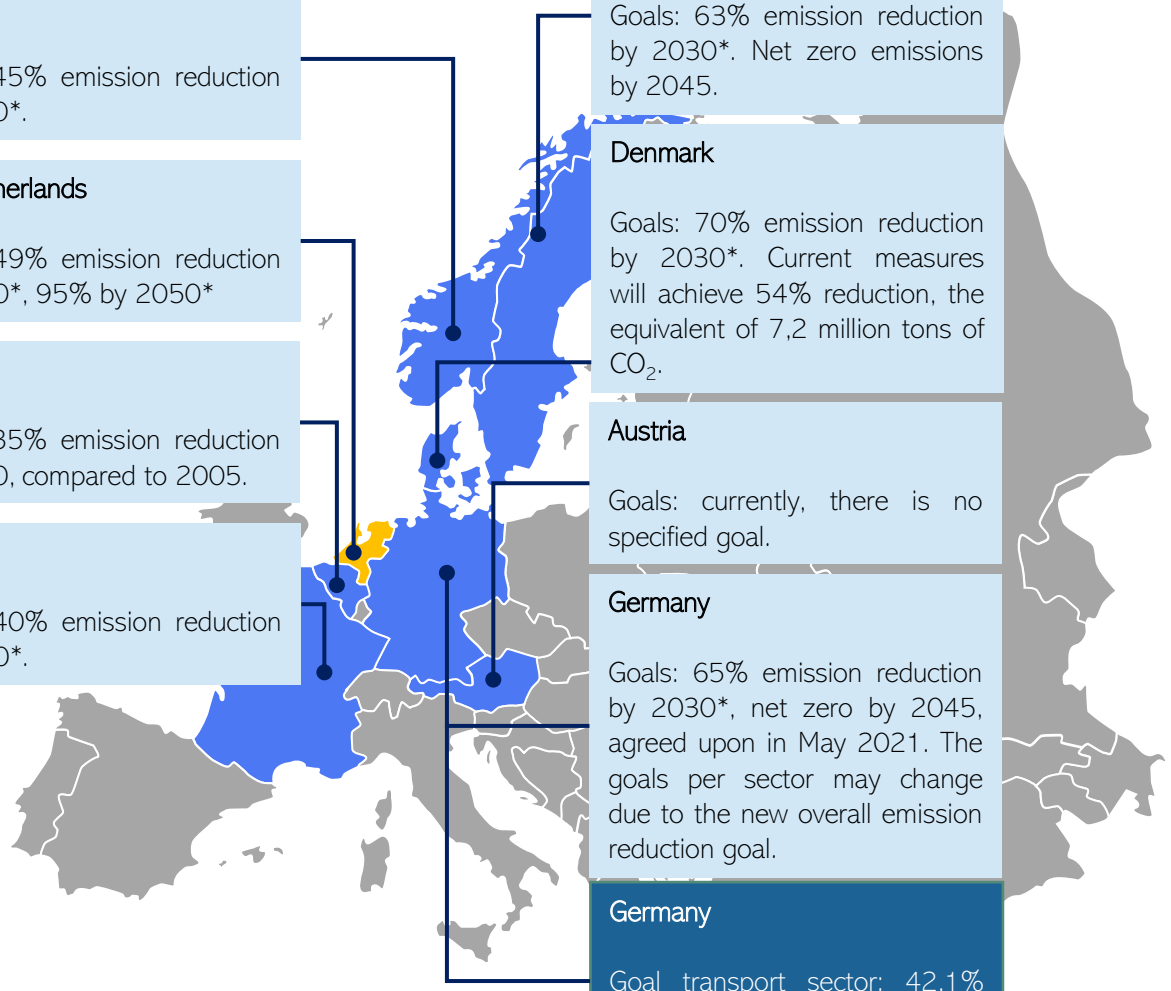
Goals: 49% emission reduction by 2030*, 95% by 2050*

Belgium

Goals: 35% emission reduction by 2030, compared to 2005.

France

Goals: 40% emission reduction by 2030*.



Sweden

Goals: 63% emission reduction by 2030*. Net zero emissions by 2045.

Denmark

Goals: 70% emission reduction by 2030*. Current measures will achieve 54% reduction, the equivalent of 7,2 million tons of CO_2.

Austria

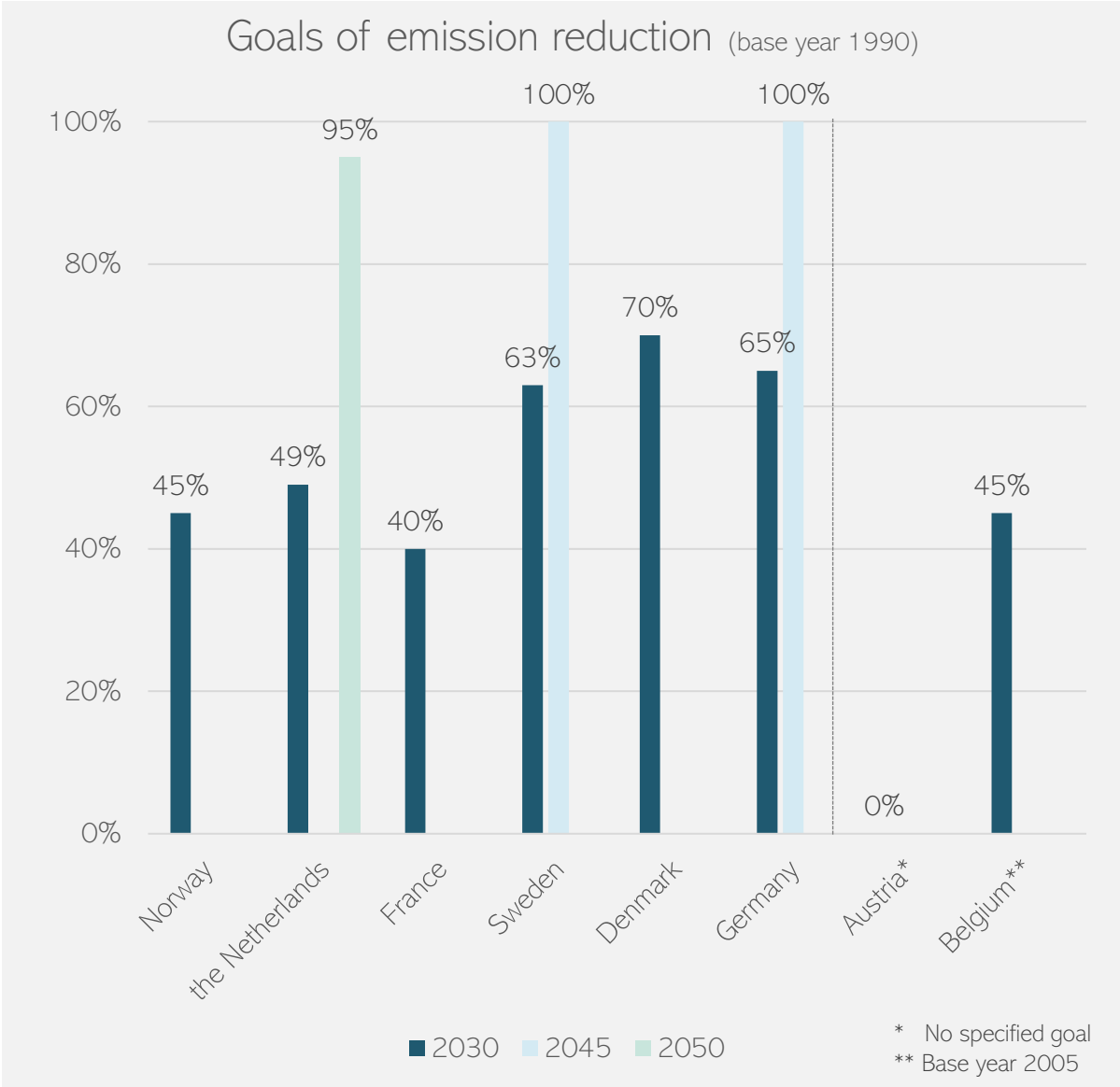
Goals: currently, there is no specified goal.

Germany

Goals: 65% emission reduction by 2030*, net zero by 2045, agreed upon in May 2021. The goals per sector may change due to the new overall emission reduction goal.

Germany

Goal transport sector: 42,1% reduction in emission, in 2019, 0,6% was achieved.



Home recharging infrastructure incentives

Observations

- Subsidies in the different countries are given in different ways. This makes it difficult to compare them, but more importantly, it makes the total cost of a BEV untransparent for potential BEV owners;
- Although these subsidies are interesting, because home recharging infrastructure is an important tool in reducing the operational costs of a BEV, the impact on the TCO is limited.

Incentives regarding home recharging infrastructure *(incl. example calculation)*

	Country	Incentive		Example calculation: Cost of home recharger	Example calculation: Total funding
	France	20%	*Max. € 960*	€ 2.000	€ 400
	Sweden	50%	*Max € 987*	€ 2.000	€ 987
	Austria	€ 600		€ 2.000	€ 600
	Germany	€ 900		€ 2.000	€ 900
	Denmark	€ -		€ 2.000	€ -
	the Netherlands	€ -		€ 2.000	€ -

Non-direct financial incentives (supporting measures)

Observations

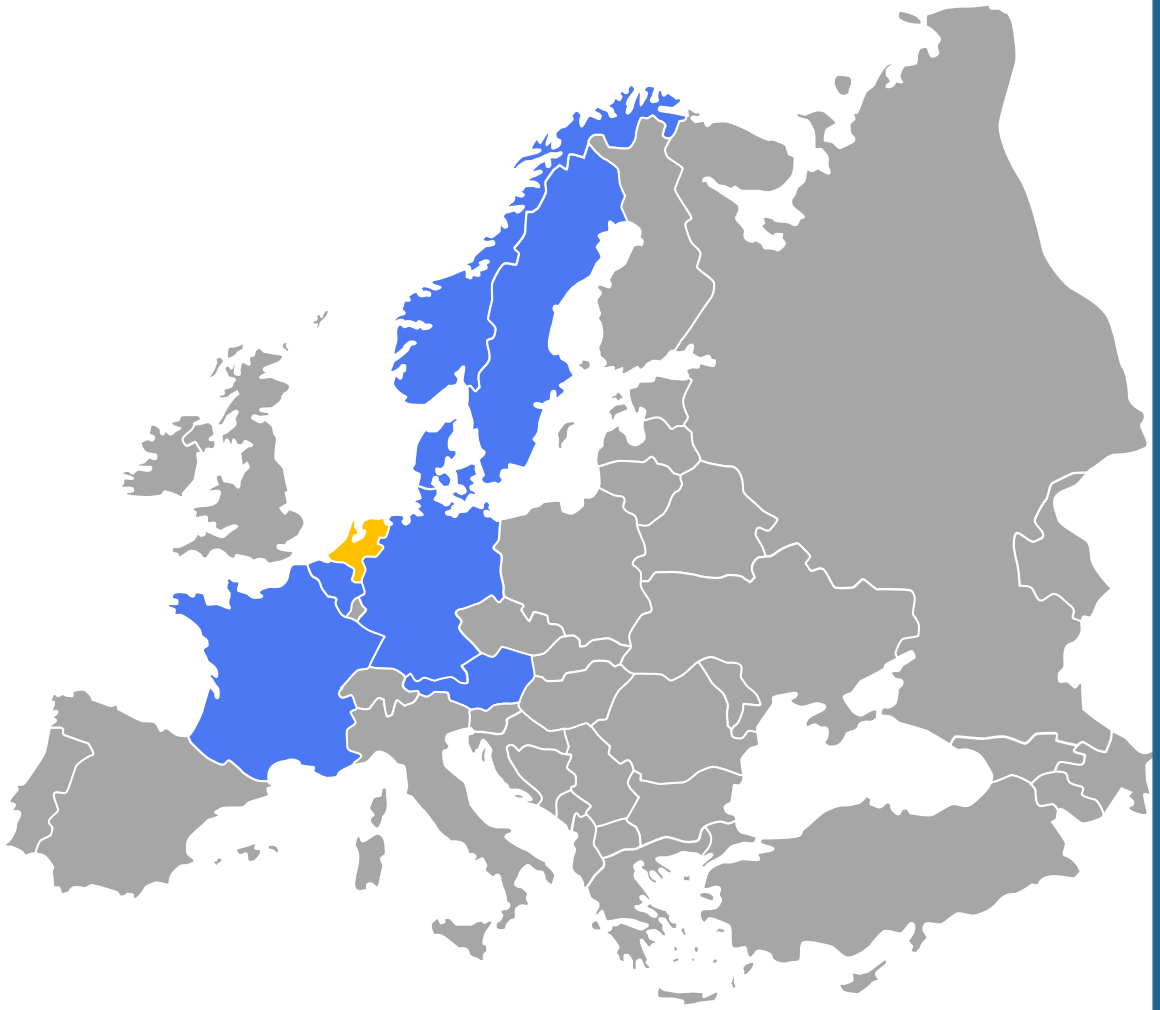
In general, fiscal and subsidy incentives are often coupled with other non-financial incentives to attract more consumers, as these promotional actions can raise consumers' awareness of electric mobility. The impact of "Non-Financial Incentives" differs between regions partially due to differences in traffic conditions, travel patterns, consumer preferences, and other local variations. Due to these differences, it is challenging to rank the importance of these incentives, however, existing research shows that they all can have a positive impact on BEV adoption.

	Incentive (examples)
HOV, bus, or transit lane access	**California**: BEV's are allowed with only the driver on a HOV lane (complex incentive, for example not applicable for higher incomes). **Norway**: BEV's are allowed on specific bus lanes (bus lane on specific corridors during rush hours only open for electric cars with two or more persons).
Free, discounted, or preferential parking	**London**: Some areas the parking fee for an BEV is significantly lower. **California**: Discount or free parking is some public parking spaces. **Norway:** Parking fee for EVs was introduced locally with an upper limit of a maximum 50% of the full price.
Environmental zones (no or paid access for ICEVs)	**London**: No congestion charge for BEVs. **Netherlands**: Several cities announced their zero emission zones, no access for ICEVs
Toll or road charge waivers or discounts	**Norway**: Discount on toll chargers on roads, tunnels and bridges (used to be free for BEV)
Licencing incentives	**Shanghai**: BEVs don't have to enter the licence plate auction. **Norway**: BEVs get license plates starting with EL, EK, EV, EB, EC, ED and EE. **UK**: 'Green' number plates for BEVs in UK. **California**: BEVs have a white "access sticker" (for the HOV lanes).

In Norway, the average user stated in a 2016 survey that the local incentives (non-direct financial incentives) had a value of € 1.500 /year/vehicle. Toll roads accounted for about 50%, time savings in the bus lane for about 30%, free parking for about 16% and ferry rates for about 4%.

Source: TOI (2018)

Incentives for BEVs



Conclusion on BEV incentives per country

There are clear differences in incentives, often led by the existing tax structure in a country. Countries as the Netherlands, Norway and Denmark have high taxation on cars, which makes it possible to incentivise BEVs through taxation benefits. France and Germany have, for instance, much lower overall taxation on cars. This creates a higher need of subsidies when trying to incentivise BEVs. Taxation on private use of a company car is fairly similar across all countries, BiK is added to a persons income. This makes it possible in all countries to incentivize BEVs by reducing BiK taxation for BEVs. The amount of the benefit for BEVs are different per country, but they are present in all countries. All countries apply different kinds of incentives to stimulate the uptake of BEVs and there are significant differences.

Differences in incentive budgets

Total budget, subsidy budget & stop-and-go subsidies

Budget comparison of BEV incentives in 2021

Introduction

The total budgets allocated in the different countries are generally not fully transparent. This is partly due to the uncertainty surrounding these budgets. Some countries have a fixed budget for subsidies, for instance, others have only estimate costs in the national budget.

The budgets presented on this slide are predictions, made by ministries or governmental institutions of the country in question, for 2021.

The budgets are sometimes allocated to different timeframes across the different countries, making comparisons difficult. This has been eliminated as much as possible by calculating the budgets for one single year, 2021. An example of this is the purchase subsidy in the Netherlands. The budget for 2021 has largely been paid out in 2020. For the purpose of this budget comparison, the budget for 2021 has been used.

Yearly budgets for tax and subsidy incentives.

Netherlands

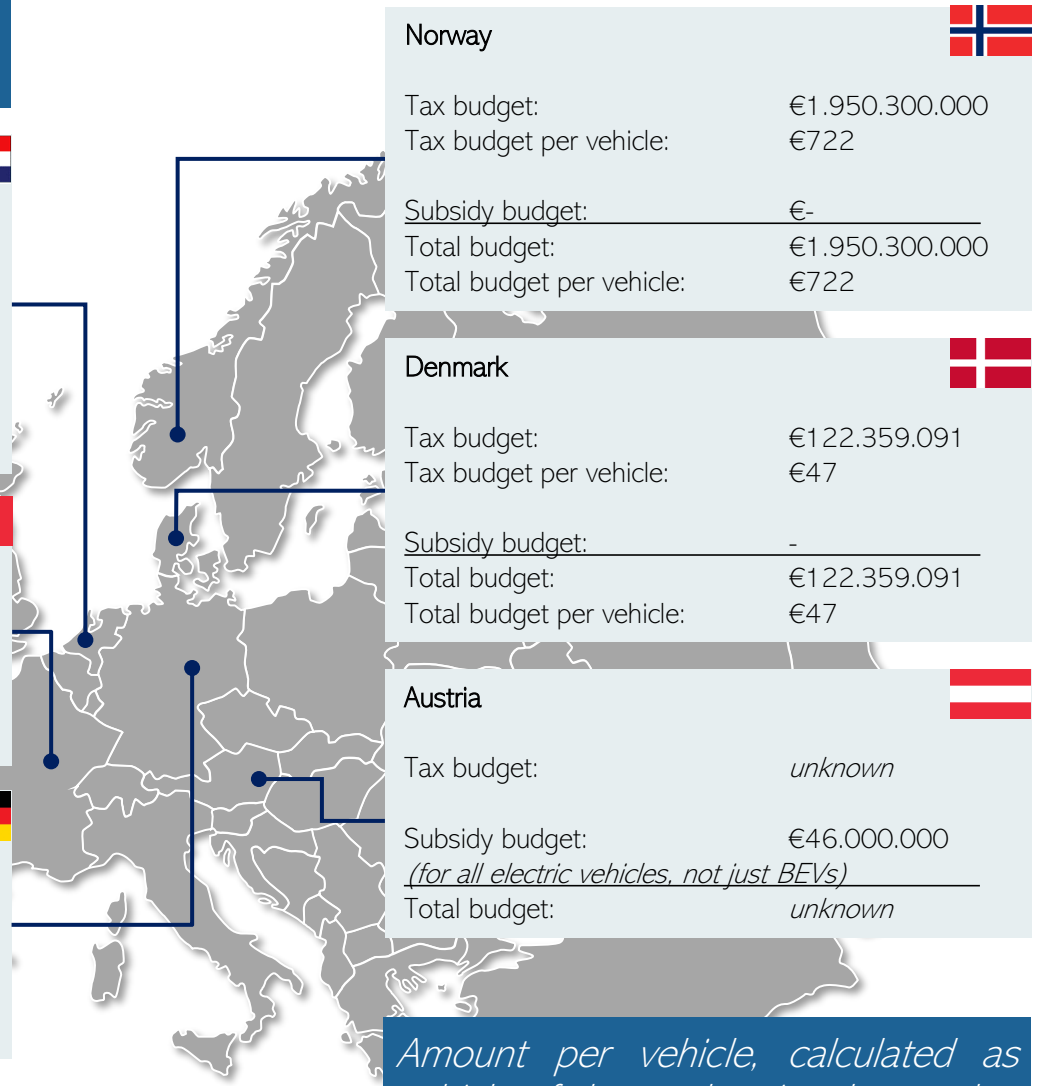
Tax budget:	€534.000.000
Tax budget per vehicle:	€64
Subsidy budget:	€14.400.000
Subsidy budget per vehicle: :	€1,72
Total budget:	€548.000.000
Total budget per vehicle:	€65

France

Tax budget:	*unknown*
Subsidy budget:	€1.239.000.000
Subsidy budget per vehicle:	€38
Total budget:	*unknown*

Germany

Tax budget:	*unknown*
Subsidy budget:	€1.845.000.000
Subsidy budget per vehicle:	€39
Total budget:	*unknown*



Norway

Tax budget:	€1.950.300.000
Tax budget per vehicle:	€722
Subsidy budget:	€-
Total budget:	€1.950.300.000
Total budget per vehicle:	€722

Denmark

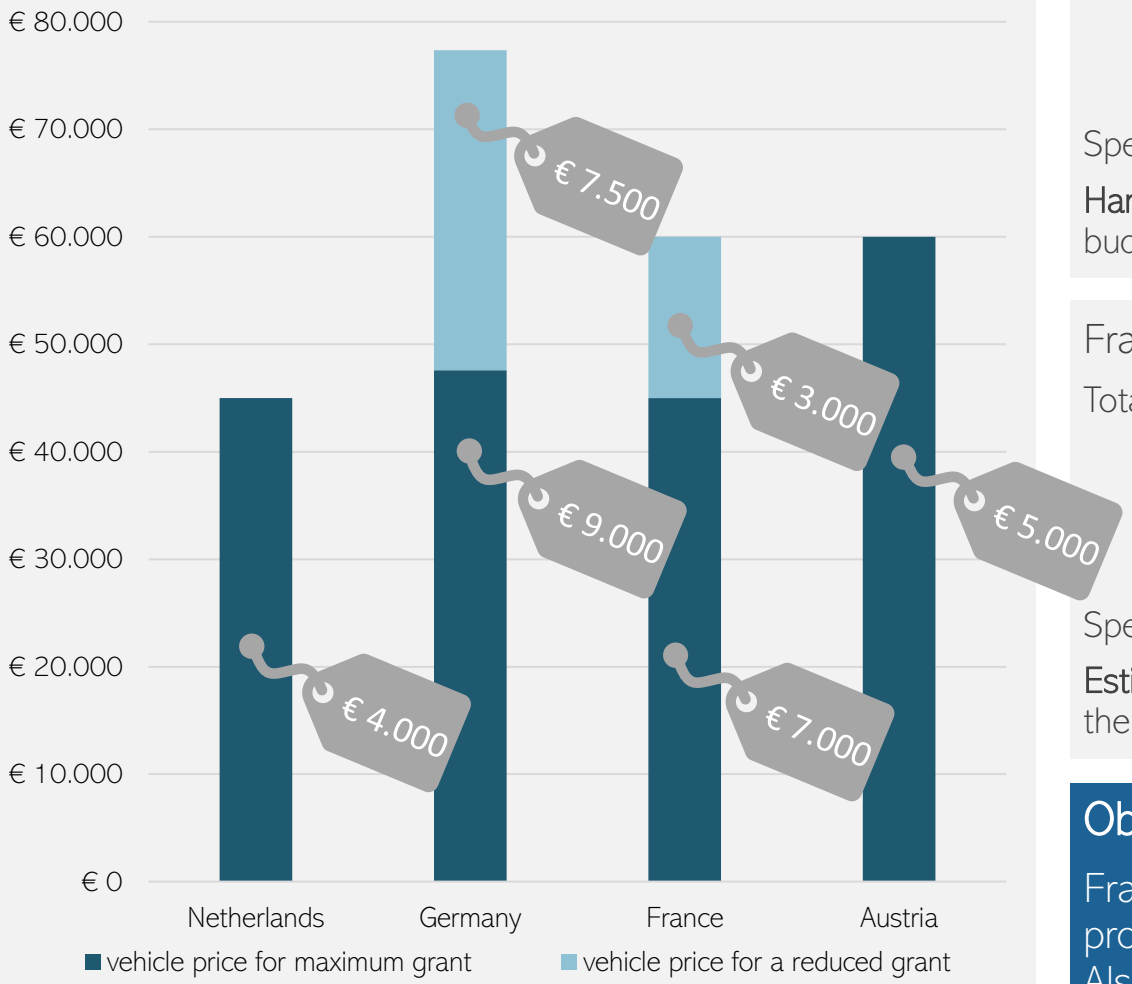
Tax budget:	€122.359.091
Tax budget per vehicle:	€47
Subsidy budget:	-
Total budget:	€122.359.091
Total budget per vehicle:	€47

Austria

Tax budget:	*unknown*
Subsidy budget:	€46.000.000
(for all electric vehicles, not just BEVs)	
Total budget:	*unknown*

Amount per vehicle, calculated as vehicle of the total national carpark.

