

Dutch BEV policy in an international perspective

June 2023



- 1) Summary of key findings
- 2) Netherlands position: BEV sales and growth
- 3) Effects of BEV policies in selected countries
- 4) Overview of used vehicle subsidies
- 5) Deep dive in effect of BEV policies
- 6) Benchmarking the Netherlands
- 7) Market conditions, BEV sales and fleet
- 8) Development of charging infrastructure
- 9) Effect on purchase price and TCO
- 10) Conclusions, key outcomes



Summary of key findings

- 1) Relative leading position of the Netherlands is diminishing in the BEV market among peer countries
- 2) Incentives will not yet be phased out in peer countries
- 3) In most countries no phase out of registration tax or road tax advantages for BEVs planned before 2030
- 4) When TCO is positive there is an uptake of BEVs on the market
- 5) As government, it is possible to steer towards specific segments (e.g., France in small segments)
- 6) BIK. Only in The Netherlands no advantage for BEV anymore from 2025 onwards

BEV Market Share and Growth: the leading position of the Netherlands diminished for both market share and growth in the last four years.

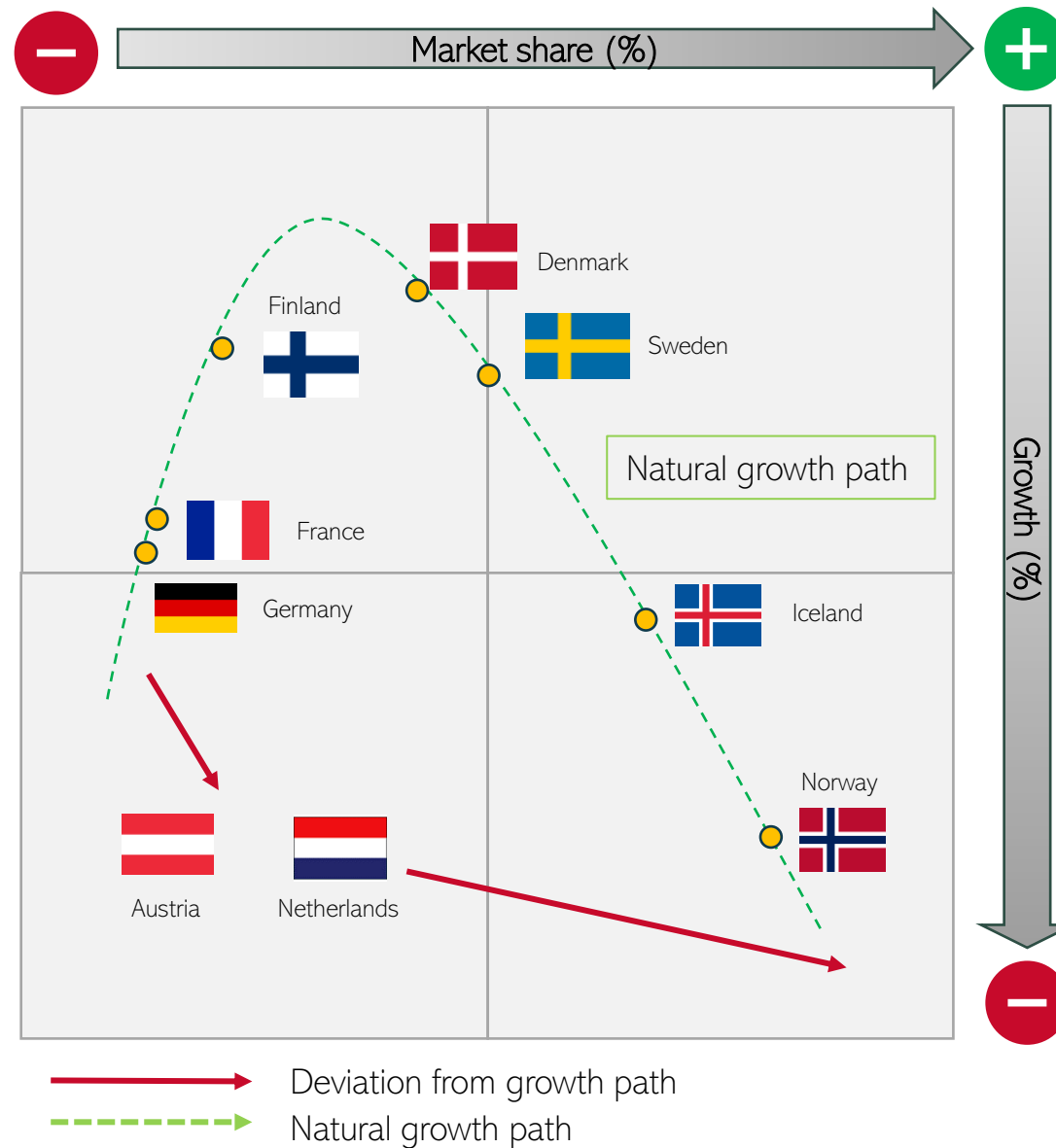
The Netherlands is experiencing stagnation with sales plateauing at around 20-25%. This is in sharp contrast to countries like Norway, Iceland, Sweden, Denmark, and Finland, where BEV sales have surpassed that of the Netherlands in 2023 Q1. Based on international experience, a more consistent incentive policy might have propelled the country to achieve a BEV sales share of over 50%.

More countries are ahead in terms of market share



*2023 YTD (Q1). Source: RVO and other national sources

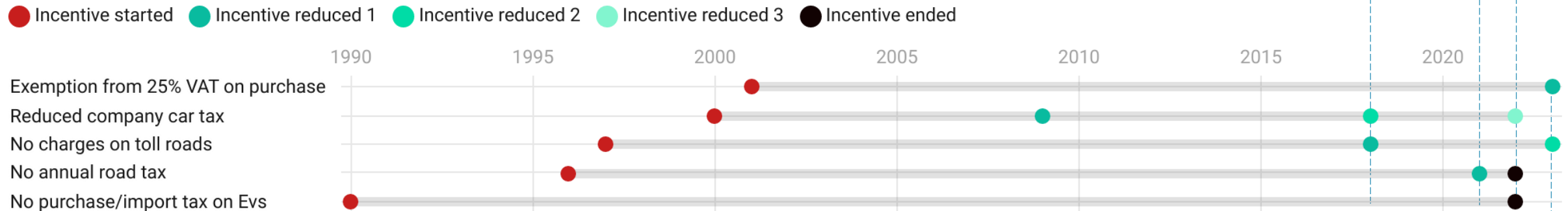
Netherlands is not in the natural growth curve within the market growth-share matrix



Premature Curtailment of Incentives: As leading country of BEV sales, Norway started to phase out incentives at 79% market share.

The Dutch government has been reducing stimulation measures from 2020 onwards, impacting growth. Examples include changes to the "bijtelling" (benefit-in-kind) taxation scheme and capping of purchase subsidies for new and second-hand BEVs. These decisions have led to a market share stagnation for BEV's just above 20% and a come back of Internal Combustion Engine Vehicles (ICEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) in certain segments. In comparison front running country Norway started their phase out strategy with a first step when market share of BEV's was already above 30% and larger steps now their market is already in mass market phase (79%).