Purchase subsidy budgets and conditions



The Netherlands

Total budget: €14.400.000

Budget limit ☑

Time limit ☑

Specifics:

Hard budget. End of the year or when the budget is exhausted.

Germany

Total budget: €1.845.000.000

~~Budget limit~~ ☐

Time limit ☑

Specifics:

Estimated budget. Time planning is leading, the costs are estimated.

France

Total budget: €1.239.000.000

~~Budget limit~~ ☐

Time limit ☑

Specifics:

Estimated budget. Time planning is leading, the costs are estimated.

Austria

Total budget: €46.000.000

Budget limit ☑

Time limit ☑

Specifics:

Hard budget. Runs until March 31st 2022, subsidy is for for all sorts of electric vehicles.

Observations

France and Germany are similar, having no budget constraint on the subsidy program. Austria and the Netherlands both have a budget- and a time constraint. Also, the total budget and amount of subsidy per BEV is lowest in the Netherlands.

Stop-and-go purchase subsidies

Introduction

Stop-and-go subsidies can create unpredictable month-on-month BEV sales. This because it changes the purchasing behaviour. This cold mean, for instance, that the purchase of a BEV is postponed, waiting for the subsidy, it can be that a purchase is done earlier than expected because of the subsidy, or it can be that someone purchases a BEV that was not planning to do so.

In order to identify the stop-and-go incentives, local experts were interviewed. The assumption is that the inside knowledge from local experts gives more insight into the severity of the impact of the stop-and-go incentives.

Hungary

Hungary has seen the effect of 'stop-and-go' incentives in three different programs. The first two programs in 2016 and 2018 ran for about two years before a predetermined budget-limit was reached. In 2020 a program was introduced, again with a predetermined budget, that was shut down after just 27 hours because the budget was depleted. The program was meant to run for almost two years. Prior to the program in 2020, car dealers and consultancy companies specialized in swiftly managing the applications for funding because of the great interest.

In 2021, again a subsidy program was announced half May and will be opened on June 14th. For this program similar results are expected, great interest which will quickly deplete the budget for the subsidy.

The Netherlands

In the Netherlands, the effect of stop-and-go subsidies seems significant.

In 2020, a purchase subsidy of €4.000 for private citizens was announced. The budget available for funding this subsidy turned out to be insufficient. Funds originally earmarked for 2021 were used in 2020. This meant that only a bit more than €1 million of the originally €14,4 million was available in 2021. The subsidy budget for 2021 was emptied within four days.

France

The French government does not have stop-and-go incentives as seen in the Netherlands or Hungary, but rather has a decreasing amount of subsidy. With this, the French government is trying to persuade its citizens to switch to BEVs quickly by reducing the purchase subsidy gradually on July 1st, 2021, and again on January 1st, 2022.

Observations

- New or higher purchase subsidies 'ignite' a run on BEVs until the deflation of the budgets, which leaves potentially BEV buyers waiting until new budgets are open;
- The abruptly phasing out of BEV tax incentives creates a run before a certain financial advantage is removed;
- In the countries where the incentives are only changing a little, there are fewer disturbances in the BEV sales figures.

Stop-and-go subsidies have a disruptive effect on the BEV uptake, creating an instable market growth for BEVs.

Deep dive in effect of BEV policies

The Netherlands, Norway, France, Germany

Method and assumptions of purchase and TCO calculations

The methodology and assumptions used for the purchase price- and TCO calculation are explained below:

TCO calculation

- A usage period of four years was used in the TCO calculation with the assumption of 28.000 km per year for the business market and 15.000 km per year for the private market.
- The depreciation is an important part of the TCO and was calculated using INDICATA, a proven car valuation tool. On the next slide, a detailed explanation is given of the calculation of the residual value, and thus the depreciation.
- To eliminate the outliers that cause fluctuation on depreciation, the average depreciation percentages per drivetrain type (BEV and petrol) over the different segments was used. This also applies to the depreciation percentages between countries. The differences between the Netherlands, Germany and France are relatively small (<1%), but Norway is the exception. In Norway, the depreciation of BEVs and petrol cars deviates significantly from the other countries, therefore, the depreciation of Germany, France, and the Netherlands are equalled, but for Norway the depreciation was calculated separately.

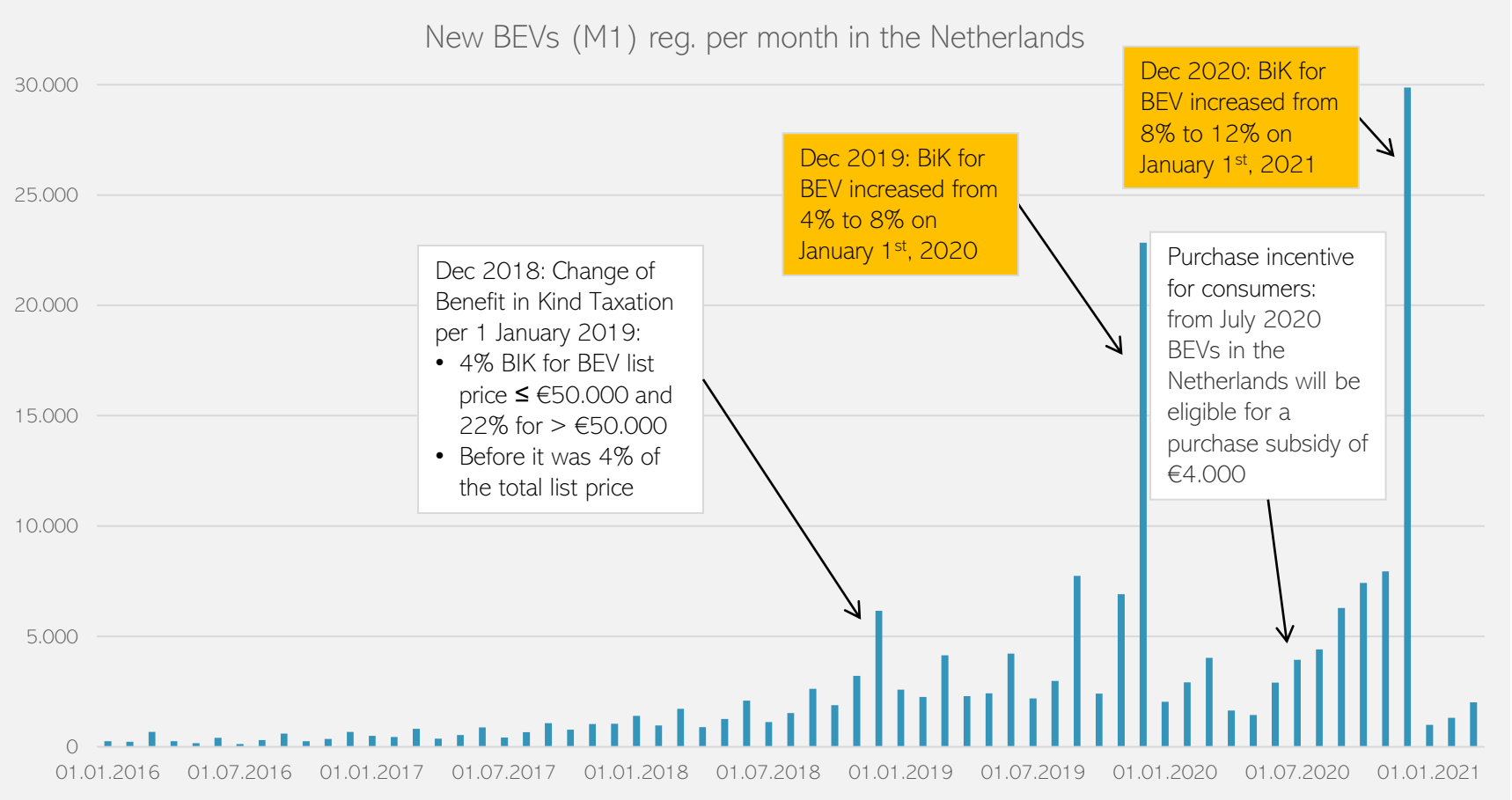
Segments

- Per country the best selling BEVs and petrol cars of 2020 are used for the TCO calculations. For each of these cars the purchase price and the TCO are calculated. Per segment the average purchase price and TCO are calculated, the average was weighted according to the sales figures in 2020.
- Selecting which car belongs to which segment is a difficult decision for BEVs. In this research the segmentation from RAI was used. This method is applied to all countries to ensure a reliable comparison. This does mean that some BEVs that are included are much more luxurious than their petrol powered counterparts, for instance, the BMW i3 in the B segment. To account for this problem and the assumption that BEVs are generally better equipped than petrol cars, the analysis was done on the cheapest variant of the BEVs and the second cheapest petrol cars.
- The average of the B-, C-, and D segments were used to create one average purchase price and TCO per country for both the private- and business market, these averages are shown in this report.

Governmental influence / Tax burden

- The total effect of governmental influence on the purchase price and TCO is also shown in this chapter. For the purchase price, this includes purchase taxes, VAT on the purchase, but also purchase subsidies. For the TCO, the road taxes are added to that list. This total of governmental influence is combined in “total tax and incentives”, and is shown both in the graphs on purchase price and TCO.
- The purchase grants in the different countries all have different rules for eligibility. For this report, we assumed an annual income of €40.000 when determining which incentives could be applied. The same income of €40.000 was used to calculate the taxation on BiK.
- The purchase subsidy of €4.000 for BEVs in the Netherlands is left out of the base calculations of the purchase price and the TCO, due to the low availability. However, the influence is shown in the upcoming slides.

The Netherlands
Chronology

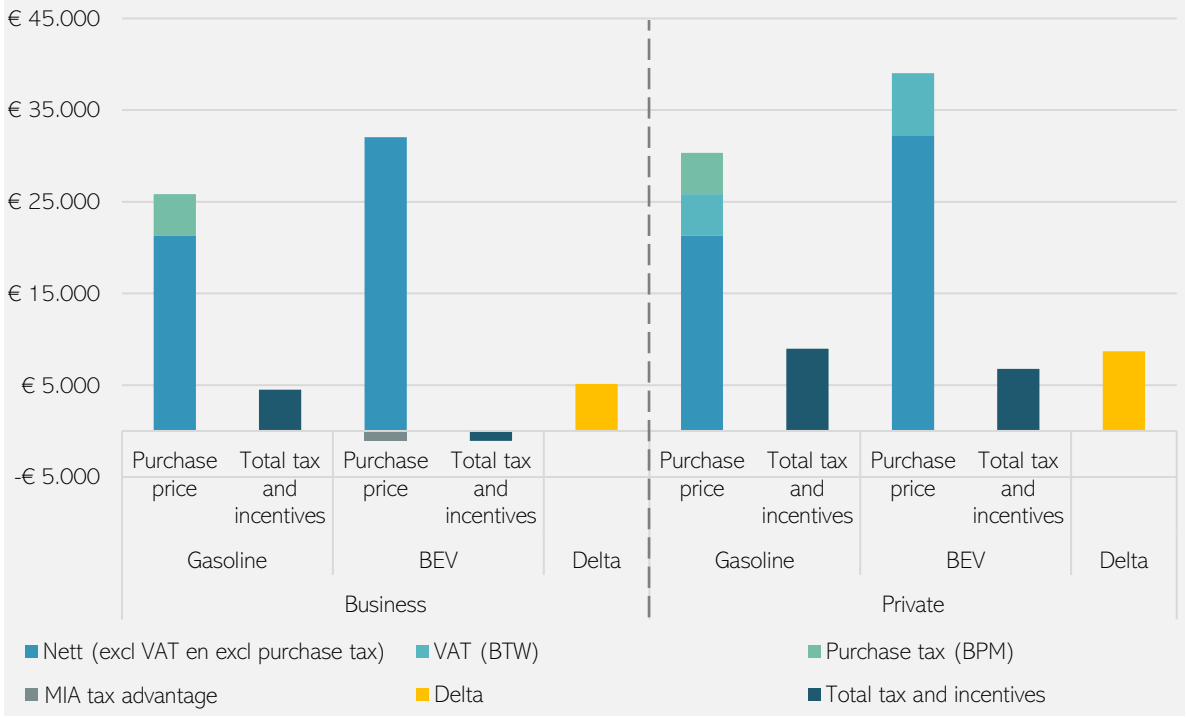


Observations

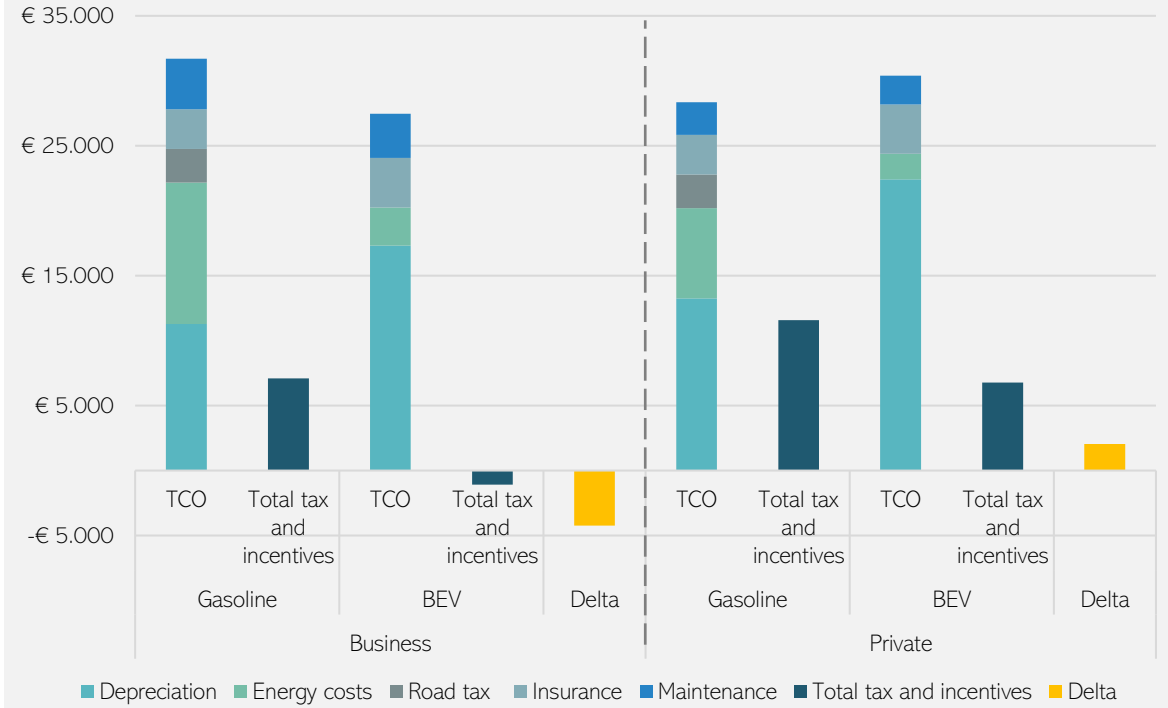
- There are large deviations between months in BEV sales with three noticeable peaks;
- These peaks are observed in the last month before an increase in the BiK taxation;
- There is a higher number of BEV registrations at the last month of the quarter. This is simply due to the arrival dates of the boats carrying the new models;
- The effect of the purchase subsidies for consumers is hard to distinguish from this graph.

The Netherlands
Average Purchase price and TCO of the B-, C-, and D segment

Purchase costs



TCO costs



Observations

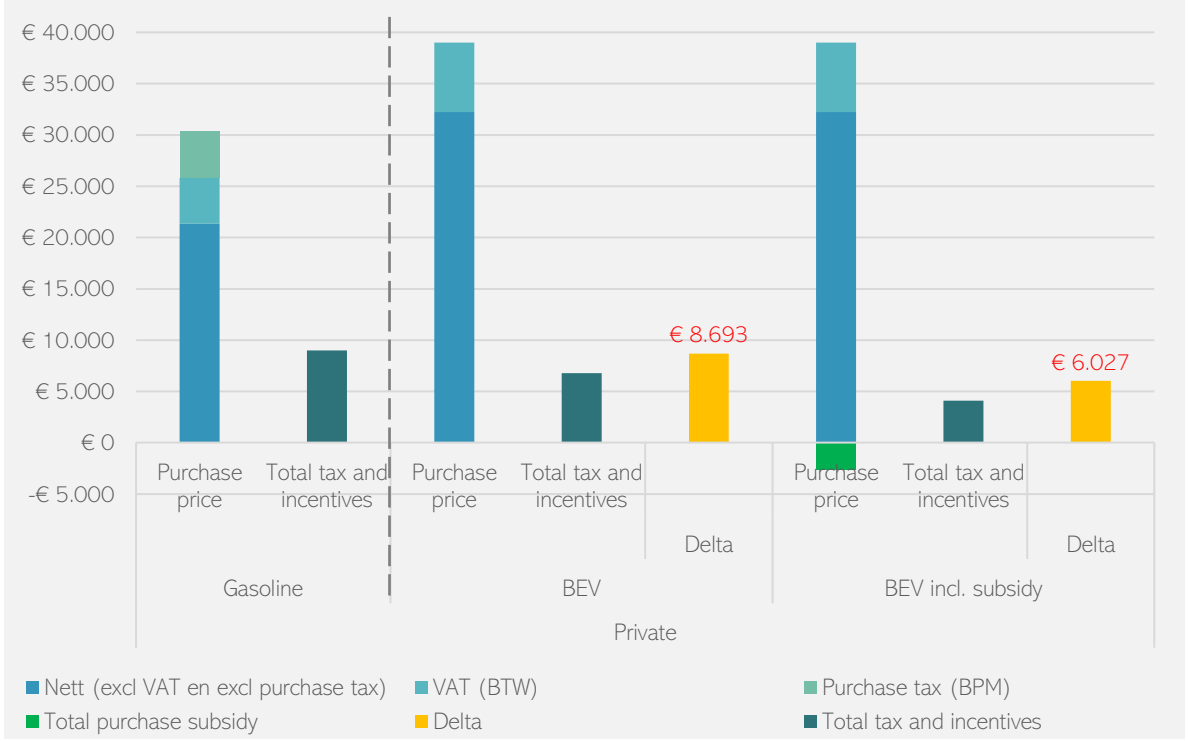
- BEVs are exempted from the purchase tax and BEVs in the business market are eligible for an investment-incentive (MIA). In both the private- and the business market, this does not compensate the higher nett price of the BEVs compared to petrol cars.
- The difference between petrol cars and BEVs is bigger in the private market due to the VAT. BEVs are due more VAT because of the higher nett price.
- There was a purchase subsidy of €4.000 available for a short period, the subsidy was left out of this calculation due to the low availability.