Overview of Norway's incentive phase-out policy



Source: Elbil.no • Created with Datawrapper

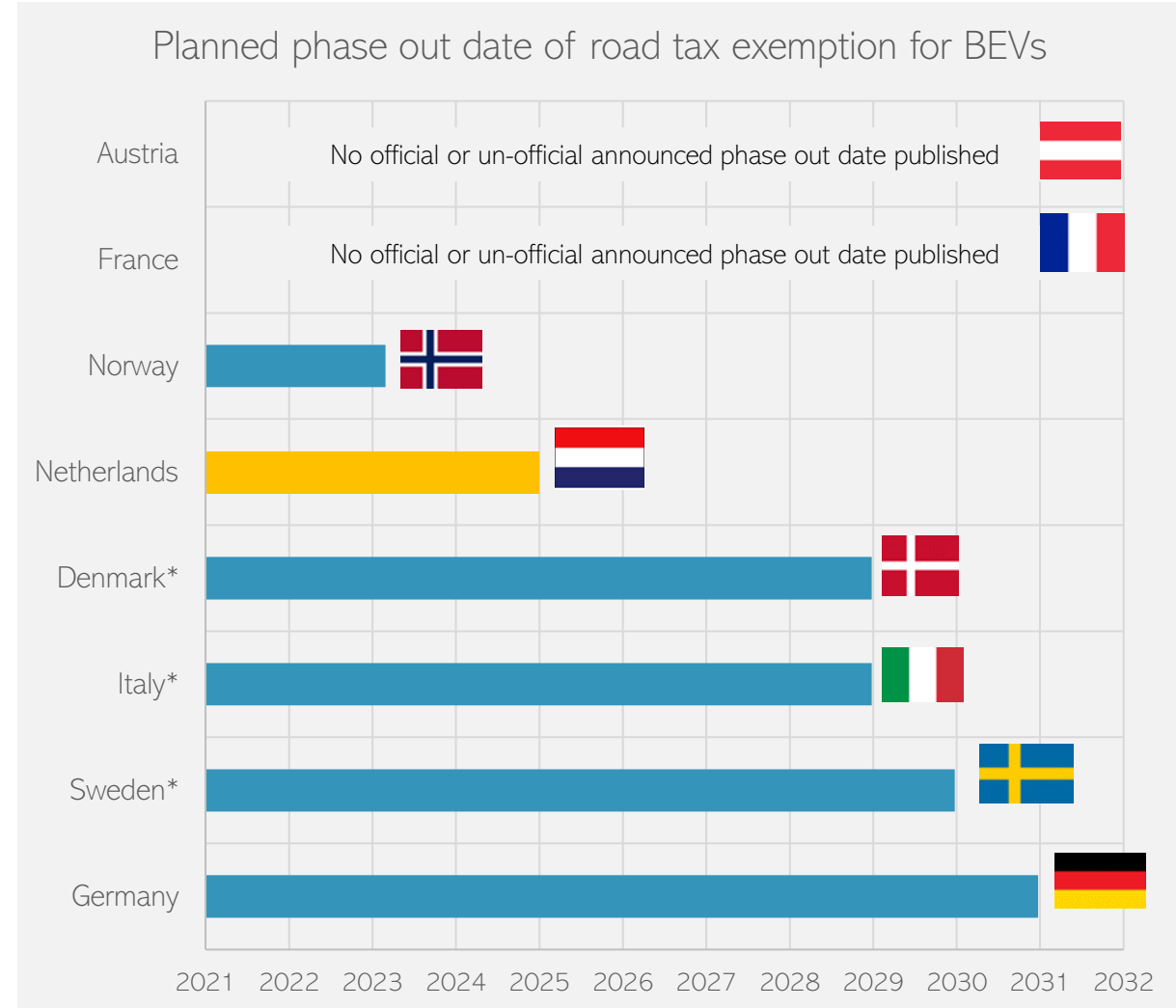
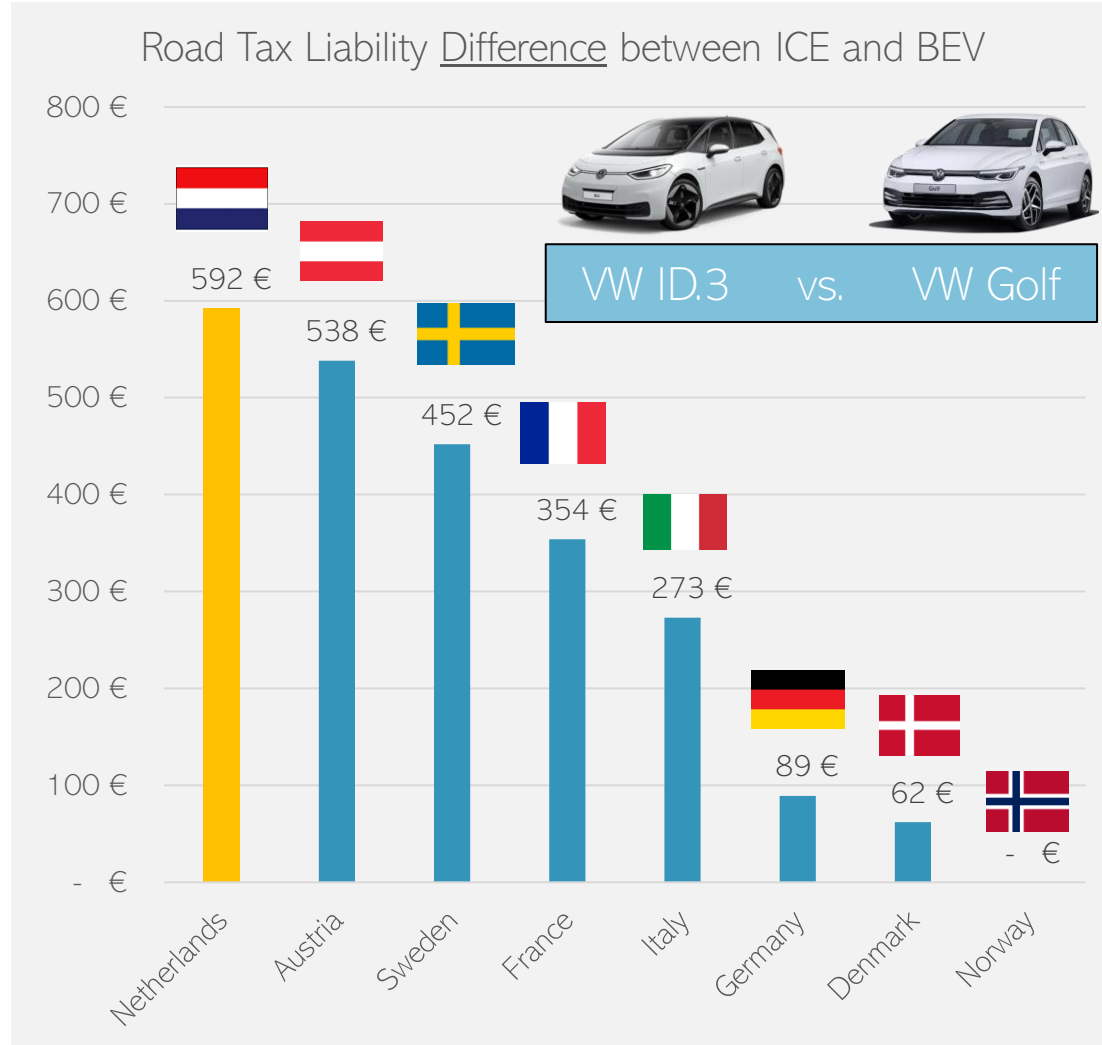
2018: 31%

2021: 64%

2022: 79%

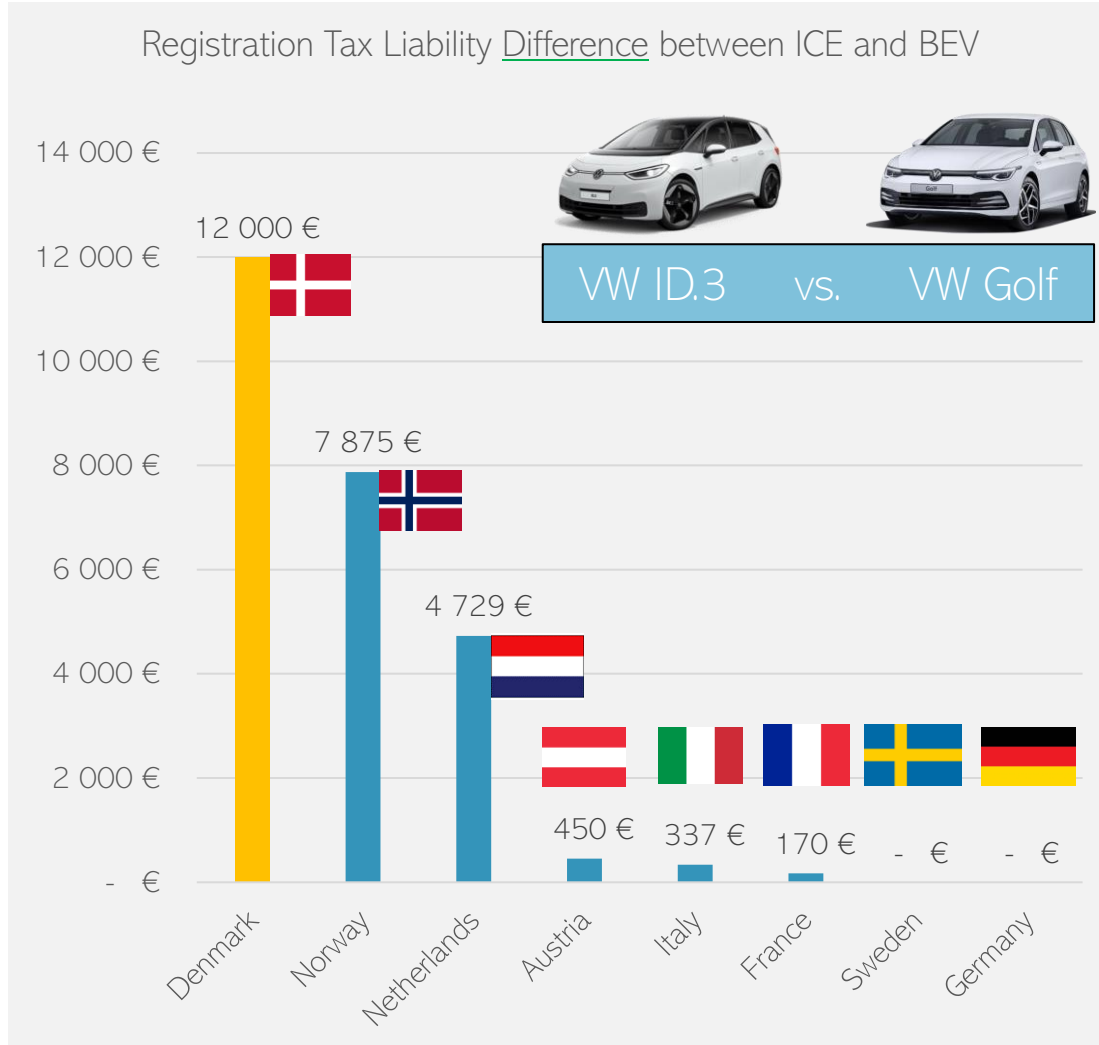
2023: 85%
market share

Road tax: The Netherlands provides the most significant amount of benefit on the road tax, but the phase out target is the earliest of all countries