Observations

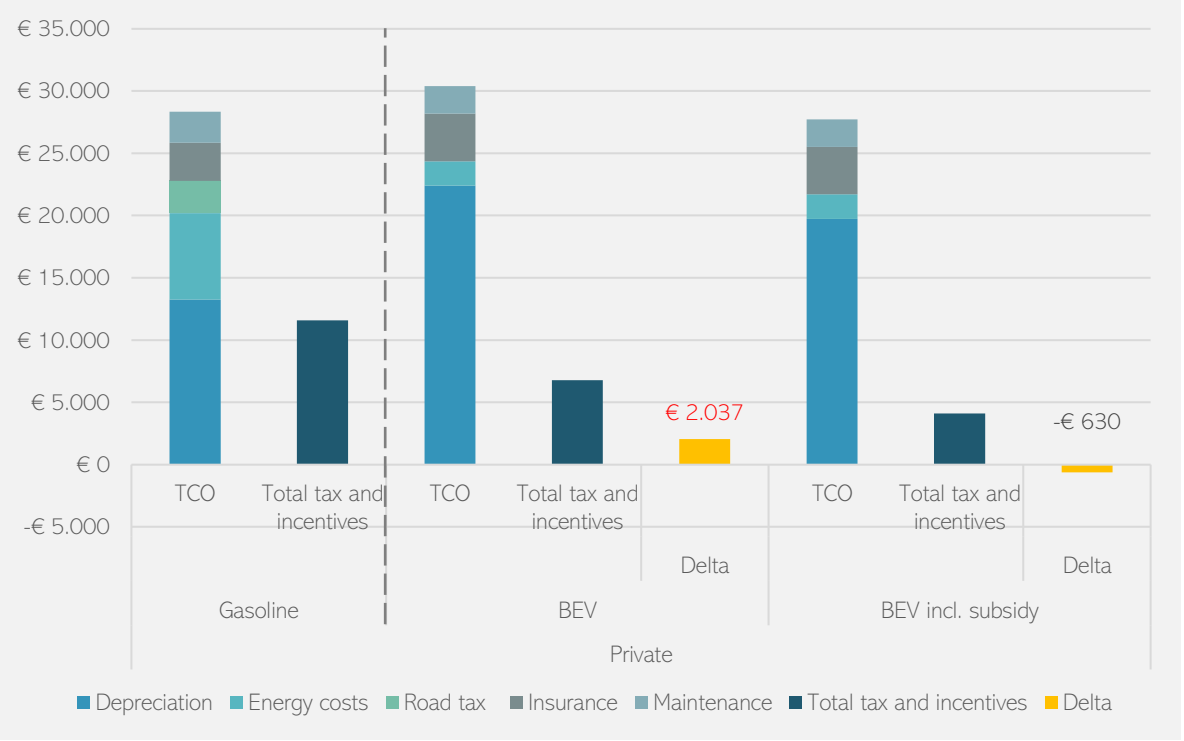
- There is no road tax for BEVs and BEVs have significant lower energy costs than petrol cars. In the business market, therefore, the TCO of BEVs is +/- €4.000 lower than that of a petrol car.
- In the private market, the savings on energy costs are lower than in the business market because the utilization rate of the vehicles is lower. Ultimately, on average, BEVs have a higher TCO than petrol cars in the private market.

The Netherlands (Effect of the €4.000 purchase subsidy)
Average of B-, C-, and D segment (private market only)

Purchase costs private



TCO costs private



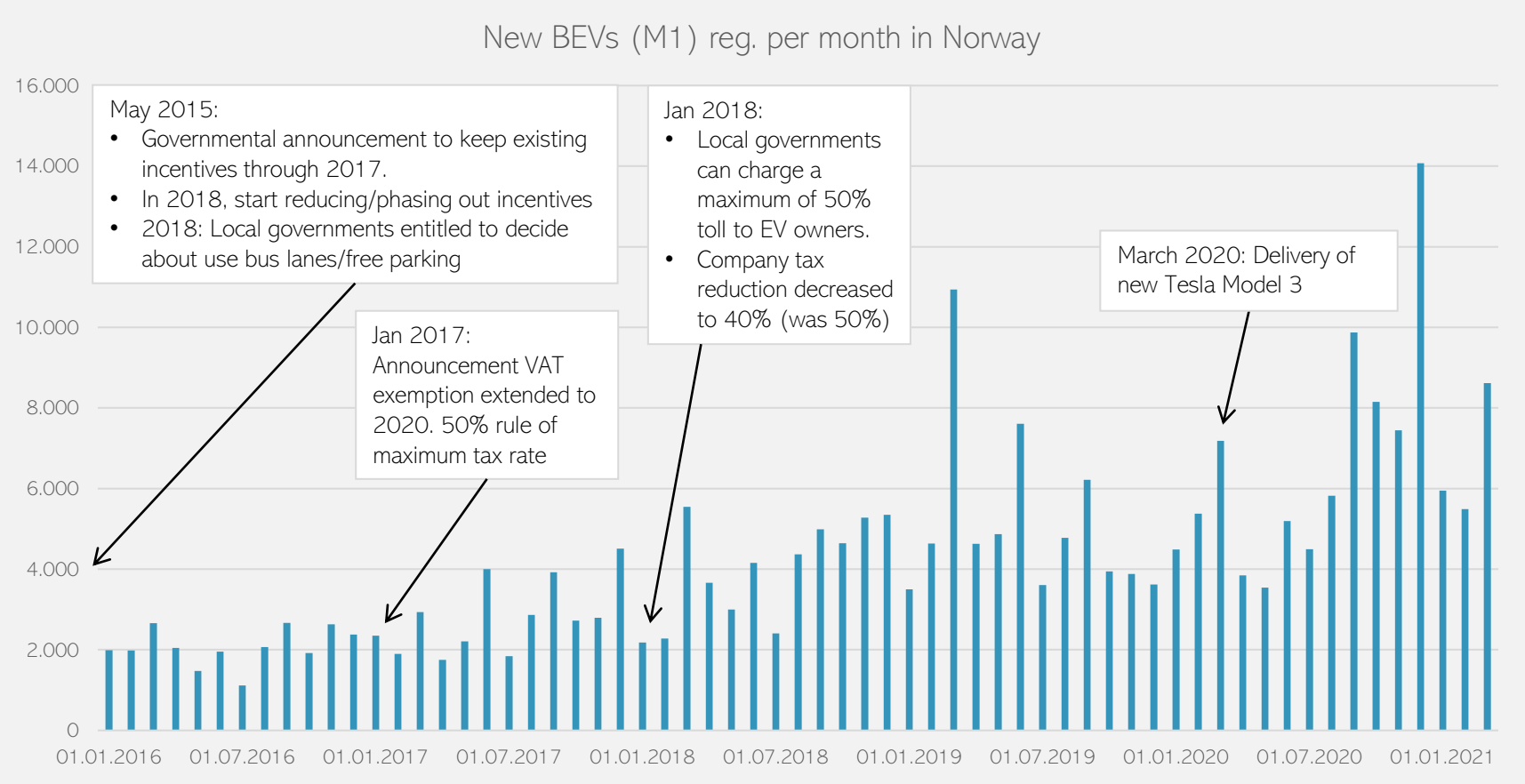
Observations

- Business purchases are not influenced by the purchase subsidy since only private purchases are eligible for the €4.000 subsidy.
- The purchase costs go down with €4.000 when the subsidy is included in the calculation. Because the cars in the D segment are not eligible for the subsidy, the difference between petrol cars and BEVs goes down less than the €4.000 subsidy.

Observations

- The TCO of BEVs is slightly positive with the purchase subsidy. This grows to a benefit of €630 in favour of BEVs over petrol cars.

Norway
Chronology



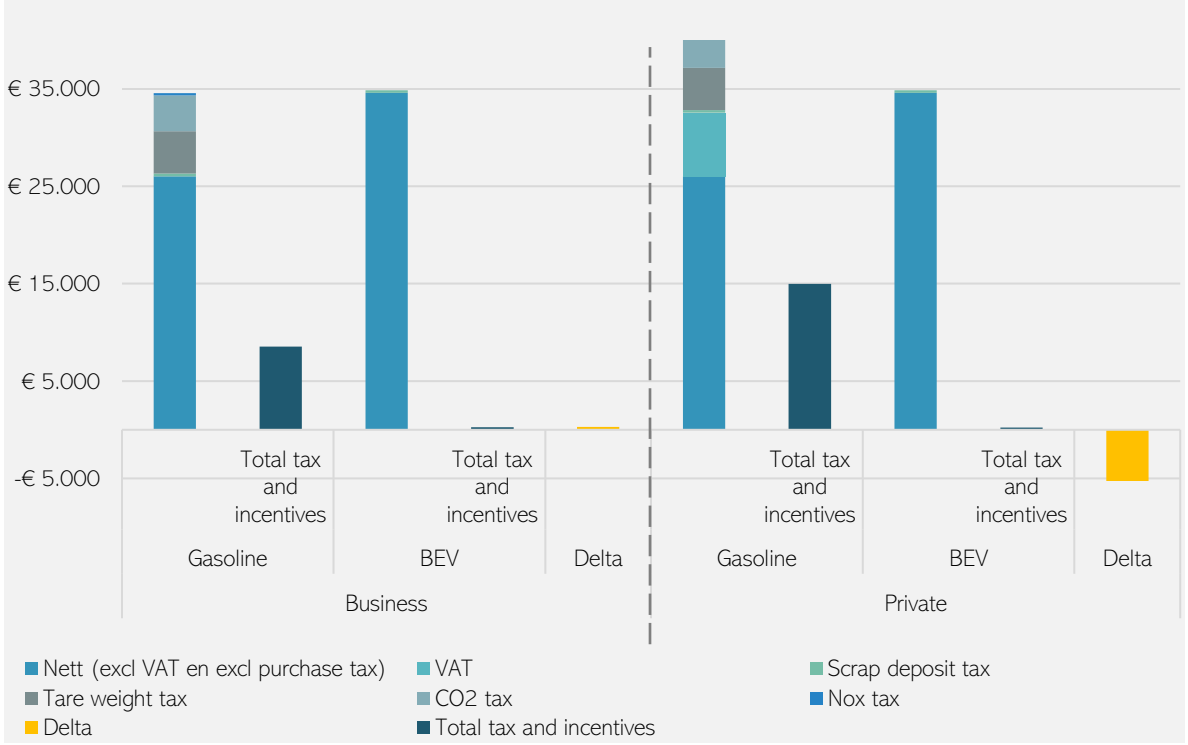
2012: Governmental decided to maintain the existing EV incentives until 2018 or when the target of 50,000 EVs is reached. In 2018, start of slowly reducing/phasing out incentives

Observations

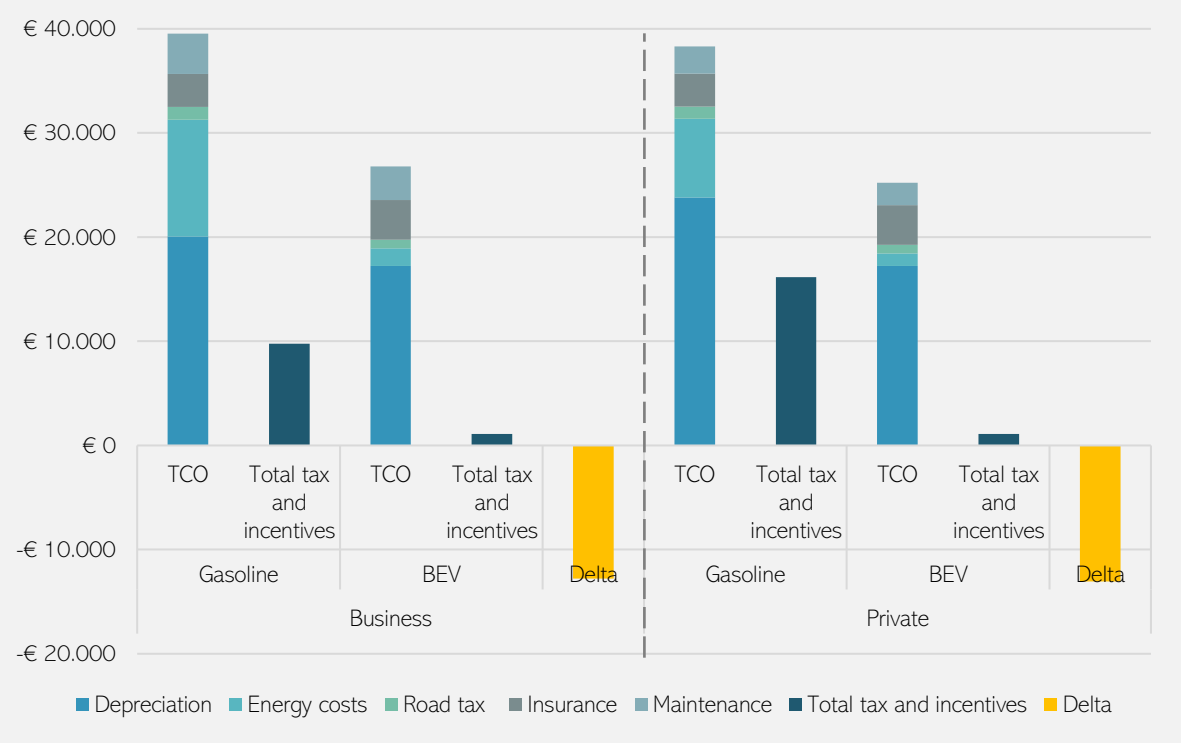
- The real growth of BEV sales started in 2014. From 2014 till 2017 there was a steady sales number of 2,000 BEVs per month;
- The number of BEV sales gradually grew since 2017. The average sales in 2019 and 2020 was above 4,000 BEV's per month.
- Every three months there is a slight peak, this due to shipping arrival dates.

Norway
Average Purchase price and TCO from B-, C-, and D segment

Purchase costs



TCO costs



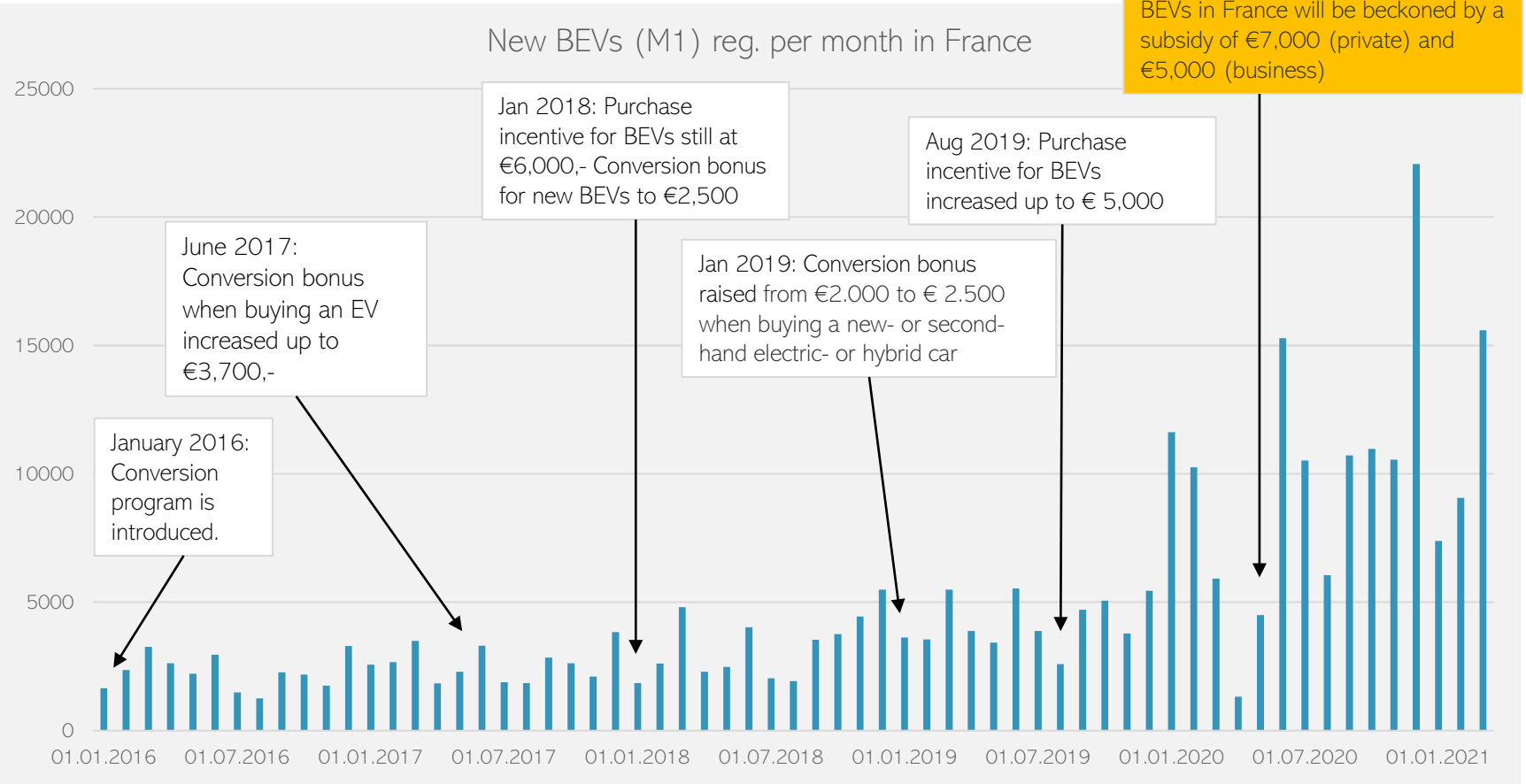
Observations

- In Norway, BEVs only pay the scrap deposit tax, whereas petrol cars are also due CO_2 tax, NO_x tax, and the tare weight tax. These tax breaks significantly reduce the purchase price of BEVs.
- Despites the tax breaks, BEVs are still slightly more expensive than petrol cars (€300) in the business market. In the private market, BEVs are cheaper than petrol cars. This is because petrol cars in the private market are due VAT, while BEVs are exempted from VAT.

Observations

- The depreciation of BEVs is in Norway lower compared to other countries. This is partly due to the maturity of the second hand market. The interest in purchasing second hand BEVs keeps the depreciation low.
- The private market sees a similar pattern as the business market, the difference is the lower depreciation of BEVs. This is caused by the VAT exemption for BEVs, petrol cars do pay VAT over the nett price, therefore, the depreciation for petrol cars is higher. BEVs have ultimately a TCO of around €13.000 lower than petrol cars.

France
Chronology



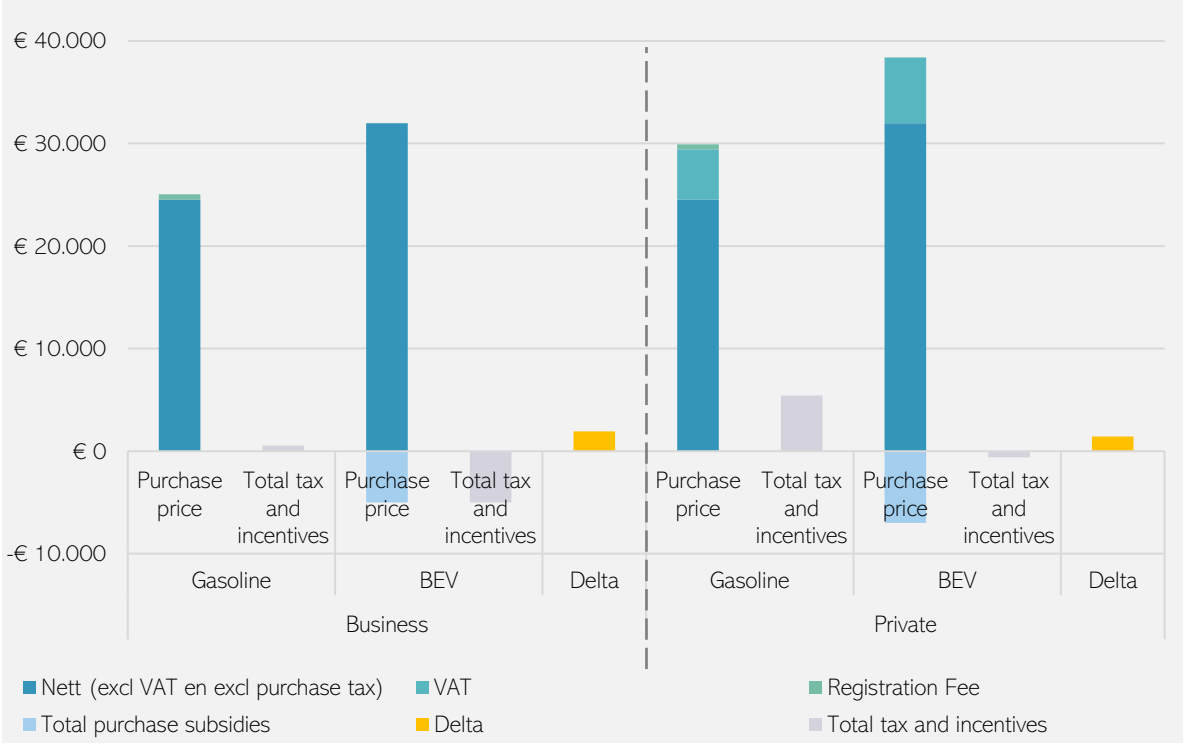
France started in 2008, as one of the first in the world, with an incentive program. In 2016, this bonus was set at €6,300,-.

Observations

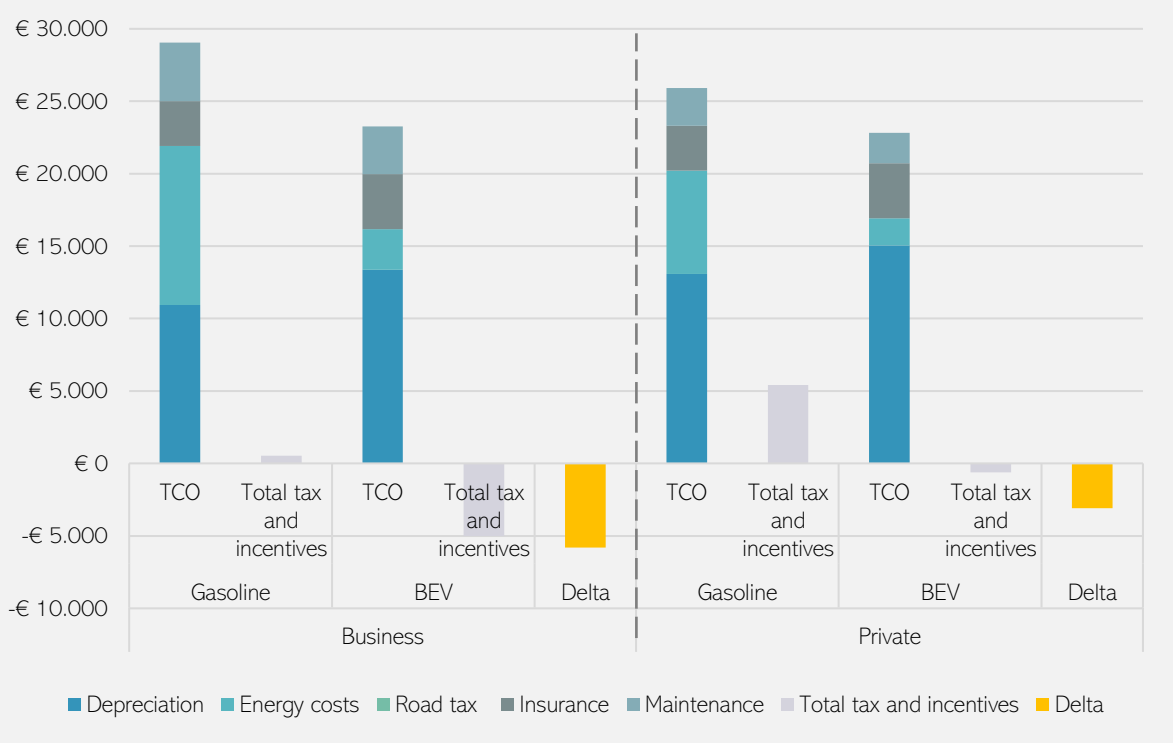
- For a long period (until 2019) there were stable but low BEV sales, with a slightly growing trend;
- In January and February 2020 there was a significant growth of BEV sales in the first two months;
- The purchase subsidy, which was increased with so-called 'Covid-19 incentives', seems to have played a large role in the increase of BEV registrations.