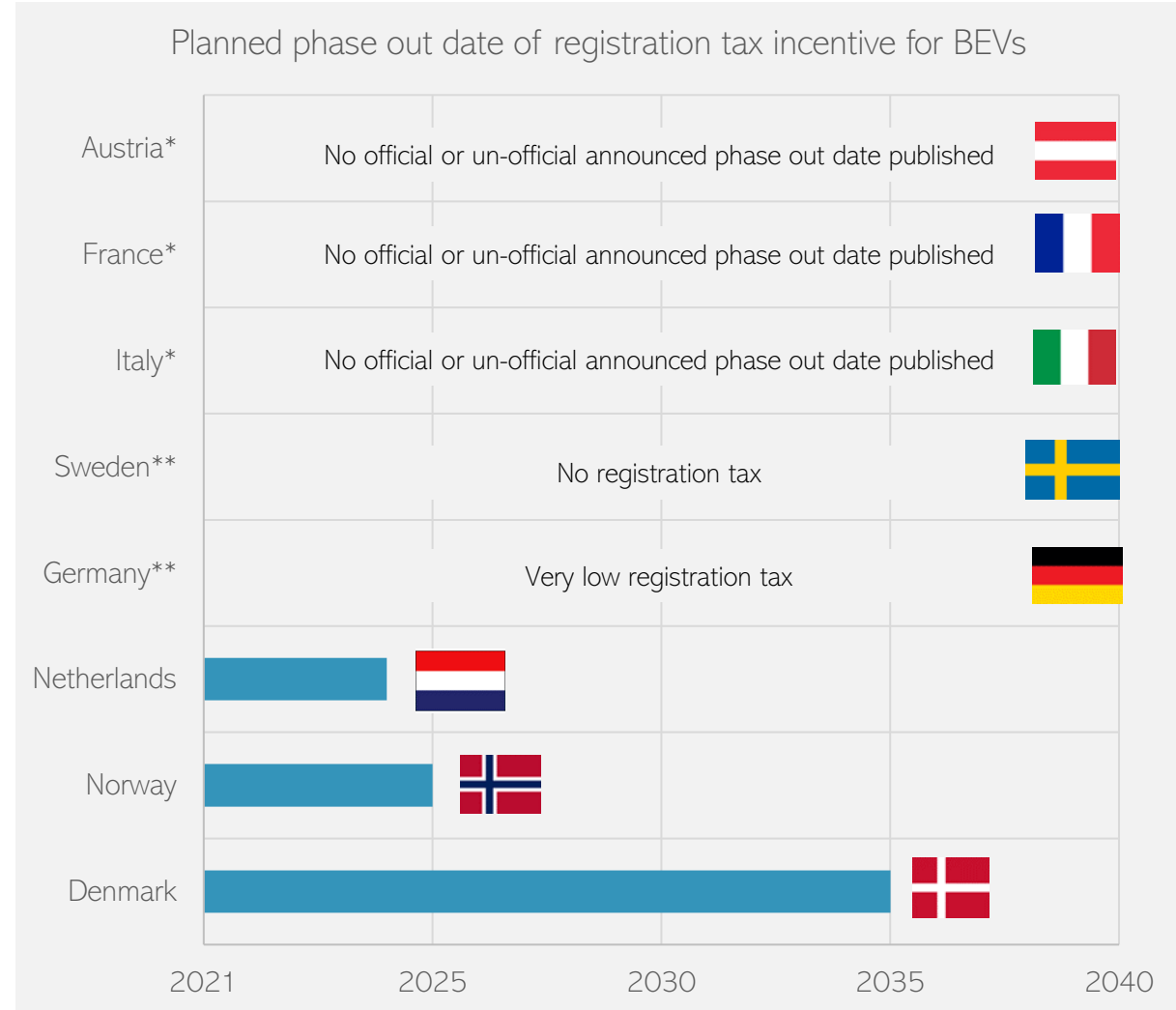


*Denmark plans to maintain benefits until 2028. Italy can earliest introduce phase out in 2029, Sweden IVL institute predicts earliest possible introduction date from 2030.

Registration tax: Denmark provides the most significant amount of benefit on the registration tax; the Netherlands amount is also significant after Norway.



Tax liability difference amounts are based on the reference cars of a Volkswagen Golf and a Volkswagen ID.3.



*Denmark plans to maintain benefits until 2028. Italy can earliest introduce phase out in 2029, Sweden IVL institute predicts earliest possible introduction date from 2030. 9

Benefit-in-Kind: relative benefit of BEVs expected to shrink only in the Netherlands and Norway, until 2025.

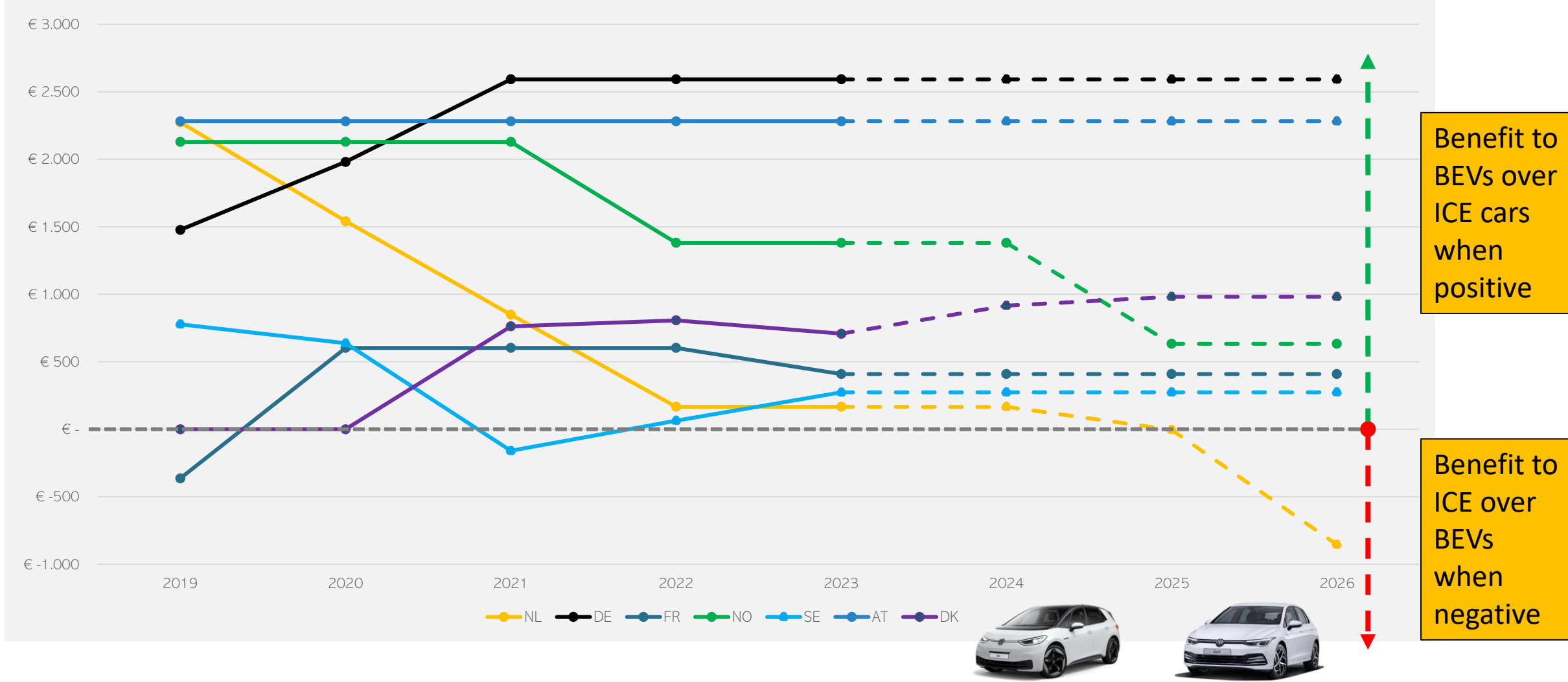


VW ID.3 vs. VW Golf

Based on vehicle prices of 2023

Benefit-in-Kind: BEV tax benefit was among highest in the Netherlands, but from 2025 onwards it is the only country with a disadvantage for BEV.

Benefit of BEV in BiK taxation



Benefit to BEVs over ICE cars when positive

Benefit to ICE over BEVs when negative



VW ID.3 vs. VW Golf

Current purchase price for BEV's higher than ICE in almost all countries, but a lower TCO due to lower energy costs and tax exemptions

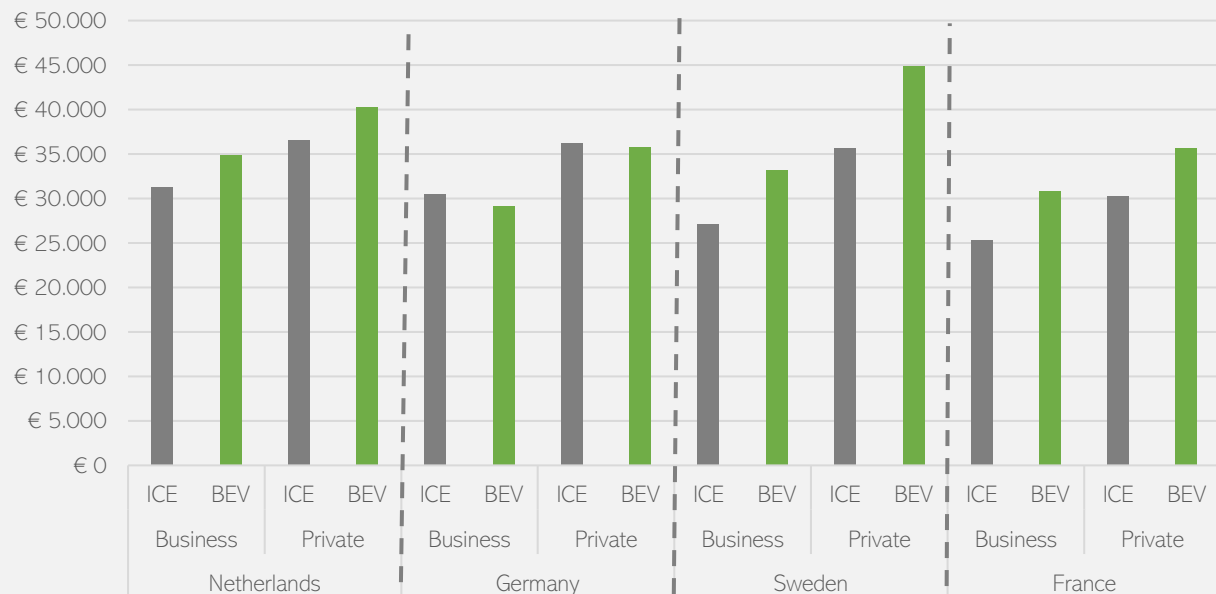
Purchase

	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
	Netherlands	-€ 6.771	-€ 4.902	€ 955	-€ 6.174	-€ 4.138
Germany	-€ 3.106	€ 2.194	€ 4.788	-€ 4.917	€ 1.328	€ 4.899
Sweden	-€ 6.258	-€ 8.614	-€ 3.244	-€ 9.610	-€ 12.703	-€ 5.378
France	-€ 10.405	-€ 3.320	-€ 2.650	-€ 11.143	-€ 2.662	-€ 2.253

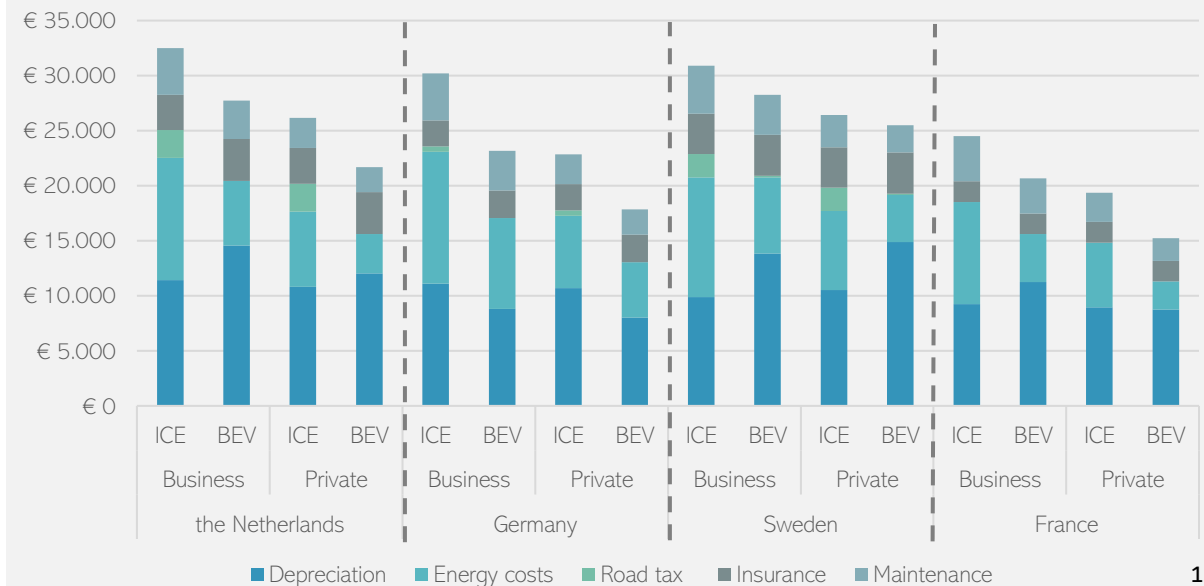
TCO

	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
	Netherlands	€ 1.435	€ 4.849	€ 8.022	€ 2.990	€ 4.979
Germany	€ 3.802	€ 8.356	€ 8.983	€ 3.409	€ 6.150	€ 5.469
Sweden	€ 1.729	€ 434	€ 5.762	€ 120	-€ 991	€ 3.657
France	€ 1.725	€ 5.666	€ 4.135	€ 2.178	€ 5.896	€ 4.243

Purchase price difference



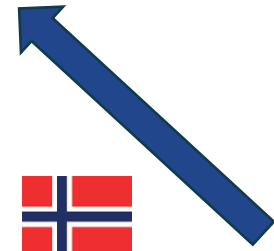
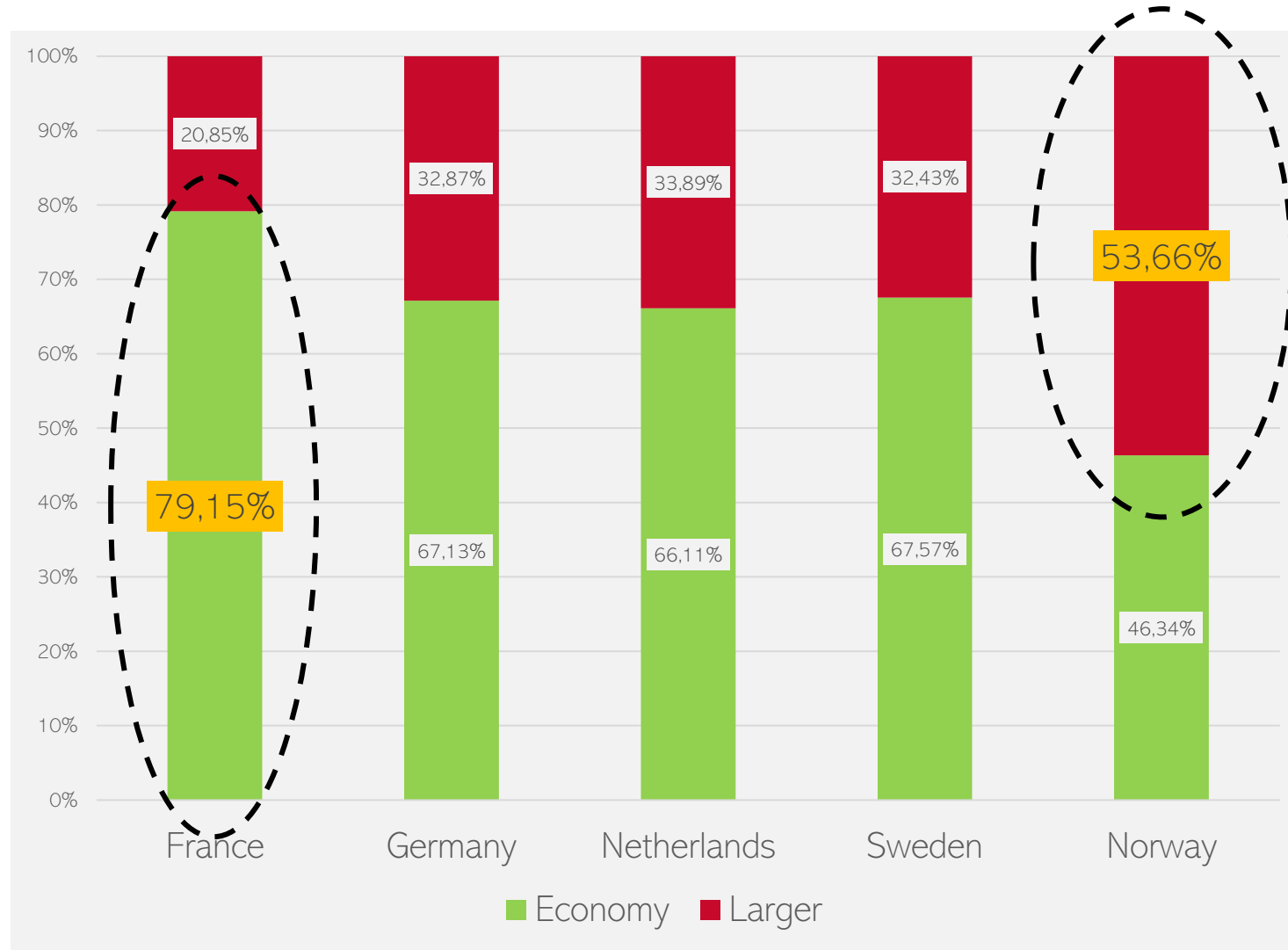
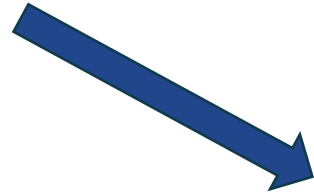
Average TCO BEV vs. gasoline cars