France
Average Purchase price and TCO from B-, C-, and D segment

Purchase costs



TCO costs



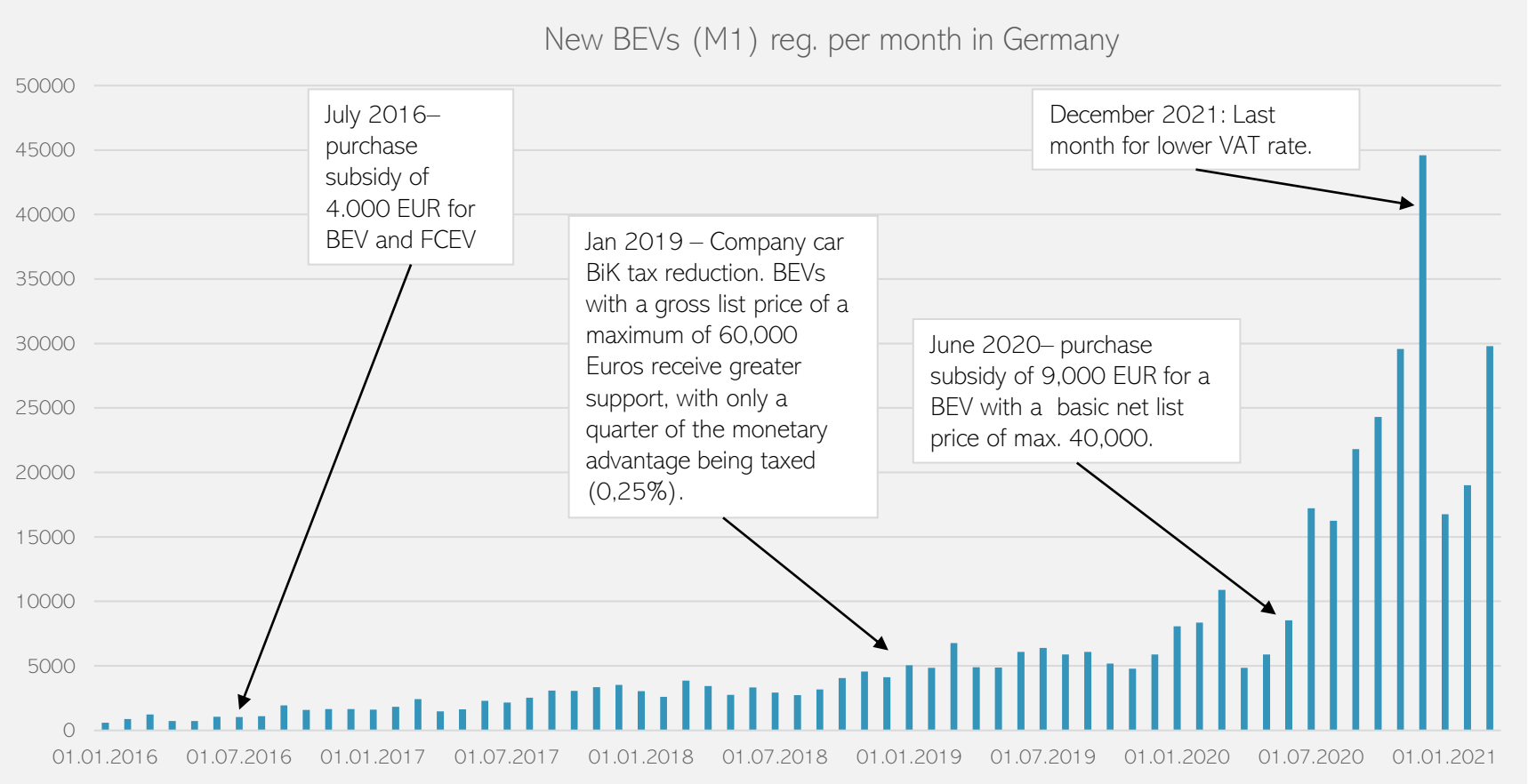
Observations

- In the private market, BEVs are roughly €1.500 more expensive than petrol cars. This small difference is caused by the purchase subsidy. Because the Polestar 2 is not being sold in France, the Tesla model 3 is the only available model in the D segment. A recent price change of the Tesla model 3 influenced the average BEV price positively, making it eligible for the purchase subsidy and reducing the average purchase price.
- Petrol cars are taxed rather lightly. France does have a progressive CO_2-based tax system but most new cars are seen as relatively sustainable in that tax scheme.

Observations

- In the business market, the depreciation is higher for BEVs but this is compensated by the lower cost of energy and lower maintenance costs. In the end, BEVs are around €5.500 cheaper in the TCO than petrol cars.
- The same goes for privately run cars. The difference is that the utilization rate is not as high, hence why the saving of a BEV over a petrol car is lower in the private market.

Germany
Chronology

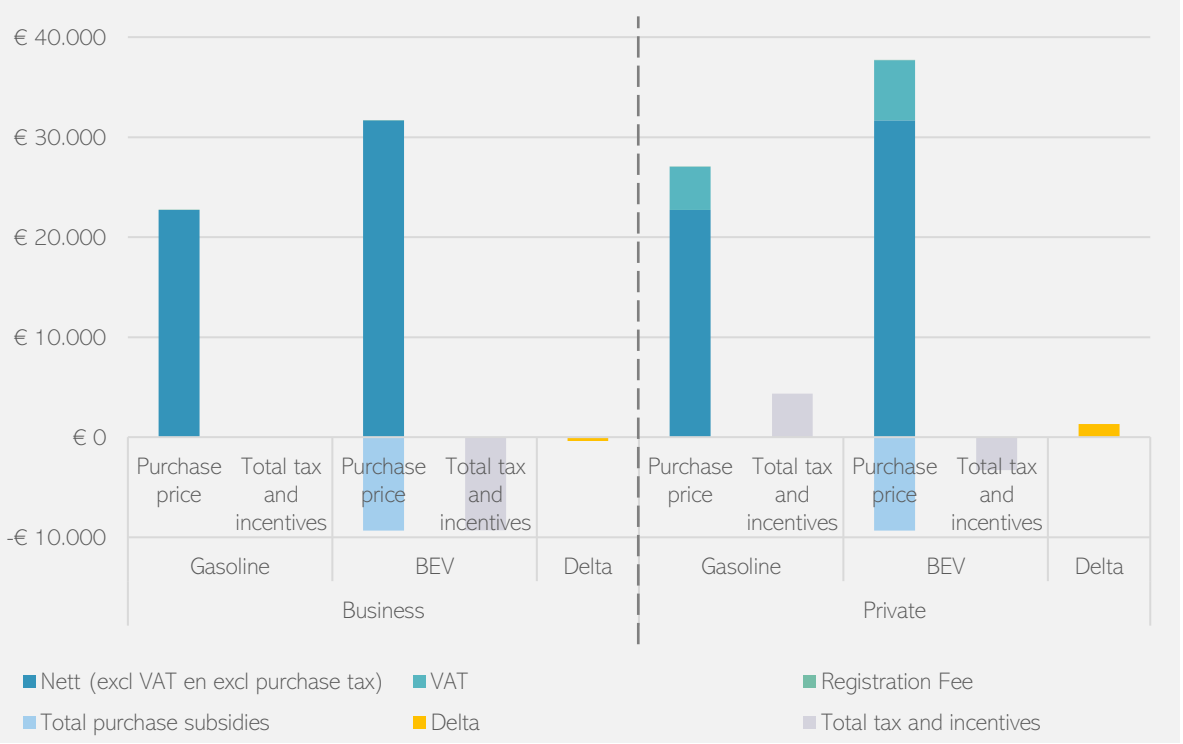


Observations

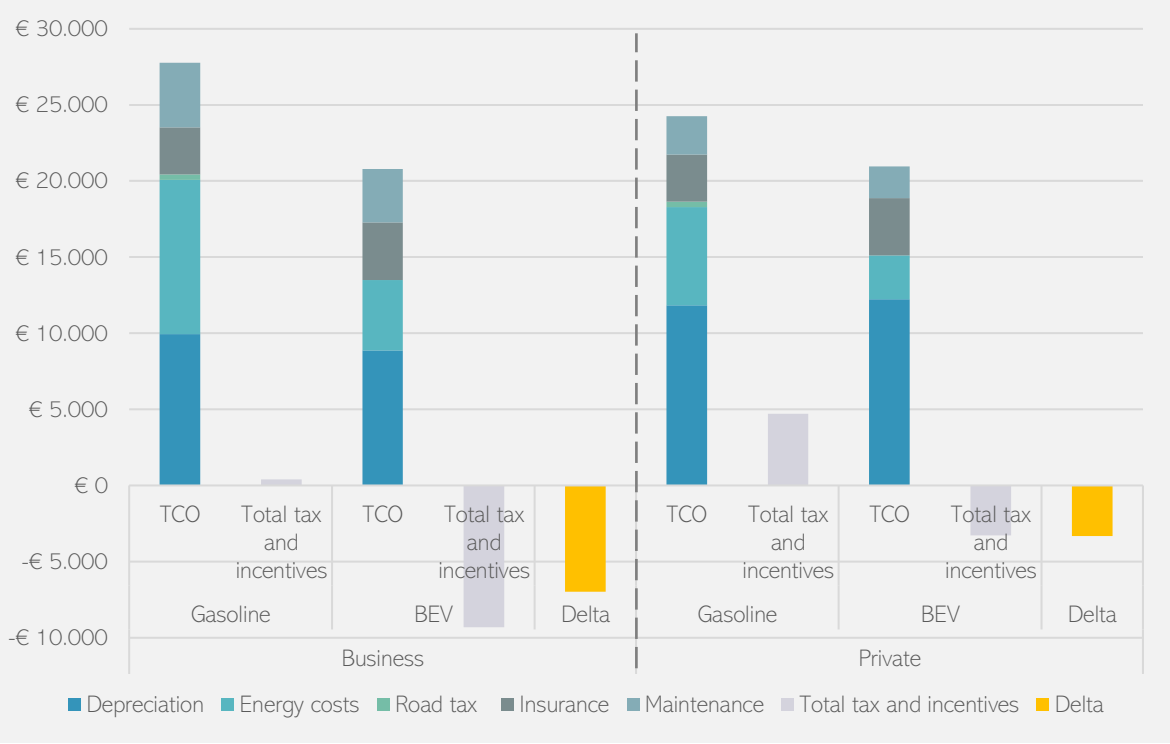
- Germany seems to have a relatively steady growth in the BEV sales figures;
- The first purchase subsidy of €4.000 in July 2016 had only a limited impact on the BEV sales;
- The second purchase subsidy introduced in June 2020 had a more significant effect on BEV sales.

Germany
Average Purchase price and TCO from B-, C-, and D segment

Purchase costs



TCO costs



Observations

- Similar to France, Germany has low taxation on cars. VAT is the only significant tax on cars. Therefore, Germany cannot give BEVs tax breaks and has to resort to a purchase subsidy of €9.000. Interesting about this purchase subsidy is that €3.000 of the purchase subsidy is paid out by the manufacturers, as far as we can see, this did not lead to a price increase of the BEVs in Germany.
- The relatively expensive D segment BEVs receive the purchase subsidy also. Because of this, the purchase prices of a BEV and a petrol car are, on average, close together.

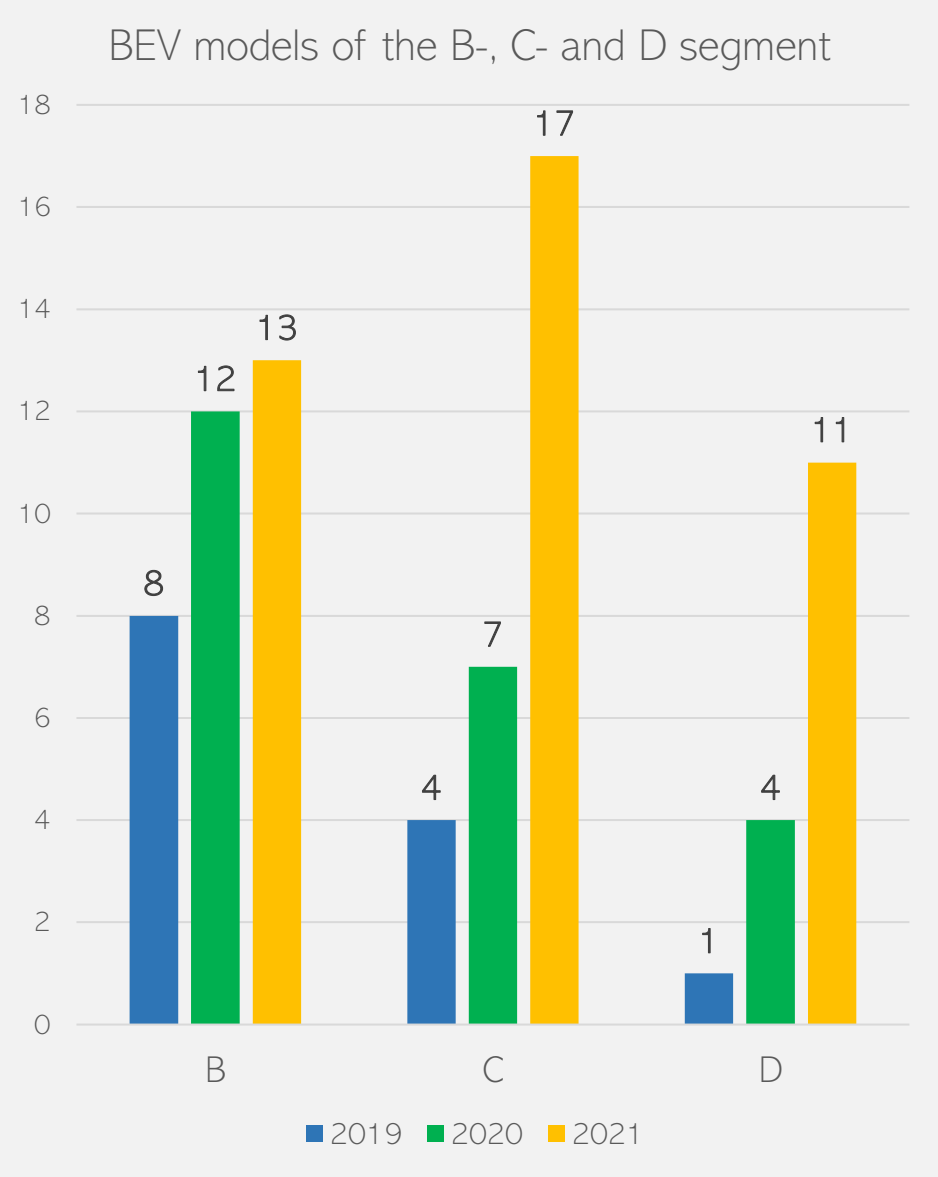
Observations

- In the private market, BEVs are around €3.300 cheaper than petrol cars. The difference is smaller than in the business market because of the lower utilization rate.
- Noteworthy is the cost of energy in Germany. The difference between BEVs and petrol cars is significantly smaller than in other countries. The saving of BEVs on energy is, therefore, also considerably lower.

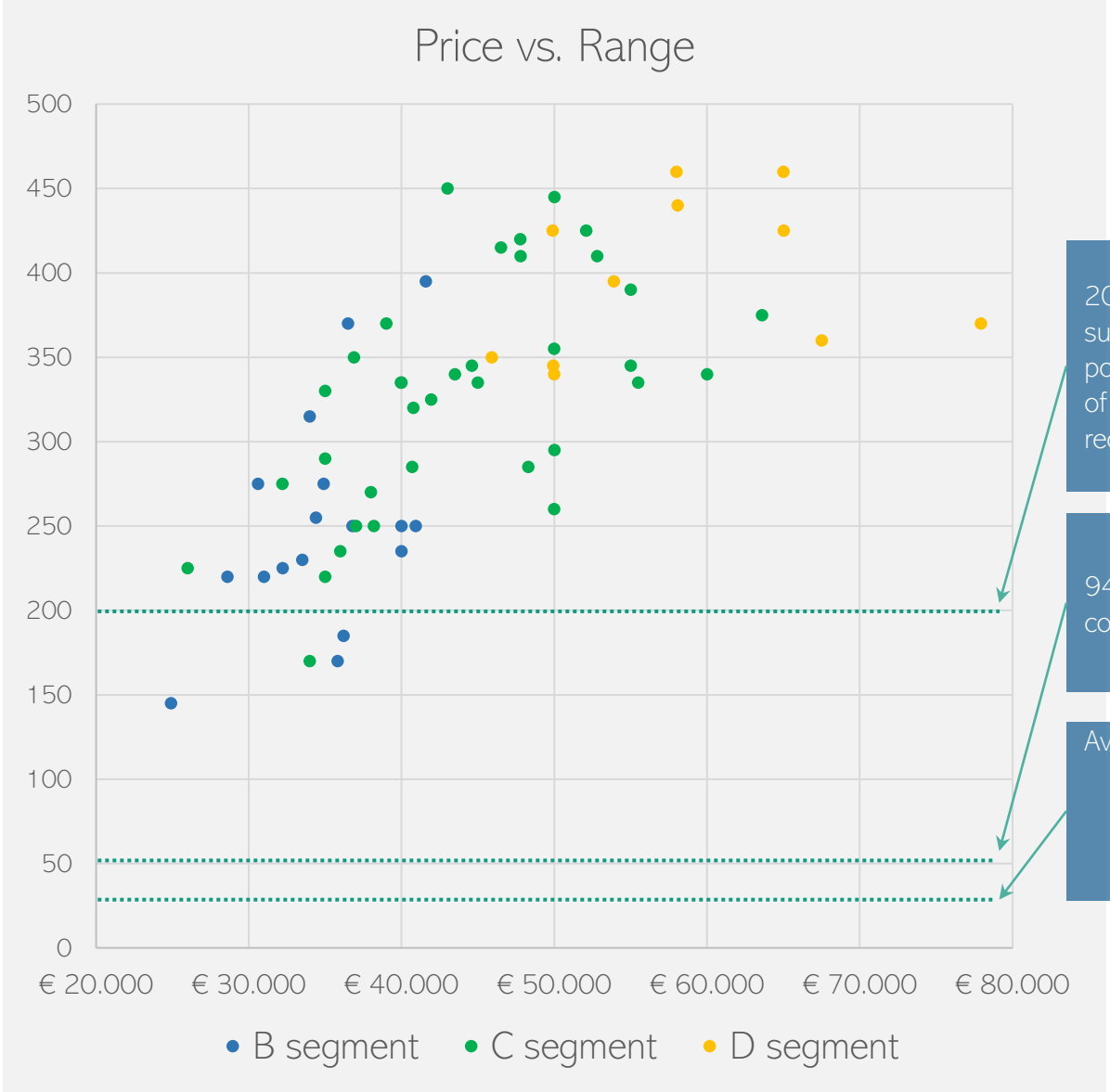
Benchmarking the Netherlands

- Marked conditions
- Number of BEV sales
- Effect on purchase price and TCO

Market conditions – BEV model availability



Source: EV-Database.nl



200 kilometers of range is sufficient for 90% of the population, to make 95% of all trips, without recharging.

94% in Germany has a commute of < 50km.

Average km p/day:
NL: 35,57 km
DE: 37,61 km
FR: 35,94 km
NO: 34,19 km

Source: Gnann, Plötz & Haag (2013); EV-Database.nl

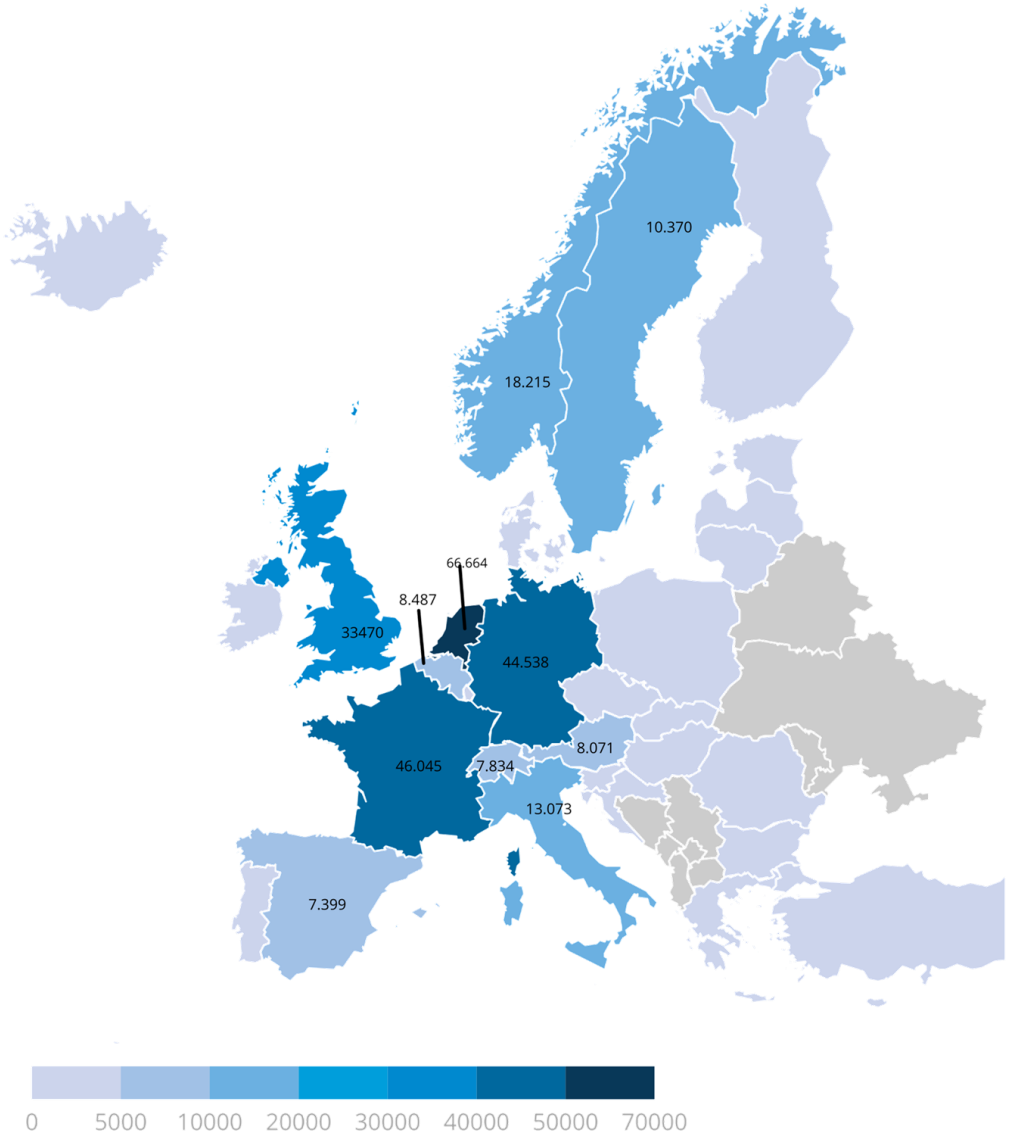
Market conditions – public recharging infrastructure

Observations

One of the most important prerequisites of a successful uptake of BEVs, is a sufficient number of (public) recharging points. Especially for (future) BEV-drivers that don't have the luxury of recharging their BEV on their private property. Therefore, public high power recharging points (above 22 kW) and normal recharging points (up to 22 kW) should be easily available and accessible to the user.

In the last 5 years, the amount of public recharging points in Europe has grown from 67.000 in 2015, to more than 285.000 in 2020.

Total amount of public recharging points per country (Dec 2020)



Source: European Alternative Fuels Observatory

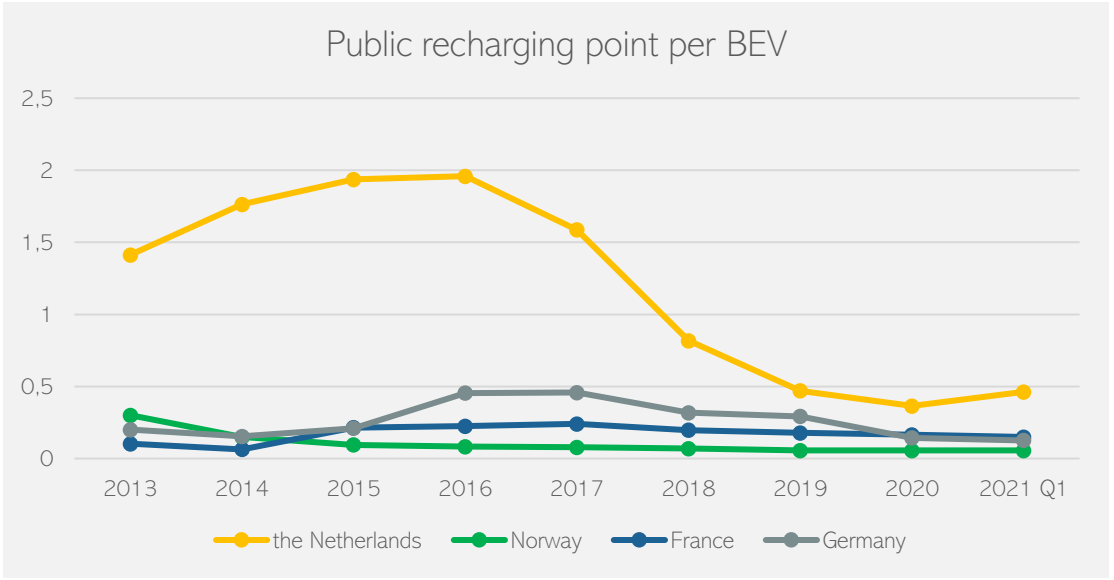
Market conditions – public recharging infrastructure

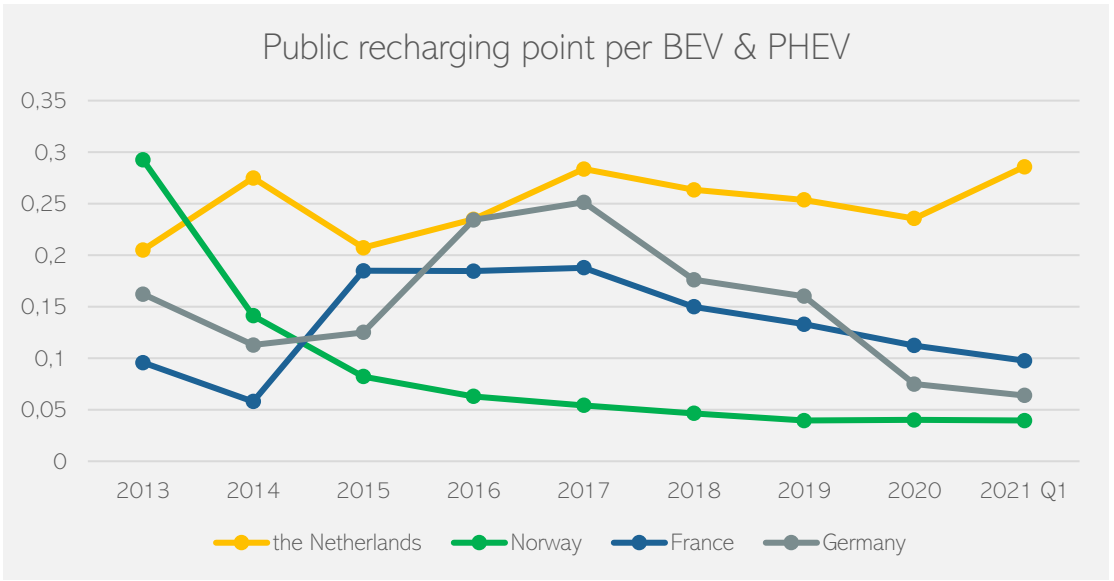
Observations

The amount of public recharging points per PEV (BEV and PHEV) is low in Norway due to the very fast uptake of PEVs in the last years. Clearly, the roll-out of new public recharging points did not keep up with the fast uptake of PEVs. However, the context in Norway is different than in other countries. A higher percentage of BEV and PHEV owners in Norway have a private recharging point at their disposal, therefore, there is a lower need for public recharging points. This was confirmed by a 2019 study from Elbil, it showed that PEV owners mostly recharge their car at home during the night.

The high uptake of BEVs in Norway means that BEVs are more and more being used for longer trips. High power recharging is used to enable these longer trips. Research showed that the highest percentage of EV drivers experiencing queueing is found in Oslo, which seems to indicate that people living and working in Oslo city, do not have the possibility to "slow charge" at home or at work because of a lack of normal recharging points and are therefore using high power recharging points more often.

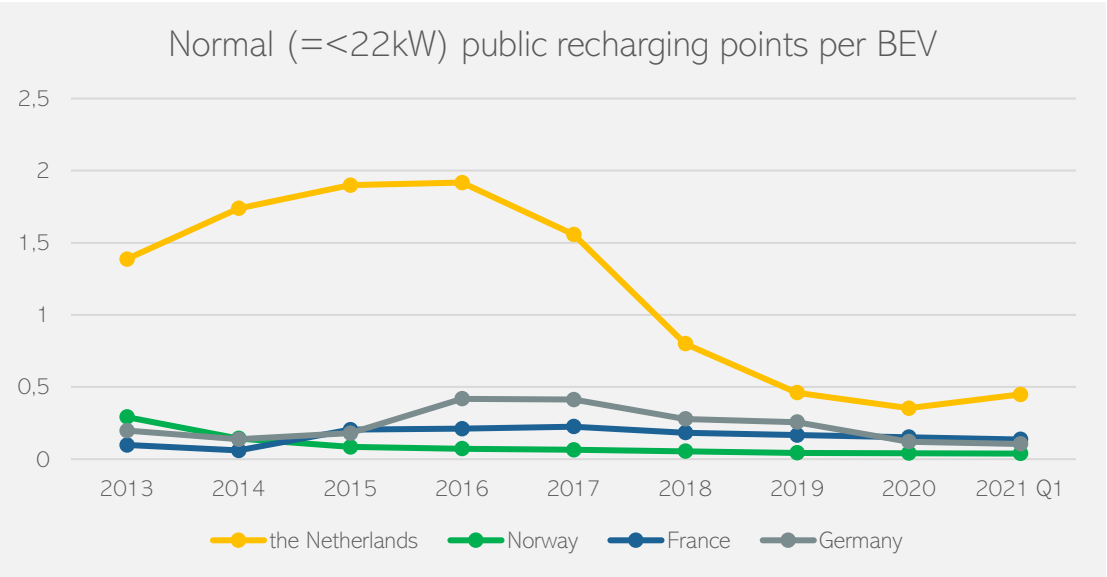
Especially in the Netherlands, but also in Germany, we can see a downward trend forming with the number of public recharging points per BEV decreasing from 2016 onward. The sales of BEVs are rising faster than the installation of public recharging points.

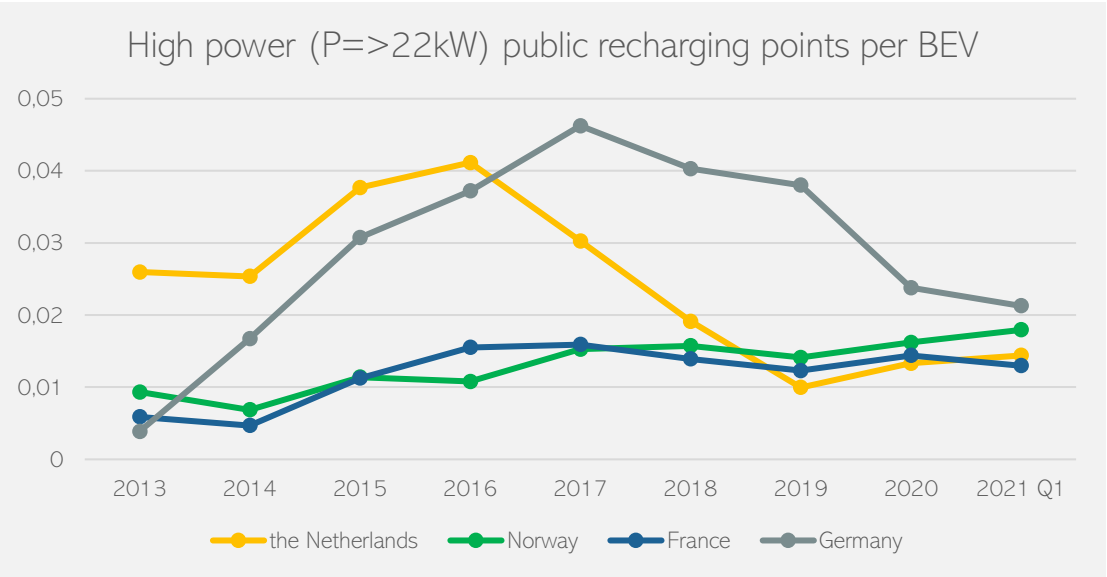




Source: European Alternative Fuels Observatory

Market conditions – public recharging infrastructure





Source: European Alternative Fuels Observatory

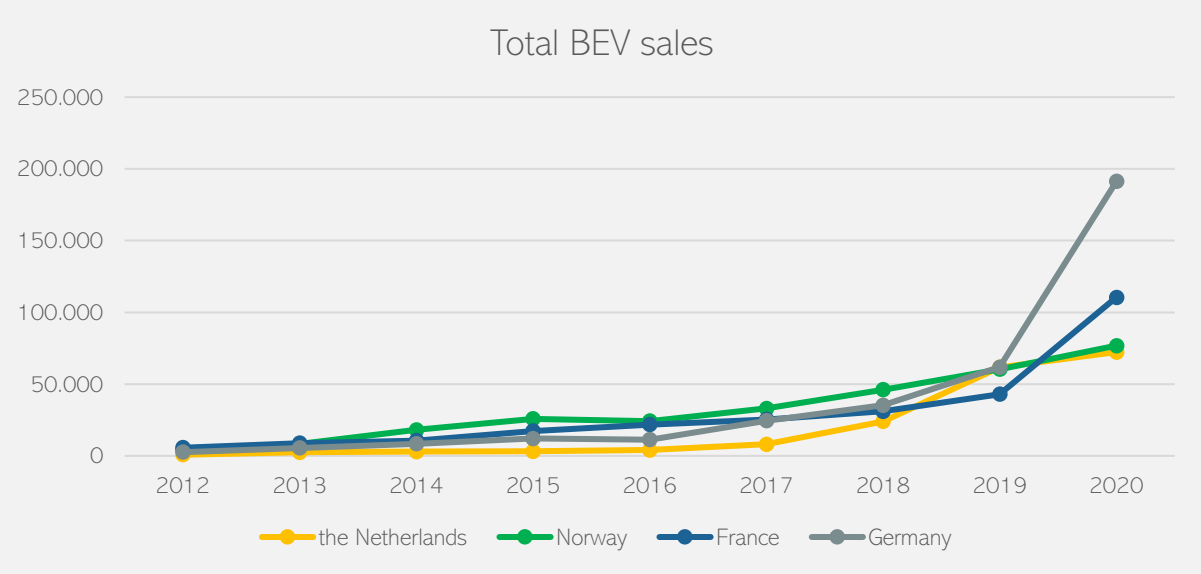
Observations

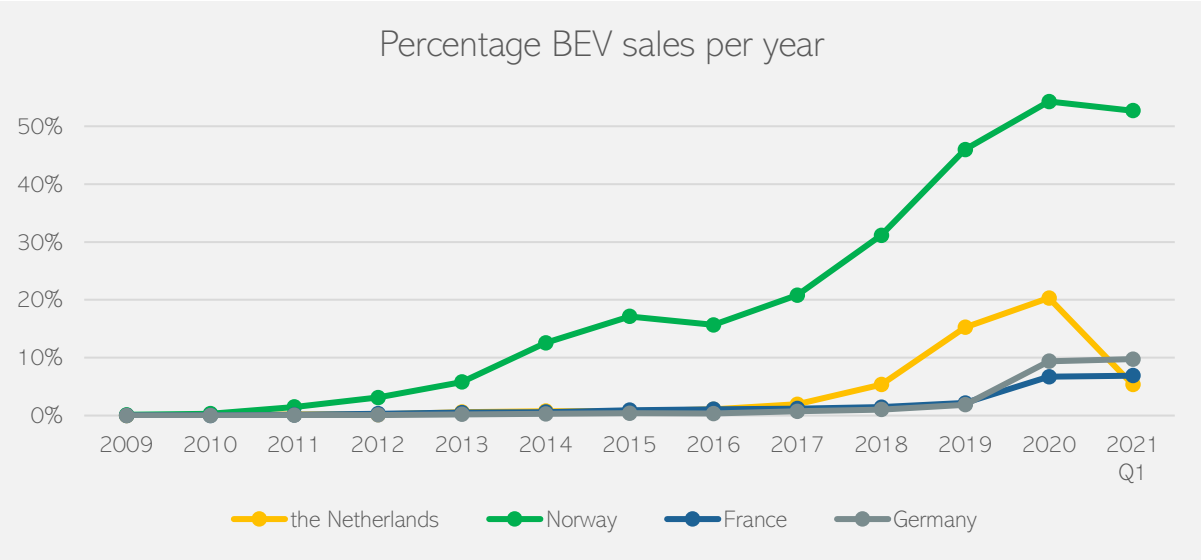
The graph clearly shows that the Netherlands has the highest amount of normal (=< 22kW) public recharging points per BEV. France has 0,13 recharging points per BEV, Germany 0,10, Norway 0,03 and the Netherlands 0,44. The high amount of public recharging points is to some extend needed in the Netherlands because the Netherlands has a higher urbanization rate. The Netherlands has an urbanization rate of 92%, whereas the Norway (82%), France (81%), and Germany (77%) have a much lower urbanization rate meaning that fewer people in the Netherlands will have the option of a home recharging point.

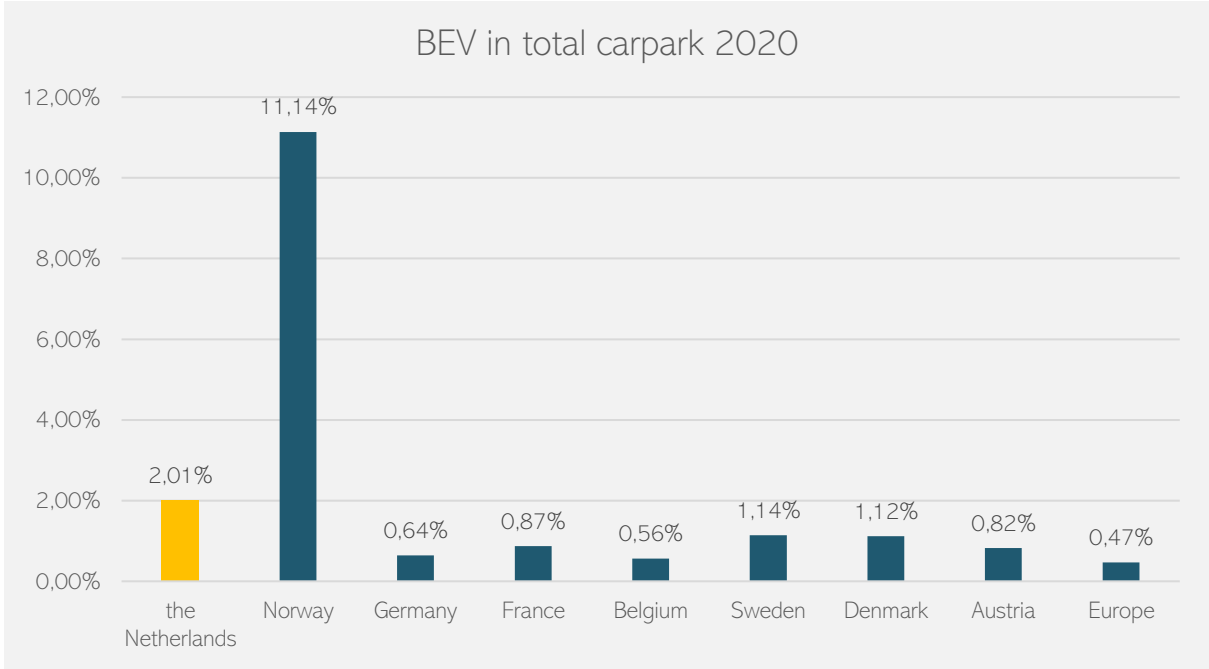
Of these countries, queueing up for a high-power recharging point is most common in Norway. The reason for this seems to lie in the fact that in the other countries, much more normal public recharging points are available per BEV than in Norway.

Source: Worldbank.org

Comparison of the BEV yearly sales- and fleet development in the Netherlands, Norway, France, and Germany





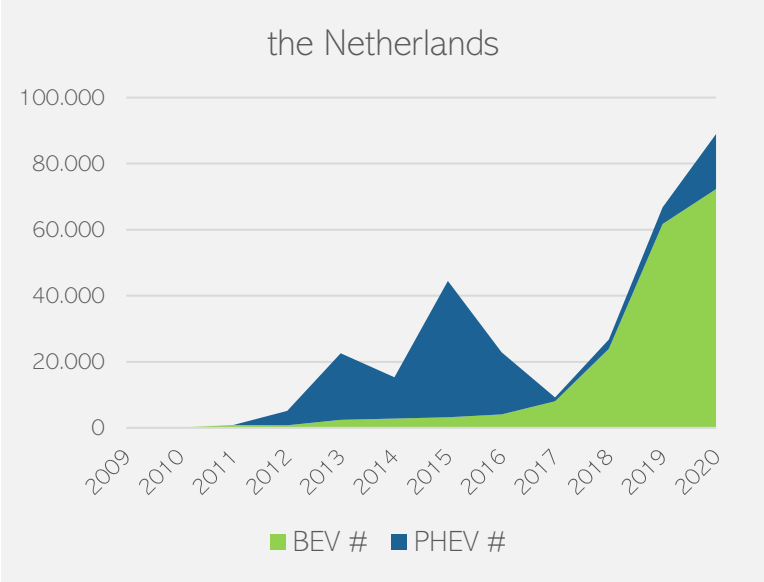


Observations

- The Netherlands is still ahead of most countries in BEV in the total carpark. However, France and Germany are increasing the BEV sales percentage much faster compared to the Netherlands, which saw a declining growth in 2020.
- The BEV sales percentage per year show a strong decrease in the Netherlands in Q1 of 2021. This is can be an indication, however, it must be said that the Netherlands historically has high BEV sales at the end of the year. The BiK tax is being increased with 4% as of 2022. Similar increases are believed to be the cause of the December-peaks in the past.