Steer towards specific segments is possible: France supports Economy segments and Norway Larger car segments (sales market share in 2022)



The French policy favors smaller car segments (A,B,C)



The Norwegian policy favors larger car segments (D, E, F, +)

Source: EAFO (2023)

France steers the market towards small subsidy segments

France

French subsidy program

Funding rate private (2023):

- € 5,000 for new BEV (€ 6,000 in '22)

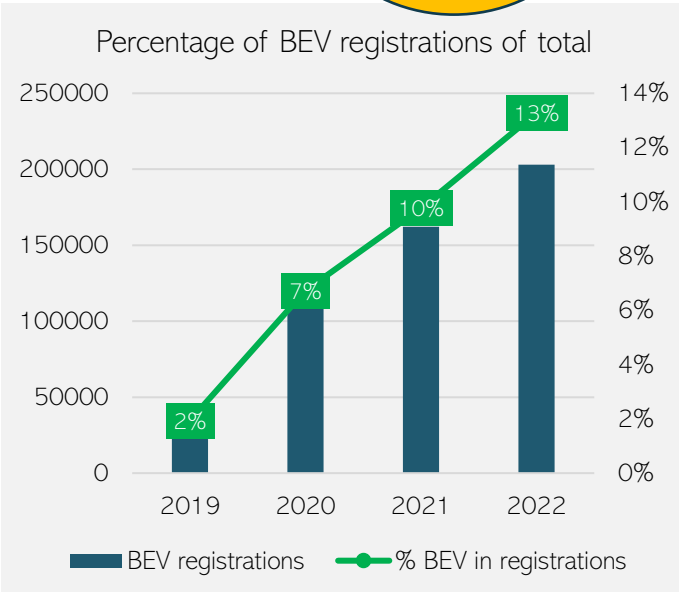
Funding rate business (2023):

- € 3,000 for new BEV (€ 6,000 in '22)

Additional conditions (2023):

- List price max. € 47,000
- Max 27% of retail price
- Weight less than 2,4 ton
- Less than € 14,100 income: up to € 7,000 subsidy
- Extra € 3,000 in Low Emission Zones

Increase to **15,4% market share and sales volumes in 2023 Q1**



The future electric Renault 5 at 100 euros per month? A possibility, with social leasing

By Jacob Philip - 26/05/2023 3 Mins Read

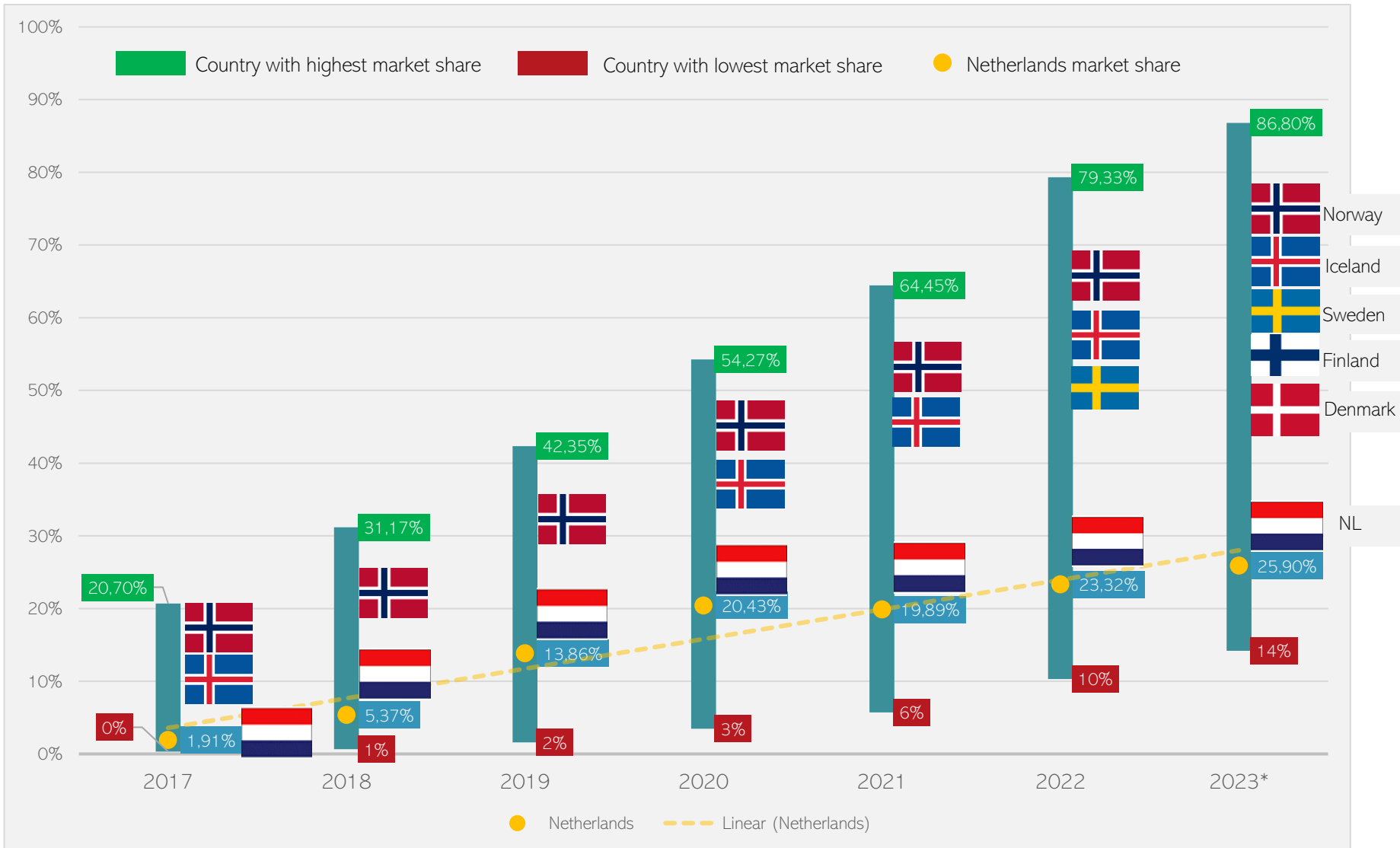


Targeting:

1. Small popular segments.
2. Low-income households in specific residential areas
3. Differentiation between private and business.