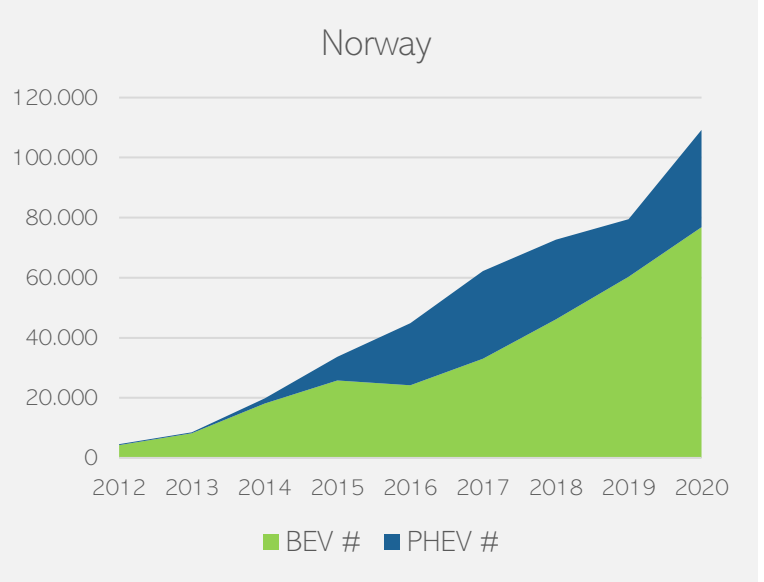
Source: European Alternative Fuels Observatory

EV market, PHEV & BEV uptake comparison



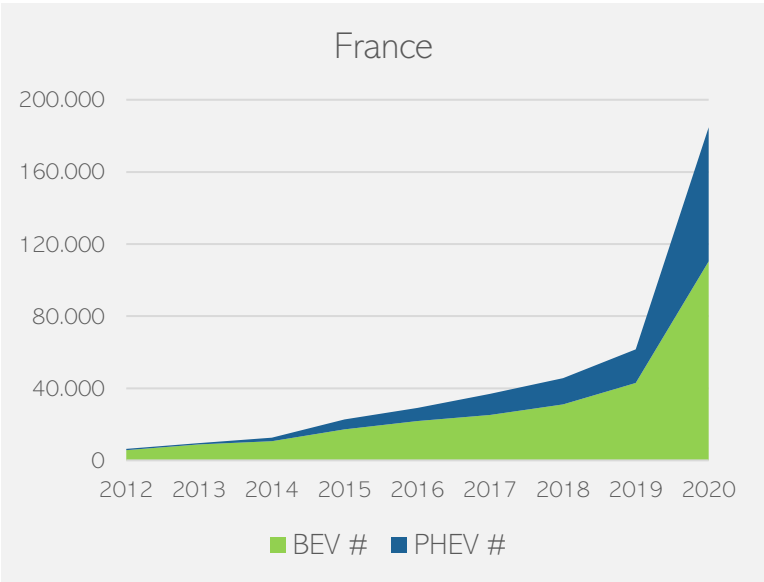
PHEV incentives '21

- Cars with tailpipe CO2 emissions of between 1 and 50 g/km pay only 50% of the road tax.
- Purchase tax are strongly reduced for PHEVs. This is due to the purchase tax being calculated by CO2 emission.



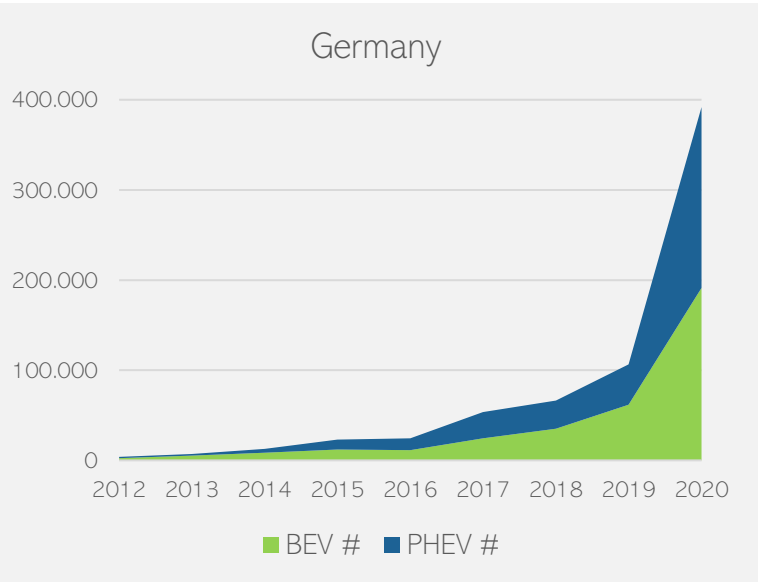
PHEV incentives '21

- The purchase tax is lower for PHEVs compared to petrol cars. Especially the reduction of 26% in the weight-tax is crucial.
- Circulation taxes are reduced for PHEVs.



PHEV incentives '21

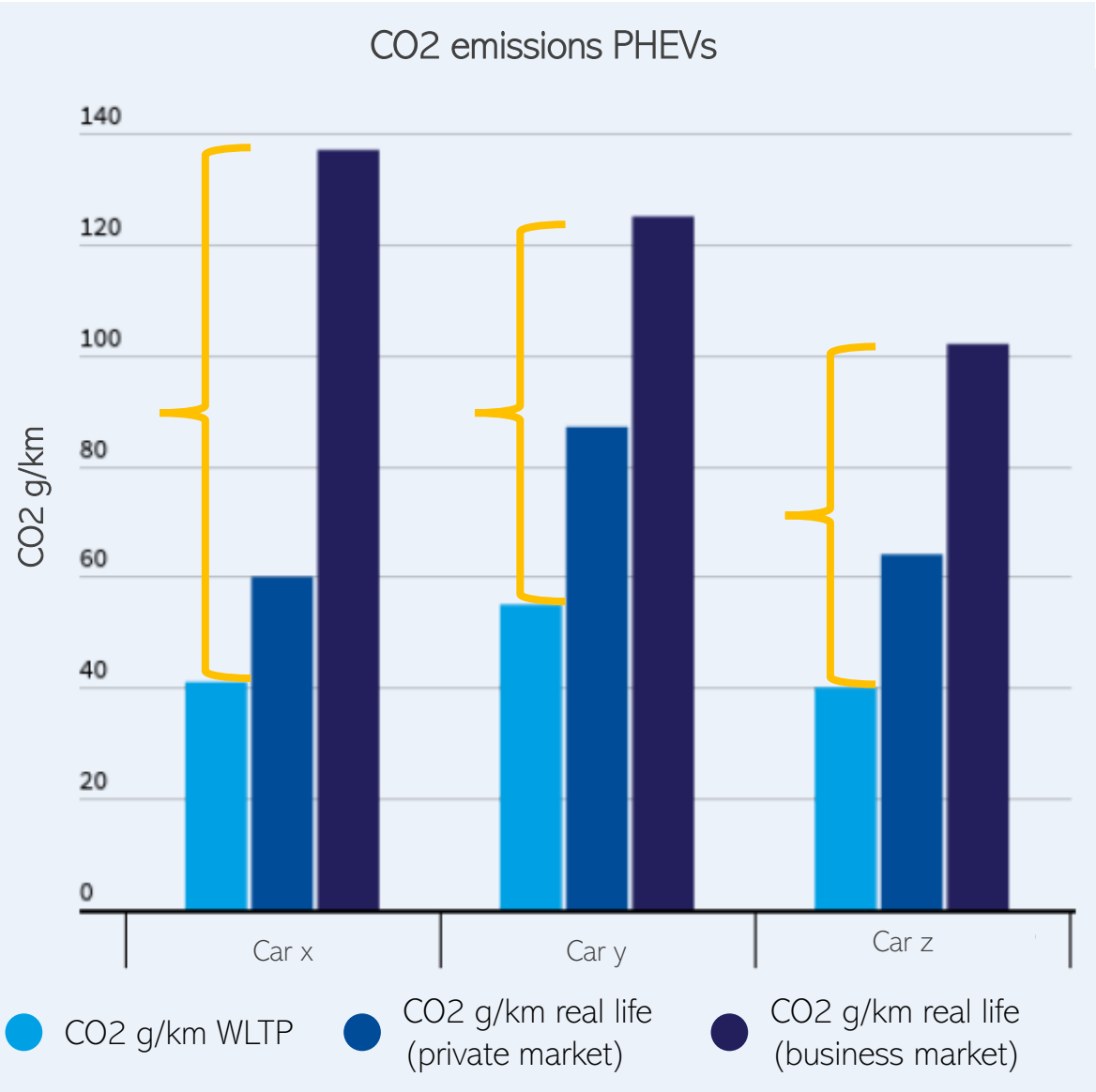
- PHEVs are eligible for a €2.000 purchase subsidy when the list price is below €50.000.



PHEV incentives '21

- PHEVs are eligible for a purchase subsidy of €5.625.
- PHEVs get a reduced taxation on the BiK compared to ICEVs.

EV market, PHEV & BEV uptake comparison



Source: Transport & Environment (2021)

Introduction

Research presented by Transport & Environment (2021) shows the CO2 emission of three PHEV models in the WLTP-test, in real-life by a private user, and in real-life by a business user. The model names are omitted as disclosing these does not add value.

Observations

- PHEV sales are increasing in all four countries. This is due to the incentives that they are eligible for;
- PHEV accounted for 51% of all EV (BEV + PHEV) sales in Germany in 2020. This was 40% in France, 30% in Norway, and 19% in the Netherlands.
- PHEVs are in theory a good step in reducing tailpipe CO2 emissions when a BEV is not an option. The WLTP test often result in CO2 emissions of <50 g/km for PHEVs.
- PHEVs emit **2-4 times** more CO_2 than in the WLTP test. In contrast, the real-life CO_2 emission of a conventional combustion engine is on average 14% higher than during the WLTP test.

Source: Transport & Environment (2021); ICCT (2020)

Comparison average purchase price of the Netherlands, Germany, Norway, and France (1/2)

Observations

<u>The purchase prices differences between BEVs and petrol cars are much higher in the Netherlands.</u>

The batteries for BEVs are, relative to the nett price of the car, more expensive in the smaller segments (segment B). That causes a bigger difference in the purchase price between BEVs and petrol cars.

Norway exempts BEVs from VAT, this heavily supports the private market. The benefit of a BEV over a petrol car on Norway gets larger as the cars get more expensive because the cost for petrol cars, in VAT and other taxes, increase.

Purchase price*

	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
Netherlands incl. subidy (currently unavailable)	-	-	-	-€ 12.340	€ 40	-
Netherlands	-€ 11.426	-€ 1.724	-€ 2.231	-€ 16.340	-€ 3.960	-€ 5.781
Germany	-€ 1.488	€ 2.486	€ 151	-€ 3.690	€ 1.248	-€ 1.513
Norway	-€ 6.852	-€ 1.081	€ 7.039	-€ 1.919	€ 5.083	€ 15.366
France	-€ 8.146	-€ 1.531	€ 3.888	-€ 8.816	-€ 994	€ 5.467

*without purchase subsidy

<u>Note</u>: The deltas of the B segment are disproportionally negative for BEVs, especially in the Netherlands. For selecting the vehicles per segment, the method of the RAI was followed. This method was chosen to equalize the method over all countries. However, in the B segment this method includes rather expensive BEVs, compared to petrol cars, such as the BMW i3 and the Hyundai Kona-electric.

Comparison average purchase price of the Netherlands, Germany, Norway, and France (2/2)

Observations

<u>The purchase prices differences between BEVs and petrol cars are much higher in the Netherlands.</u>

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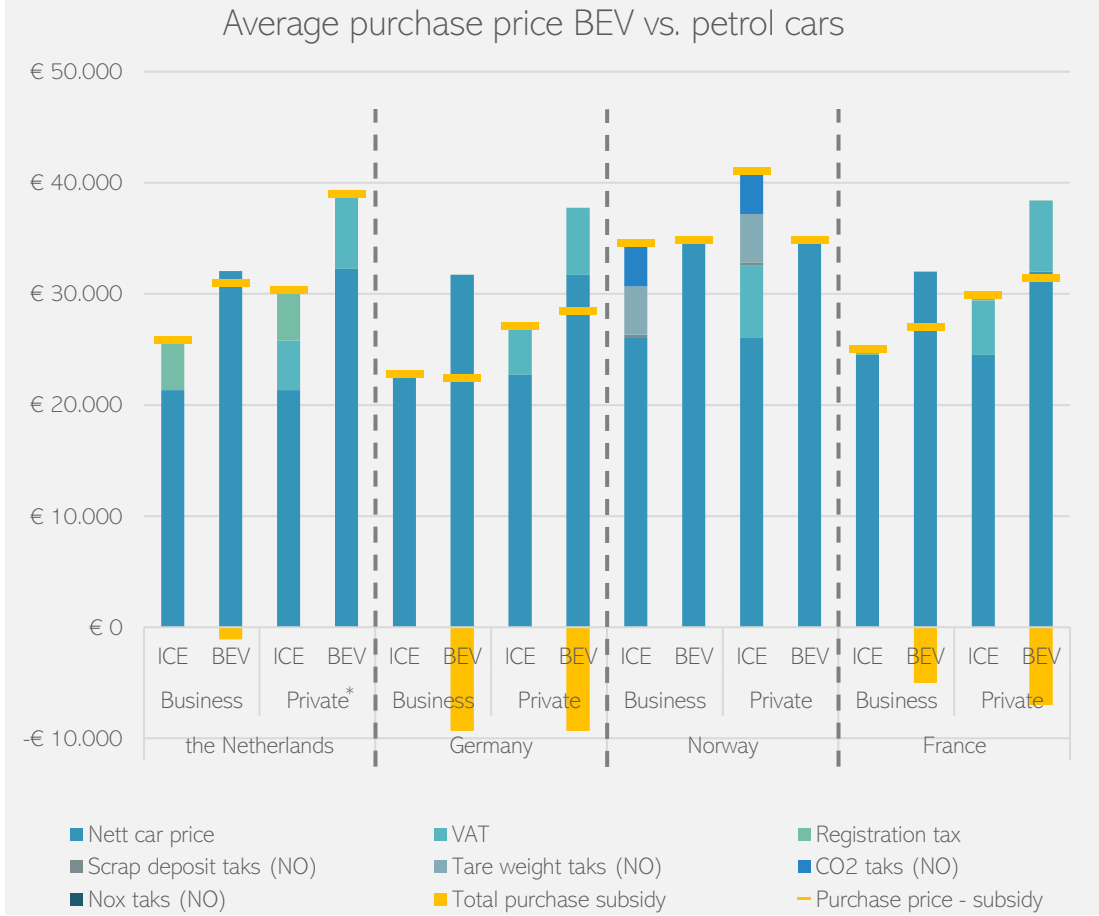
France	-€ 8.146	-€ 1.531	€ 3.888	-€ 8.816	-€ 994	€ 5.467

Horizontal yellow marking indicates the purchase price incl. subsidy



*without purchase subsidy

<u>Note</u>: The deltas of the B segment are disproportionally negative for BEVs, especially in the Netherlands. For selecting the vehicles per segment, the method of the RAI was followed. This method was chosen to equalize the method over all countries. However, in the B segment this method includes rather expensive BEVs, compared to petrol cars, such as the BMW i3 and the Hyundai Kona-electric.

Comparison average TCO of the Netherlands, Germany, Norway, and France

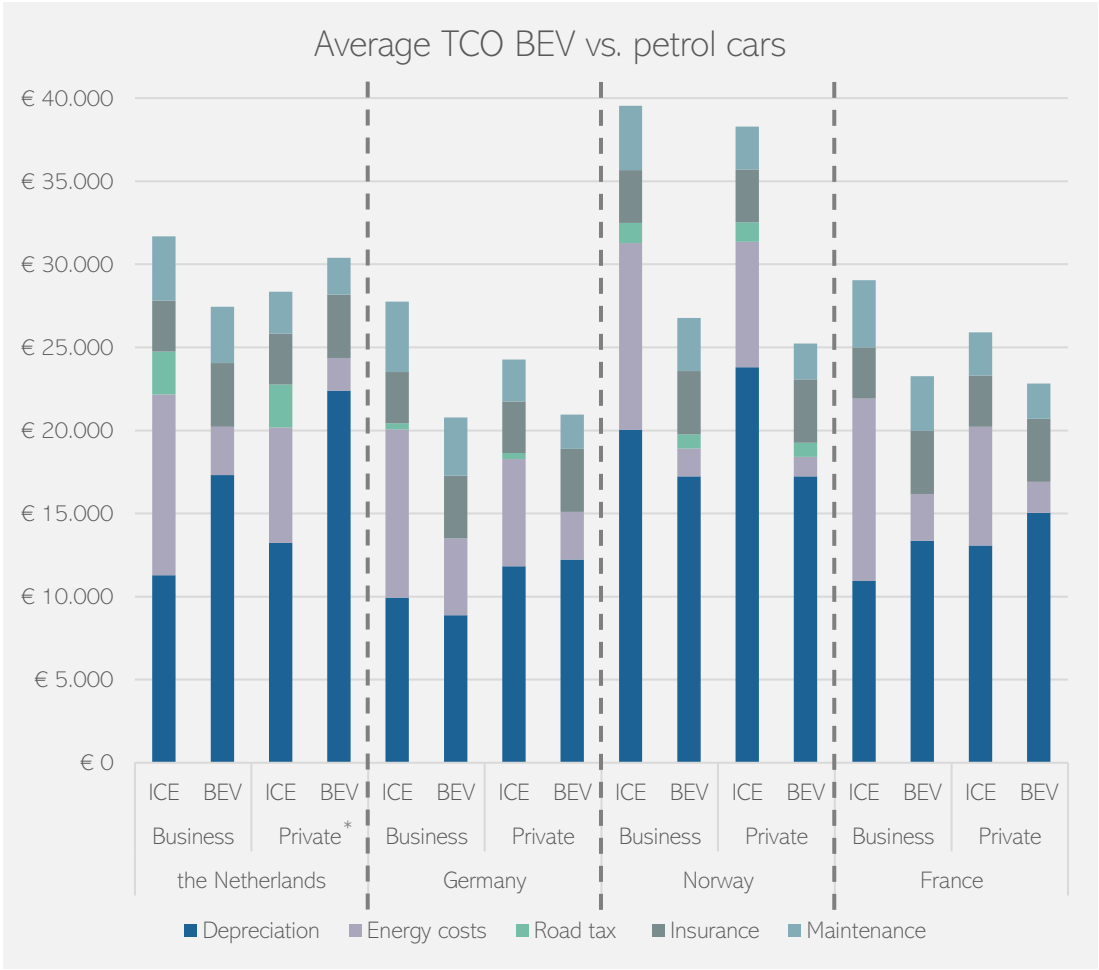
Observations

In the Netherlands, the TCO benefit of BEVs over petrol cars is much smaller than in Norway, Germany and France. The private market in the Netherlands is the only market where BEVs are more expensive.

The depreciation of BEVs is, as of now, still higher than that of petrol cars. This difference is best seen in the Netherlands. In France and Germany, the depreciation is compensated by the purchase subsidy.

The TCO of the individual segments show the effect of a progressive tax system. Cars with higher CO_2 emission, generally in higher segments, are taxed higher. This creates a greater benefit for BEVs over petrol cars in higher segments.

TCO*	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
Netherlands incl. subidy (currently unavailable)	-	-	-	-€ 2.650	€ 4.739	-
Netherlands	-€ 104	€ 6.310	€ 6.513	-€ 6.650	€ 739	-€ 199
Germany	€ 6.158	€ 8.810	€ 5.963	€ 2.493	€ 5.232	€ 2.211
Norway	€ 9.651	€ 10.405	€ 18.259	€ 8.517	€ 11.039	€ 19.657
France	€ 2.783	€ 6.215	€ 8.380	-€ 69	€ 3.458	€ 5.859



*without purchase subsidy

*Note: The deltas of the B segment are disproportionally negative for BEVs, especially in the Netherlands. For selecting the vehicles per segment, the method of the RAI was followed. This method was chosen to equalize the method over all countries. However, in the B segment this method includes rather expensive BEVs, compared to petrol cars, such as the BMW i3 and the Hyundai Kona-electric.