Netherlands position: BEV sales and growth

Market share of BEV's in The Netherlands stabilizes, more countries within Europe ranked above the Netherlands



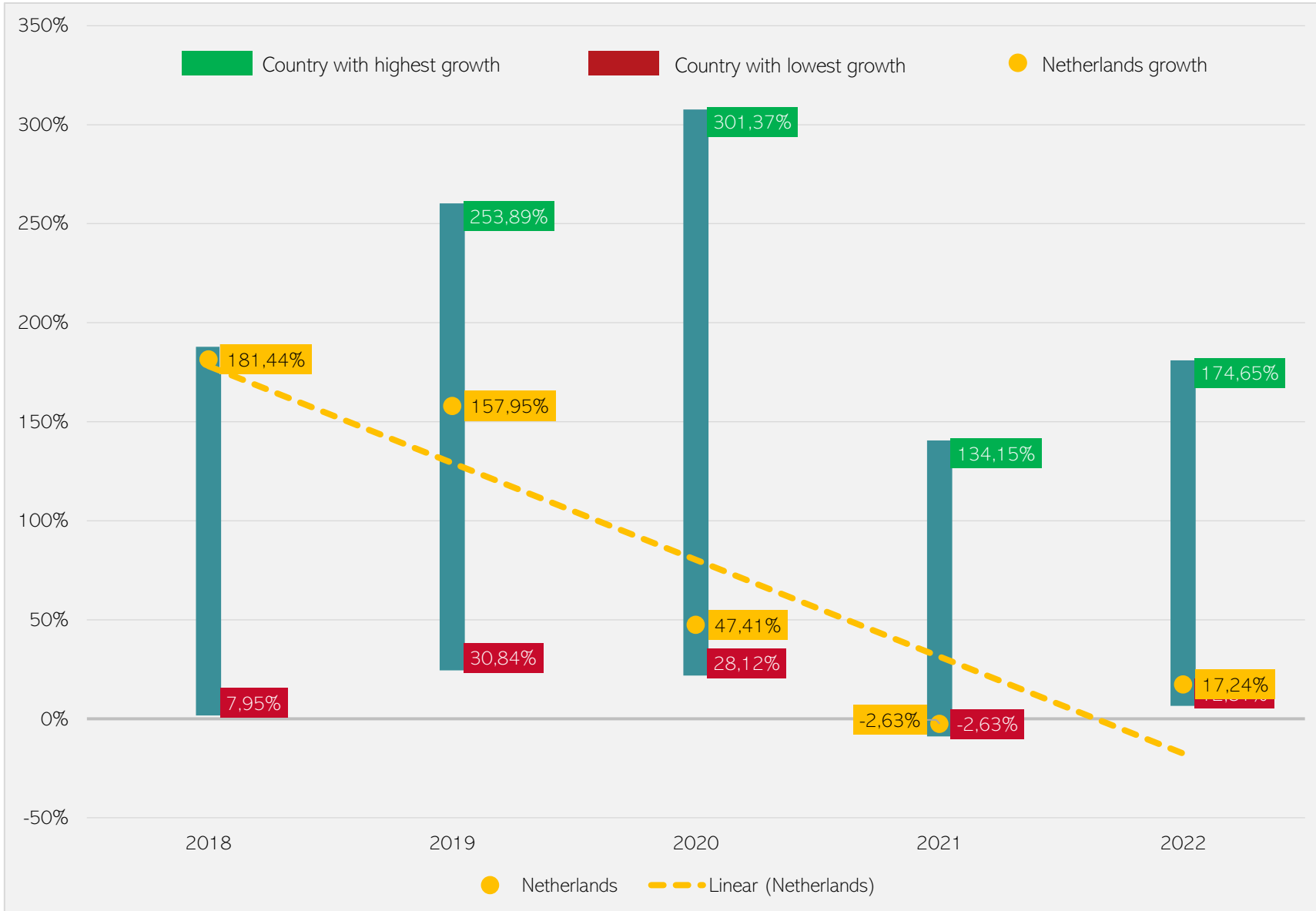
The Netherlands' BEV market share growth has slowed, while neighboring countries like Iceland (47%), Sweden (31%), Finland (28%) have surged ahead.

Since 2021, Denmark, Iceland, Finland, Germany, and the UK experienced significant BEV market share growth. The number of countries with higher share further increased to 3 in 2022 and up to 5 in 2023 Q1.

Peer countries selected: Countries selected: AT, BE, DK, FI, FR, DE, IL, IE, LUX, NL, SW, CH, UK

*2023 YTD (Q1). Source: RVO and other national sources

Relative hare of the Netherland`s BEV registration share growth among peer countries