Effects of different incentive conditions

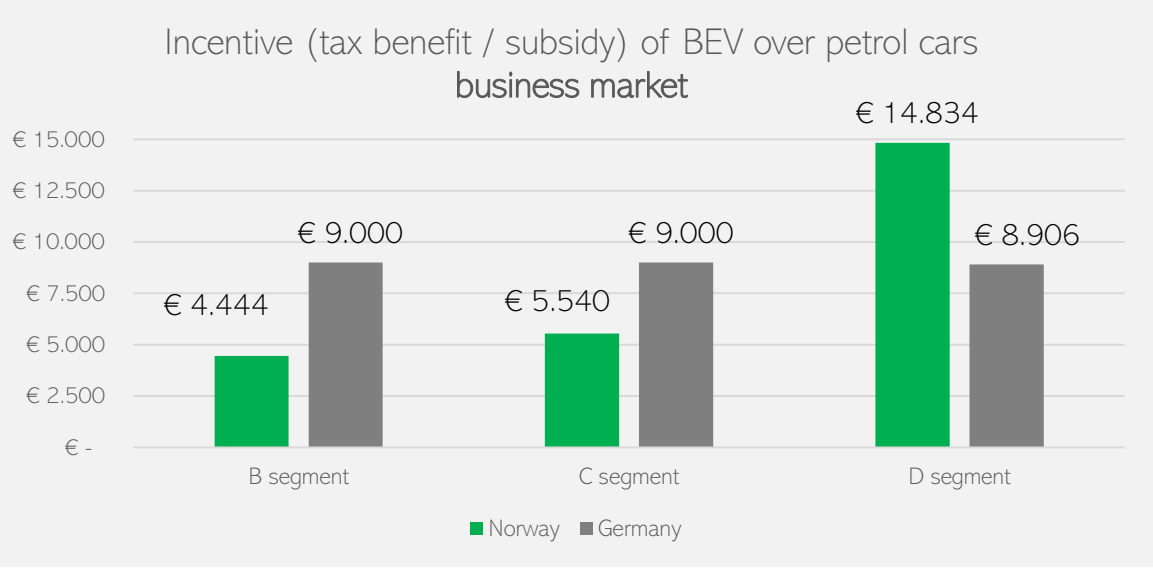
Introduction

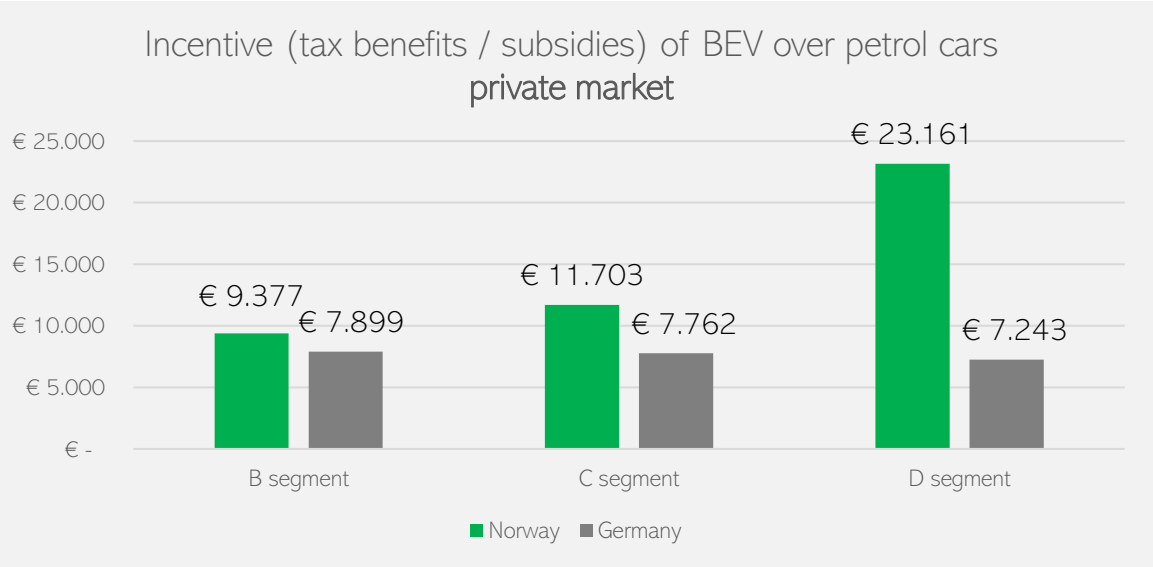
There are differences between countries on how incentives for BEVs are deployed. Countries like France and Germany focus mostly on subsidies, whereas Norway focusses on taxation benefits to incentivize BEVs. Those two different approaches have different incentivizing effects per segment. This difference is visualized by comparing the total incentive of a BEV over a petrol car, this includes subsidies as well as tax benefits such as the VAT exemption for BEVs in Norway.

Observations

- Purchase subsidies (which stay the same under the cap) have a relatively high effect on smaller BEVs, and a lower effect on larger BEVs.
- Taxes based on emission, such as in Norway, have an increasing benefit for BEVs over petrol cars in higher segments. This same principle holds for the VAT exemption for BEVs in the private segment in Norway, the savings on VAT increase as the base price of the car increases.

Assumed: ICEVs in higher segments usually drive more kilometres per year and have generally higher tailpipe CO2 emissions.



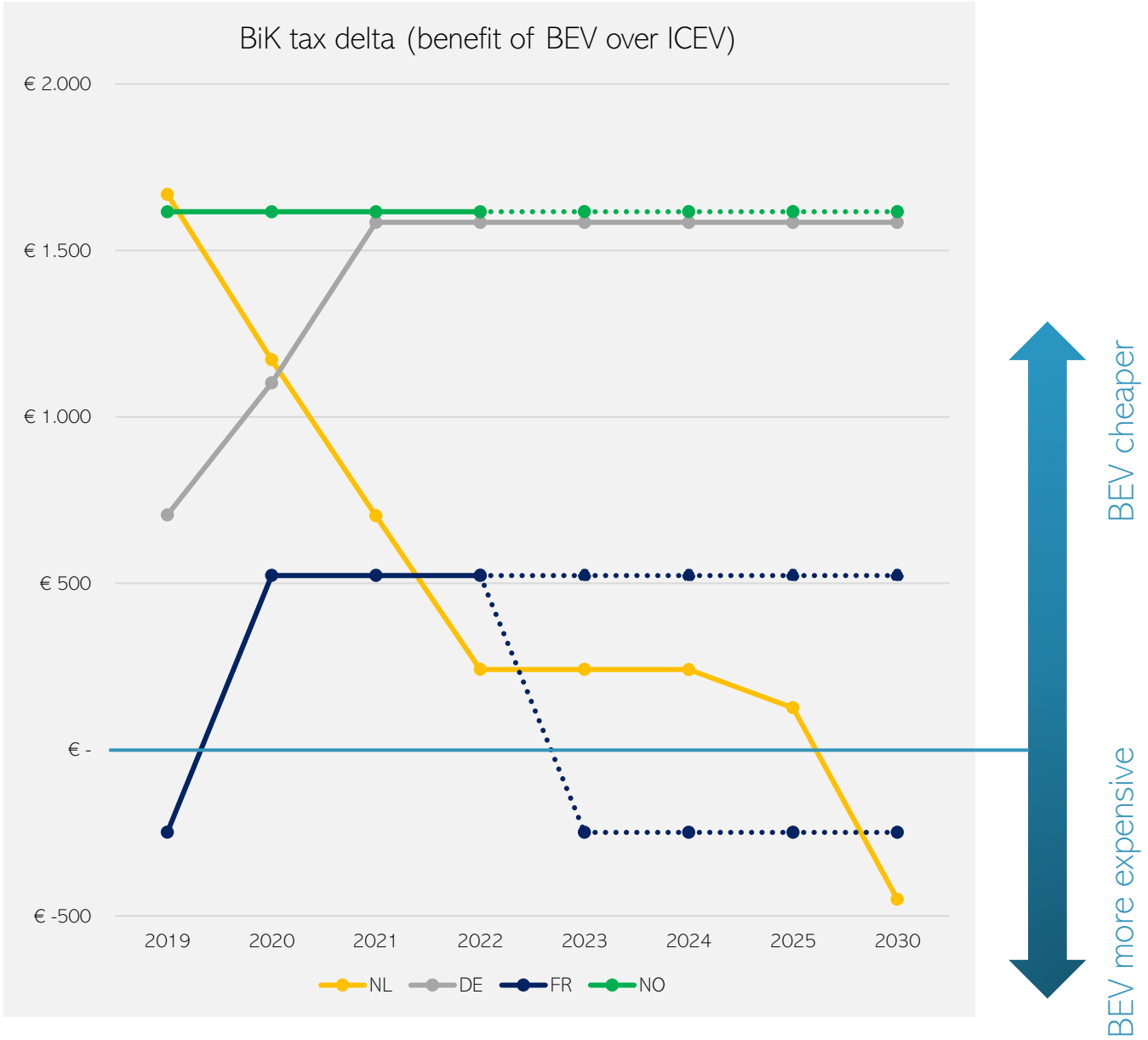


Taxation on Benefit-in-kind

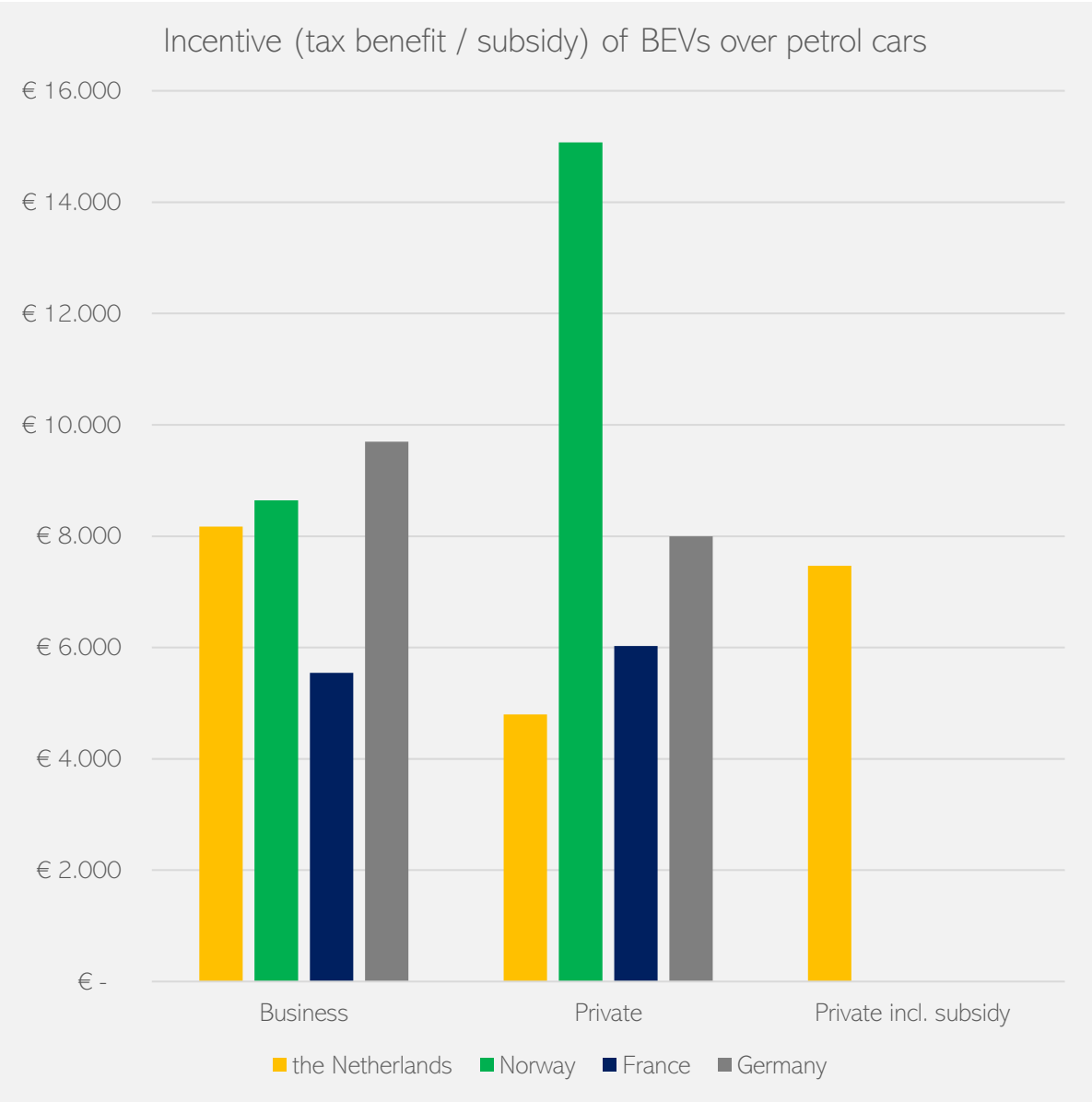
Observations

- Up to and including 2019, there only was a substantial advantage of BEVs opposed to petrol cars in the BiK taxation in the Netherlands and Norway;
- Only the Dutch government has committed to shrinking the advantage of BEVs over petrol cars in the BiK taxation. The regulation in France after 2022 is not clear yet;
- The past has proven that BiK taxation has an impact on the BEV uptake. A clearly communicated increase of the BiK percentage on the one hand, leads to end of year sales impulses, as seen near the end of 2019 and 2020, and on the other hand, in case of a strong increase, to a significant decline of sales in the following year. This was showed by the increase in the end of 2020 and the decline in the first quarter of 2021 in the Netherlands;
- It is not the BiK tax percentage that is decisive, but the difference in BiK tax relative to petrol cars. As soon as the cost advantage declines too much, it will be a realistic scenario that the corporate demand will decline, and corporate users will opt for petrol cars;

This calculation of BiK was done by comparing the VW Golf 1,0 TSI and the VW ID.3 45 kWh.



Comparison of average incentives (tax benefit / subsidy) for BEVs



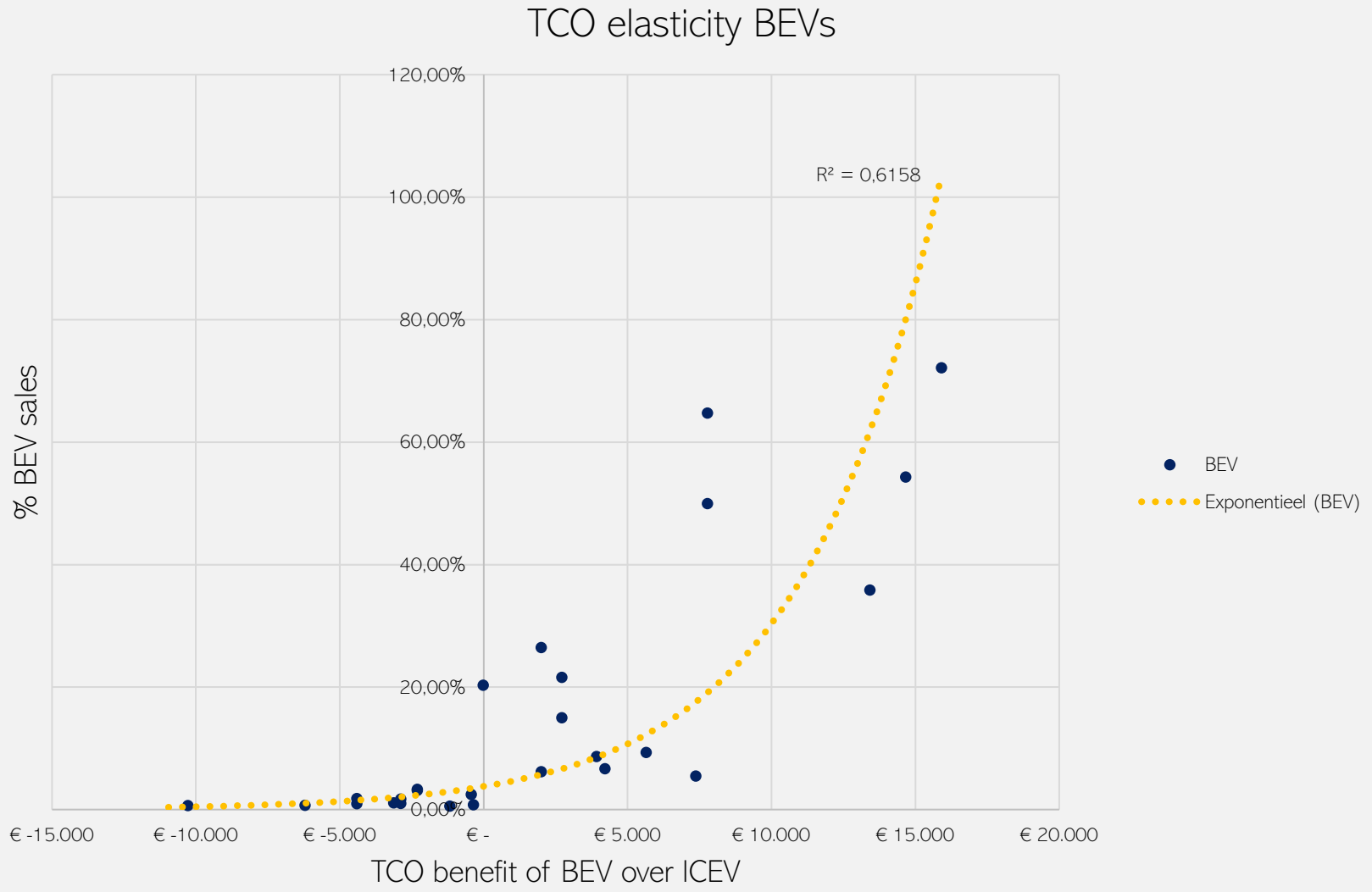
Introduction

The height of the incentive of the BEVs over petrol cars is calculated by adding all taxes to be paid over four years together, this includes VAT on the purchase, purchase taxes, and road taxes, and subtracting purchase subsidies. The total value of petrol cars is subtracted from the total value of BEVs. Therefore, the higher the value in the graph, the higher the incentive for BEVs over petrol cars in that country.

Observations

- Norway is the only country that excludes BEVs from VAT, this creates an enormous incentive for BEVs over petrol cars in the private market. That is also the reason why in Norway most BEVs are sold in the private market. In the other countries, most BEVs are sold in the business market.
- France and Germany both have high purchase subsidies, the incentive of BEVs over petrol cars is not much higher than in other countries due to the low overall taxation on petrol cars.

Price elasticity



Observations

- The graph suggests an exponential growth of the BEV uptake after a certain threshold.
- The R^2 is 0,7123, the adjusted R^2 is 0,6883. The amount of data points is not sufficient to have strong significant results. This is, however, a strong indication of the relation between TCO benefit of BEVs and BEV uptake.
- The adjusted R^2 suggests that 68,83% of the rise in BEV uptake in the business market can be explained by the TCO benefit compared to petrol cars.

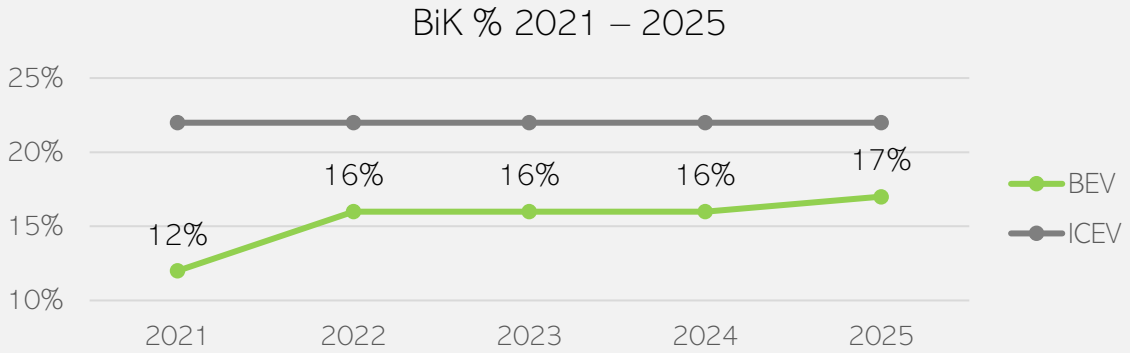
Outlook 2025 – 2030

Outlook incentives 2025 – 2030

The Netherlands

Benefit in kind taxation

In the Netherlands, BiK tax is calculated over 22% of the list price of a company car. BEVs have a discounted rate which is gradually increased, as shown underneath. There is no agreed upon plan for after 2025.



Purchase subsidy

The purchase subsidy in the Netherlands is specified until the end of 2025. It is not clear if the purchase subsidy will be in effect after 2025.

Observations

In the Netherlands the government declared to keep regulatory changes regarding the BEVs flexible, however, until now there were no alteration to the on beforehand specified incentives. For none of the incentives in place there is a plan for after 2025.

France

Purchase subsidy

In France, the most important incentive is the purchase subsidy. The value of the subsidy is being lowered, this is done in two steps. The value of the subsidy is clear until the end or 2022.

BiK taxation

French drivers get a reduced BiK taxation, this discount stays the same until the end of 2022, after that it is not clear if there will be a reduced taxation for BEVs or that the benefit will be removed altogether.

No clear incentives 2025 – 2030

There is no clear incentive scheme, or other regulation, announced for after 2025.

Observations

Most other countries do have incentive plans laid out until 2025 but France only till the end of 2022.

Outlook incentives 2025 – 2030

Denmark

Registration tax

Until 2025 BEVs pay 40% of the registration tax. From 2025 to 2030 the registration tax will be increased every year with 8%, to 80% in 2030. From 2030 to 2035 the registration tax will increase 4% per year until 100% is reached in 2035.

Tax on electricity for BEVs

Tax on electricity is lowered for companies as of 2021, making public recharing cheaper. This is in effect until and including 2030.

2025

A planned evaluation moment to see if additional measures need to be taken

Observations

The plans for Denmark are clear for most of the BEV incentives, even after 2030. A steady increase in BEV taxation is planned, although the BEV sales percentages are not yet among the best in Europe.

The registration tax on cars account for roughly € 6,7 billion in tax revenue, equal to 2,3% of the gross income of Denmark. Benefits for BEVs are, therefore, substantial and can be costly.

Source: Autovistagroup.com (2020); ACEA (2020)

Germany

Purchase subsidy

Germany will extend its subsidy for electric cars until 2025. The increased bonus will be extended beyond 2021, but lowered in two steps until 2025.

BiK tax

On conventional cars, 1% of the list price is added to the salary per month, over which income tax needs to be paid. For BEVs, only 0,25% of the list price is added to the income per month over which income tax is paid.

This is in effect until and including 2030.

Motor vehicle tax

Each year, vehicles in Germany have to pay motor vehicle tax. Starting 2021, the CO2 component has increased. Because BEVs are exempted of this tax, the benefit for BEVs over ICEVs has increased. The taxation for a car with CO2 emission of 150 g/km goes up from €110 to €122 annually. This is in effect until and including 2025. Because the reduction is valid for five years, BEVs can have the benefit until 2030.

Observations

Next to the purchase incentive, the reduction of the benefit in kind tax to 0,25% for BEVs is a significant incentive for BEVs. The lower tax on BiK is of big importance, and is planed to be unchanged until 2030. The motor vehicle tax, however, is not that significant.

Source: ICCT (2020)

Outlook incentives 2025 – 2030

Norway

Gradual changes

The Norwegian government has little future plans for the BEV incentives specified. The goals for BEV sales are specified, 100% BEV sales by 2025, and the incentives are there to support this goal. It is, therefore, unclear which incentives will be in effect after 2025.

Like some other governments, Norway is planning to gradually reduce the benefits for BEVs. There are two main differences, the gradual changes do not create large fluctuations in the BEV sales and these changes follow the course of the technological and price developments of BEVs.

Observations

Although there is no clear policy presented with regards to the BEV incentives, only that there will be a gradually reduction, no extreme fluctuations are to be expected.

Overall observations of different Outlooks 2025 – 2030

With regards to future BEV policy, the time-frame heavily differs per country. France for example has presented their plans up to 2022, where Denmark has plans up to 2035.

It is interesting to see that no presented plans are going to show an increase of BEV incentives, only a unchanged or (slow) phasing out of the incentives.

That being sad, future outlooks of plans, goals, ambitions of national governmental BEV incentives are unfortunately no mathematical sciences. Policy decisionmakers make outlooks, also for the period after they sit in government, so there is no certainty about the implementation at that time. But also when they are in government, the policy can be flexible and incentives can change due to certain developments.

Observations & findings

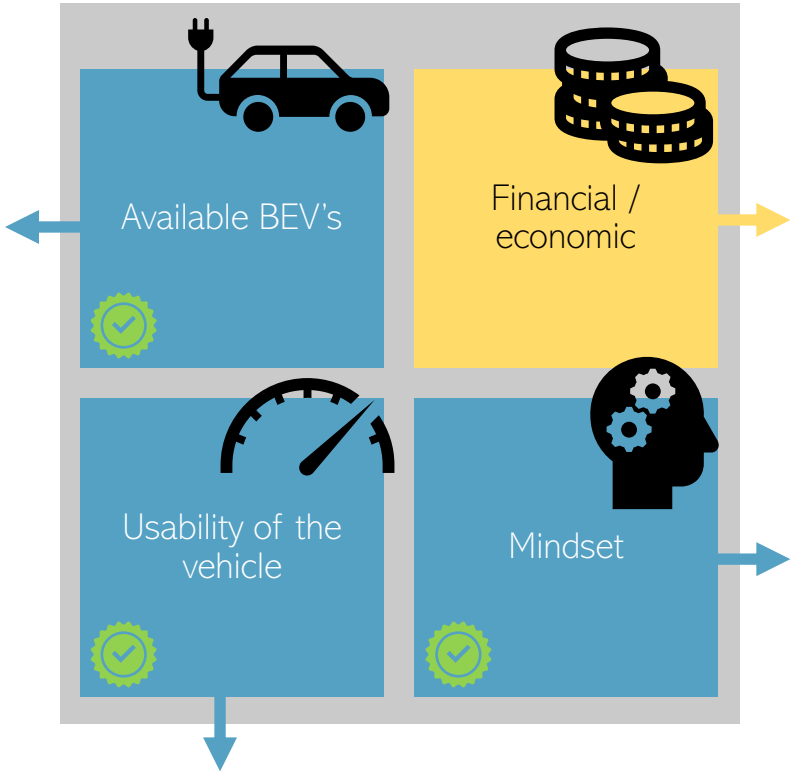
Observations & findings 1/6

Vehicle availability

The number of BEV models available in the B, C and D segment is rapidly growing in the last few years, from 13 models in 2019, 23 in 2020, up to 41 in 2021. It is noticeable that in all popular vehicle type segments there is a choice of vehicle models. In the past, the decision not to buy a BEV because the 'right model' was not available was a valid reason, but this now seems to be a lot less applicable. Considering this, the growing model availability has a positive impact the BEV sales.

In the Netherlands specifically, the relative growth of BEV models is higher than the growth in sales, resulting in a lower average number of BEV sold per model.

General factors in purchasing behaviour



Financial / economic

BEVs have a higher list price than petrol cars in all vehicle segments, the difference is relatively highest in the smaller segments. The predicted price reductions, seems to go slower than earlier expected. For smaller vehicles, car manufacturers sacrifice battery size, thus range, to limit the price differential somewhat.

The financial and economic factors are the largest roadblock for a further increase of the BEV uptake. This is discussed in depth on the next pages.

Usability

Over the last couple of years, the usability of BEVs has massively improved. This is seen in increased ranges of BEVs in all segments, lowered charging times, and better battery quality. There are also still hurdles for BEVs, one of those is the standardization across borders. This is not on the level it should be yet. Ultimately, usability of BEVs has increase severely, but is not yet on the level of the petrol car. This research showed that with the increase of BEV sales, the number of public recharging points per BEV is decreasing. Investment in public available recharging points, therefore, remains necessary.

Mindset

In the Netherlands, public opinion on BEVs is shifting rapidly in favour of BEVs. For instance, the survey presented in a (previous) proEME study showed that only 20% of the public in the Netherlands opposes incentivizing BEVs over petrol powered cars.

There are, however, still problematic misunderstandings that negatively influence the public opinion. The "Elektrisch rijden monitor" by the ANWB shows that not enough people know about, and understand the incentives in place for BEVs in the Netherlands.

Observations & findings 2/6

Trends in governmental incentives

All European governmental organizations discussed in this report encourage the purchase of BEVs. The incentives can influence either the purchase costs and/or the operational costs and can influence the costs of either the owner or the driver.

The Netherlands has decreased some of the key incentives for BEVs in 2020, while other countries have increased some key incentives.	Generally, governments in all countries aim to remove the benefits for BEVs over petrol cars when the market completely moved to zero emission mobility, or when ICEVs are banned. Countries that are more ahead in the BEV uptake, like Norway, can remove incentives for BEVs sooner than countries with lower uptake of BEVs. Despite having a policy of adjusting as we go ("Hand-aan-de-kraan-beleid"), the Netherlands is particularly rapid in dialling back the incentives, e.g., in the case of BiK.
Norway mainly incentivizes the private market and the Netherlands mainly the business market.	In Norway, the private market is incentivized more than the business market, mainly through a very beneficial VAT exemption of BEVs. Therefore, BEVs are predominantly sold in the private market. In the Netherlands, the business market is incentivized more than the private market. The 2020 introduced incentive would correct this difference, however, the available budget was very low (relatively and absolute). France and Germany do not make big distinctions between the private- and business market.
Tax systems with a lower tax burden demand (larger) purchase subsidy programs to positively impact BEV sales.	France and Germany have a lower tax burden on cars. Therefore, incentivizing BEVs can only be done through subsidies. Countries, such as the Netherlands, that have higher tax burdens, usually have to implement lower purchase subsidies to create the same benefit for BEVs over petrol cars.

Observations & findings 3/6

Trends in governmental incentives

All European governmental organizations discussed in this report encourage the purchase of BEVs. The incentives can influence either the purchase costs and/or the operational costs and can have an effect on the costs of either the owner or the driver.

Purchase subsidies create a benefit for BEVs over petrol cars in lower segments, and emission-based taxes do so in higher segments.	All purchase subsidies in this report have a maximum list price as condition for eligibility of the subsidy. Therefore, in higher segments, where cars are more expensive, the BEVs are not always eligible for the subsidy. Emission-based taxes, however, are higher in the higher segments because the cars in those segment emit, on average, more CO2.
Depreciation is the biggest cost in the TCO. Currently, the depreciation of BEVs is higher than that of petrol cars.	The depreciation of BEVs is difficult to calculate, since the market is still maturing. Research showed, however, that the deficit in residual value of BEVs compared to petrol cars, is reducing. In Norway, the depreciation of BEVs is significantly lower than petrol cars. This indicates that the residual will go up as the BEV market matures.
There is a limited focus on the occasion market in all countries within this research.	France and the Netherlands are thus far the only countries with purchase grants for second-hand BEVs, of a modest one- and two thousand euro, respectively.

Observations & findings 4/6

Trends in governmental incentives

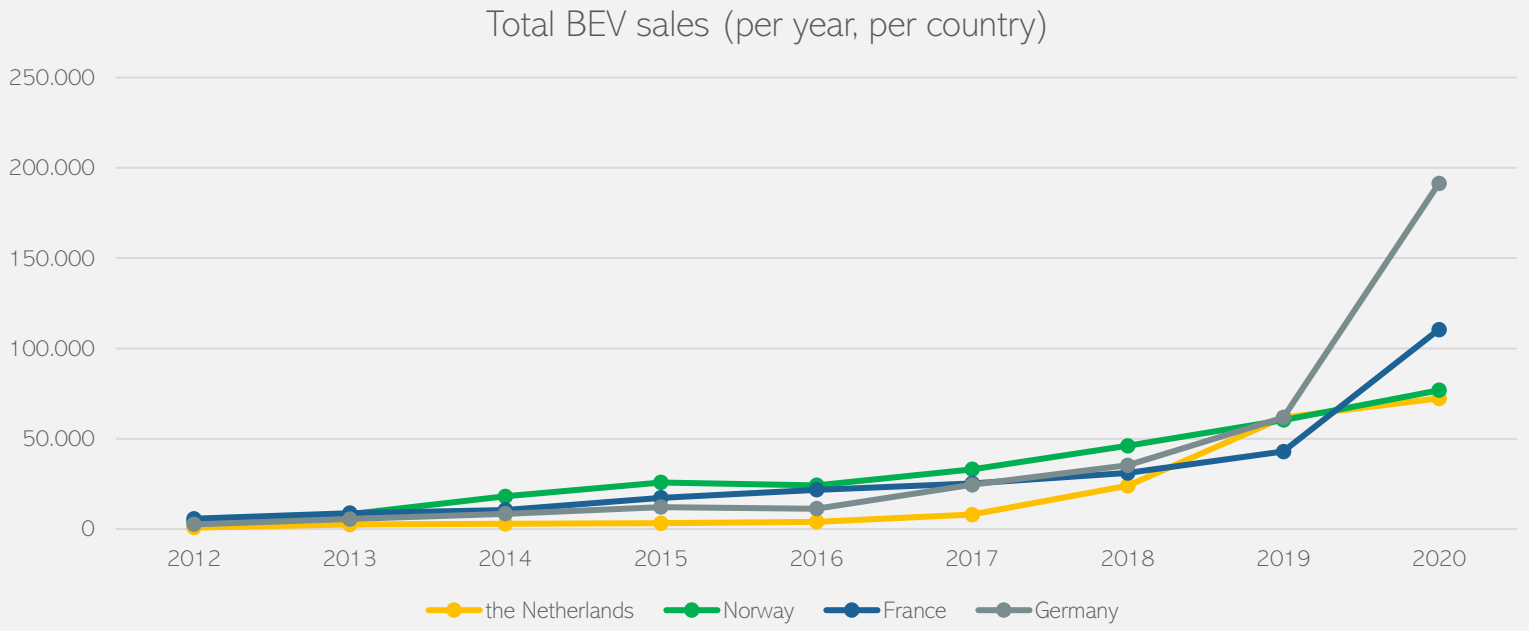
All European governmental organizations discussed in this report encourage the purchase of BEVs. The incentives can influence either the purchase costs and/or the operational costs and can have an effect on the costs of either the owner or the driver.

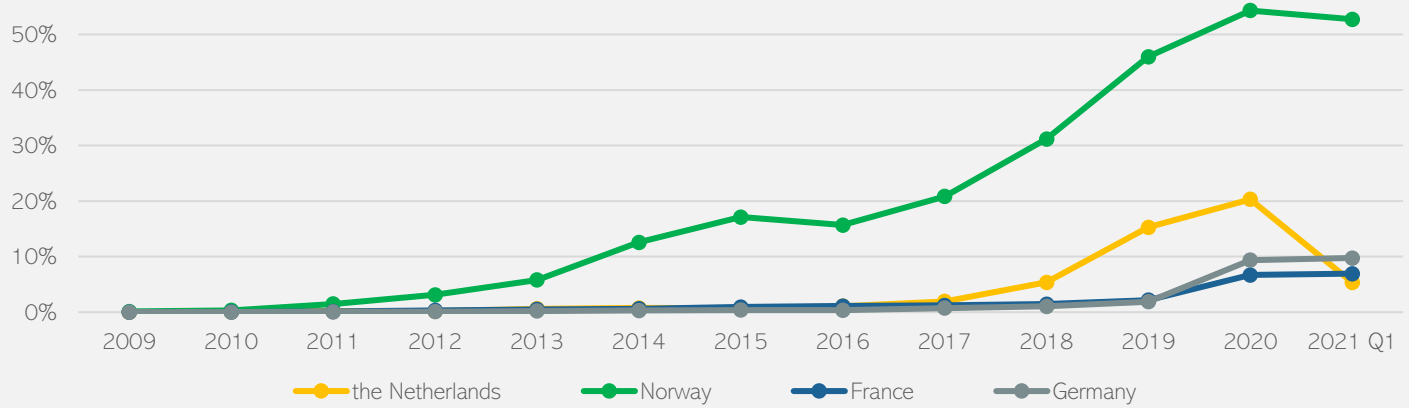
Stop-and-go incentives have a disruptive effect on the BEV uptake, creating an instable market growth for BEVs.	New or higher purchase subsidies 'ignite' a run on BEVs until the deflation of the budgets, which leaves potentially BEV buyers waiting until new budgets are open. The abruptly phasing out of BEV tax incentives creates a run before a certain financial advantage is removed. In the countries where the incentives are only changing a little, there are fewer disturbances in the sales figures.
Policy outlook 2020 – 2025: No presented plans are showing an increase of BEV incentives, only an unchanged or (slow) phasing out of these incentives.	With regards to future BEV policy, the time-frame heavily differs per country. France for example has presented their plans up to 2022, where Denmark has plans up to 2035. Policy decisionmakers make outlooks, also for the period after they sit in government, so there is no certainty about the implementation at that time. But also when they are in government, the policy can be flexible and incentives can change due to certain developments.

Observations & findings 5/6

Success of BEV uptake

Policy that creates a more beneficial TCO for BEVs, leads to higher BEV sales. The international results indicate that there is a threshold amount from which the incentives have a progressively increasing effect.
This research indicated that such a threshold value is reached when the TCO of a BEV is around €5.000 lower compared to a petrol car.
There is a notable difference between the private- and the business market, where the private market is more focused on the upfront investment costs and the business market more on the TCO.





Success of BEV uptake - *percentage*

In terms of percentage of BEVs, in the total car sales is Norway still well ahead of the other countries in this research. The trend in 2020 indicates a significant increase of the percentage of BEV sales in France and Germany.
In Q1 2021 the sales percentages stay the same in all countries, except for in in the Netherlands, which decreases significantly.
NOTE: the sales percentages of 2021 are only from the first quarter. It is to be expected that the sales in the Netherlands will increase in Q4, due to the expected BiK change in 2022.

Observations & findings 6/6

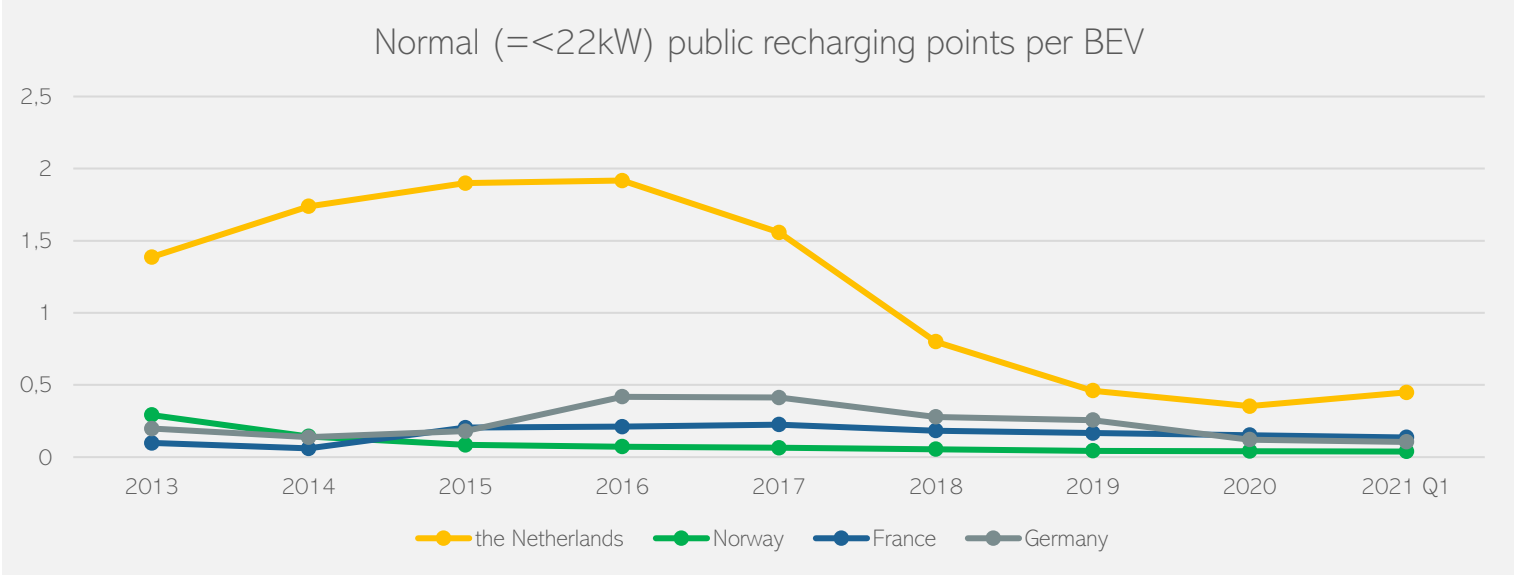
Recharging infrastructure

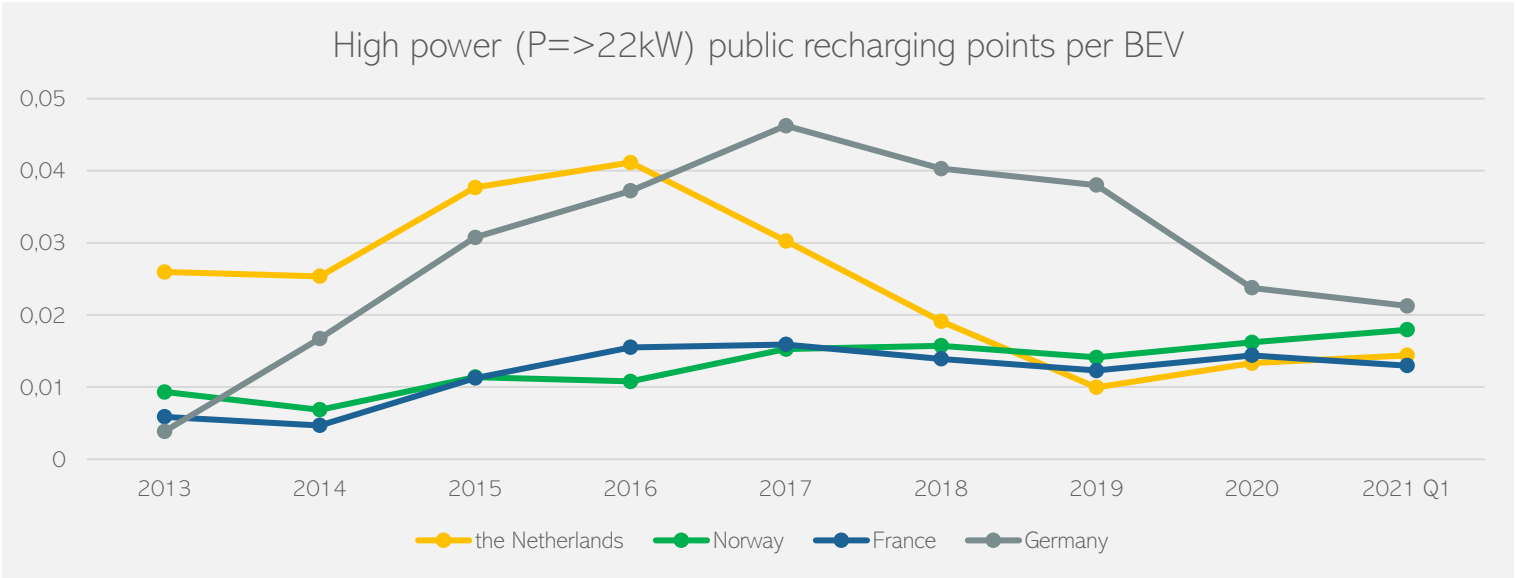
The number of recharging points per BEV is currently lowest in Norway. This is due to the national context. In Norway, having a private parking spot with recharging infrastructure is much more common. The lack of public recharging points does make the infrastructure of high-power rechargers a necessity, when undertaking longer trips outside of the usual leisure/commuting journeys.

Most countries are seeing a decrease in the number of recharging points per BEV as the fleet of BEVs increases. To keep the usability of BEVs high, a solid infrastructure is imperative. The exact number of public recharging points needed is country- and even neighborhood specific. In densely populated areas where people do not have their own driveway, inhabitants are dependent on publicly available recharging.

The Netherlands is a good example of this, it has the highest number of normal (=< 22kW) recharging points per BEV. The Netherlands also has the highest percentage of urbanization (92%), meaning that it needs a high number of public recharging points per BEV

Besides the number of public recharging points per BEV, the accessibility of these recharging points is also important. Universal accessibility will increase the usability of BEVs.





Definitions, methods and source references

Definitions

- ICE(V): Internal Combustion Engine (Vehicle) (a car driven by fossil fuels)
- BEV: Battery Electric Vehicle (a car driven just by electricity that has been stored in a battery)
- PHEV: Plug-in Hybrid Electric Vehicle
- PEV: Plug-in Electric Vehicle (BEV and PHEV together)
- TCO: Total Cost of Ownership;
- BiK: Benefit in Kind:
- The net effect of the additional BiK: The income tax that has to be paid extra.

Methods and source references

Sources:

- TCO data, policies and incentives: proEME (https://www.pro-eme.eu/)
- Data and graphs BEV numbers and recharging infrastructure: EAFO (www.eafo.eu)
- Age passenger cars: CBS (https://www.cbs.nl/nl-nl/nieuws/2016/20/personenauto-s-steeds-ouder)
- Electric vehicles: models until 2022 EV Database (www.ev-database.nl)
- Relevant news articles and press releases: (www.electrive.com & www.europe.autonews.com, amongst others)
- Vehicle prices and technical information about the vehicle: (www.nissan.no, amongst others)
- National regulations regarding BEVs: (www.service-public.fr & www.rvo.nl, among others)
- Interpretation and clarification of regulations: (www.anwb.nl & www.elbil.no, among other independent organizations)
- Dutch public opinion on BEVs: “Elektrisch rijden monitor 2020” (www.anwb.nl)
- Price parity research: BloombergNEF (2021); ICCT (2021), among others
- CO2 emissions: Transport & Environment (2021); ICCT (2020)

Disclaimer: All information in this report has been obtained from sources considered accurate and reliable. Nevertheless, due to the possibility of material, interpretation and analysis errors, the analysis and recommendations provided do not warrant accuracy, timeliness or completeness.

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