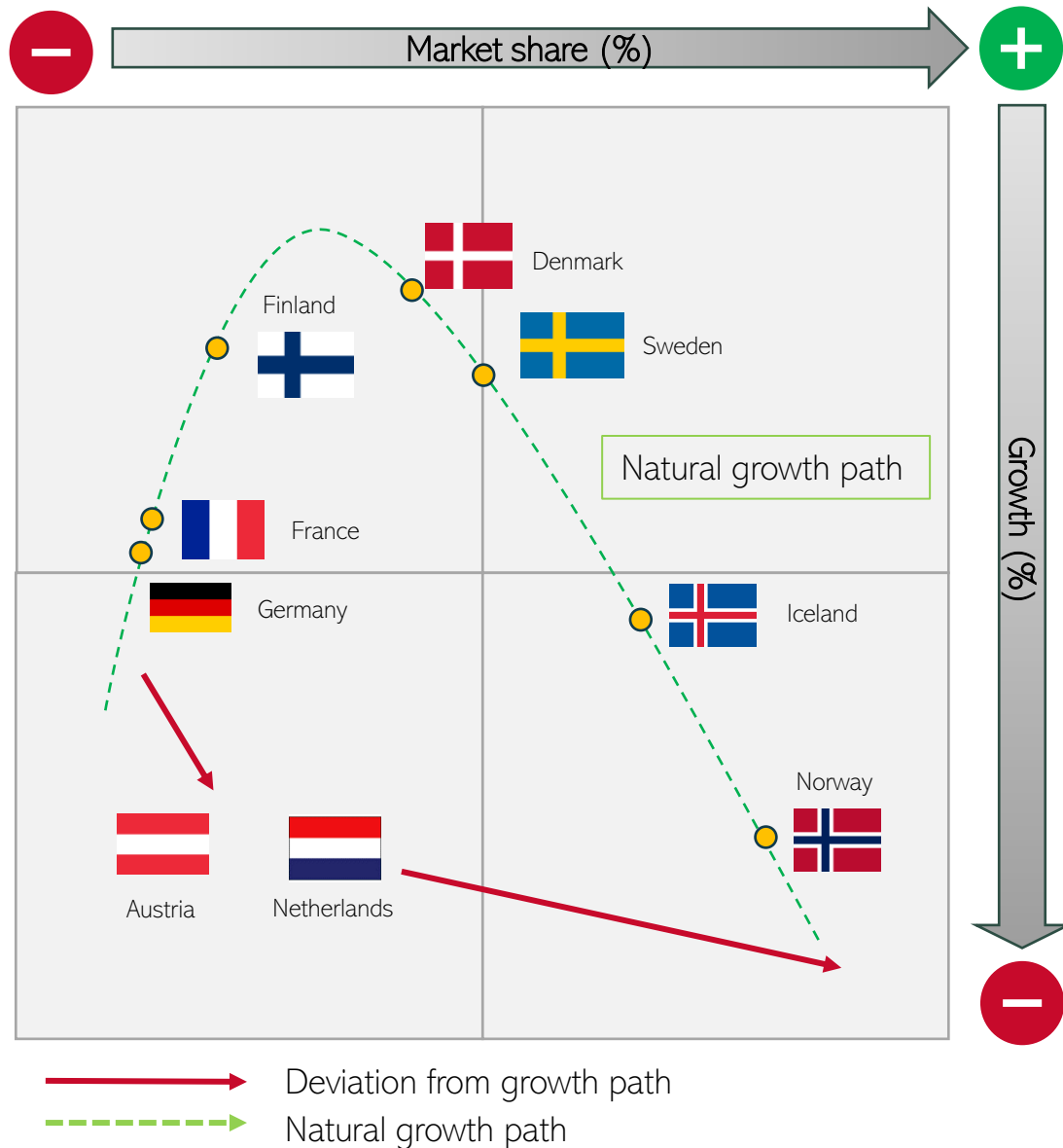
The Netherlands' transition from a BEV growth leader in 2018 (181.44%), went down to negative growth in 2021 (-2.63%) and low, 17,2% rate in 2022.

Countries like the UK, Denmark, Finland, Ireland, Sweden have demonstrated remarkable BEV growth rates, surpassing the Netherlands.

Peer countries selected: Countries selected: AT, BE, DK, FI, FR, DE, IL, IE, LUX, NL, SW, CH, UK

Method: Growth rates are calculated as % changes from YoY of BEV (M1) registration market shares.

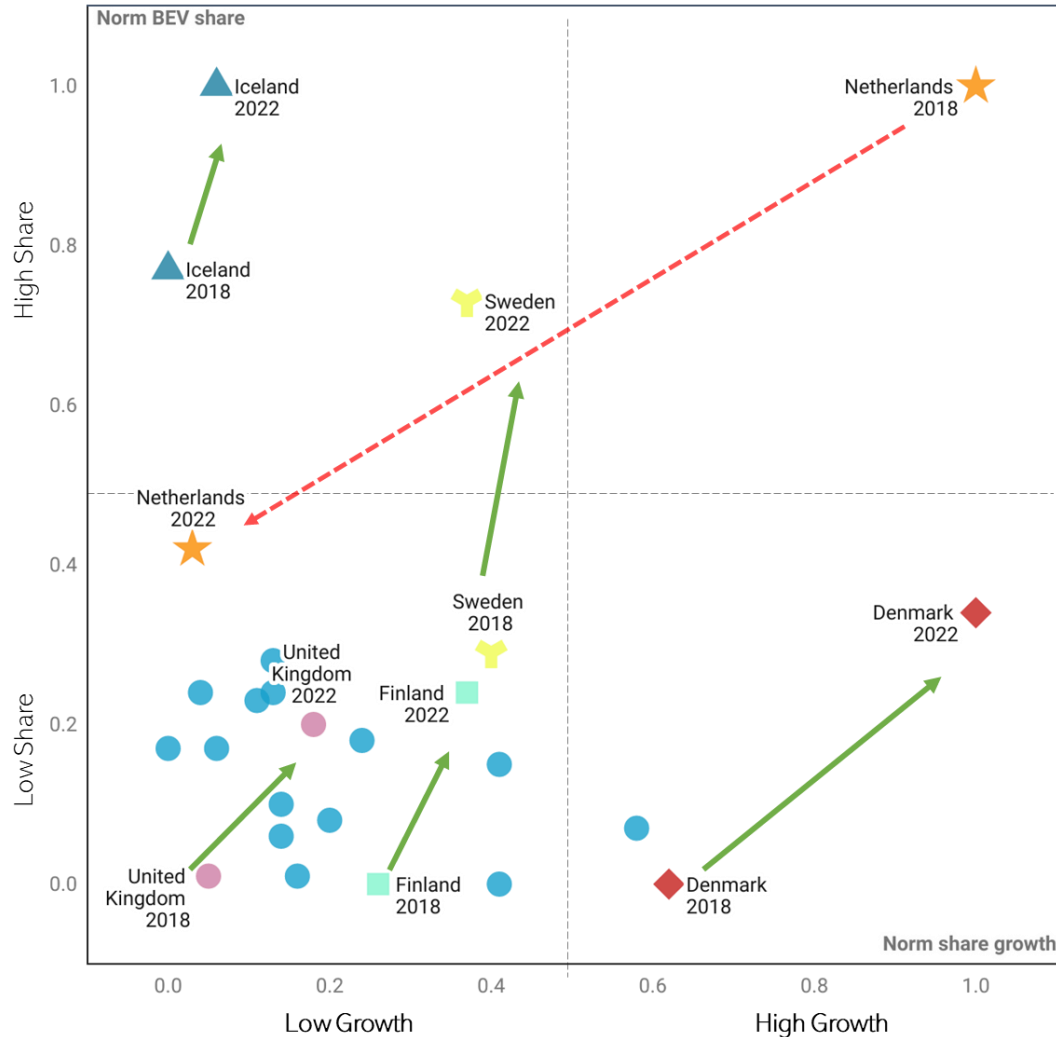
Position of the Netherlands in the growth - share matrix among European countries



Observations

- Examining the relative market share growth of BEVs between 2018 and 2022, the Netherlands had a growth of 34%, which is lower than the average growth of the European countries at 57%.
- In terms of growth, Denmark had the highest growth rate of 98%, followed by Finland at 93%, and Germany at 75%. Belgium, and Ireland also had high growth rates of 70%, and 72%, respectively. The Netherlands had a market share of 23% in 2022, ranking third behind Norway at 79% and Iceland at 41%.
- The Growth – Share matrix indicates the relative position of the Netherlands among European countries, having position in the low share, low growth quadrant. Countries as Iceland and Norway show a relative low growth rate, but having a very high market share which justifies the low growth rate. Countries with high performance transit from high growth low share to low growth high share through the years (see natural growth parabolic curve). Exemptions from that curve are Austria and The Netherlands with a relative low growth rate while market share is still relative low. For those countries it will be difficult to reach high market shares for BEV in relative short time.

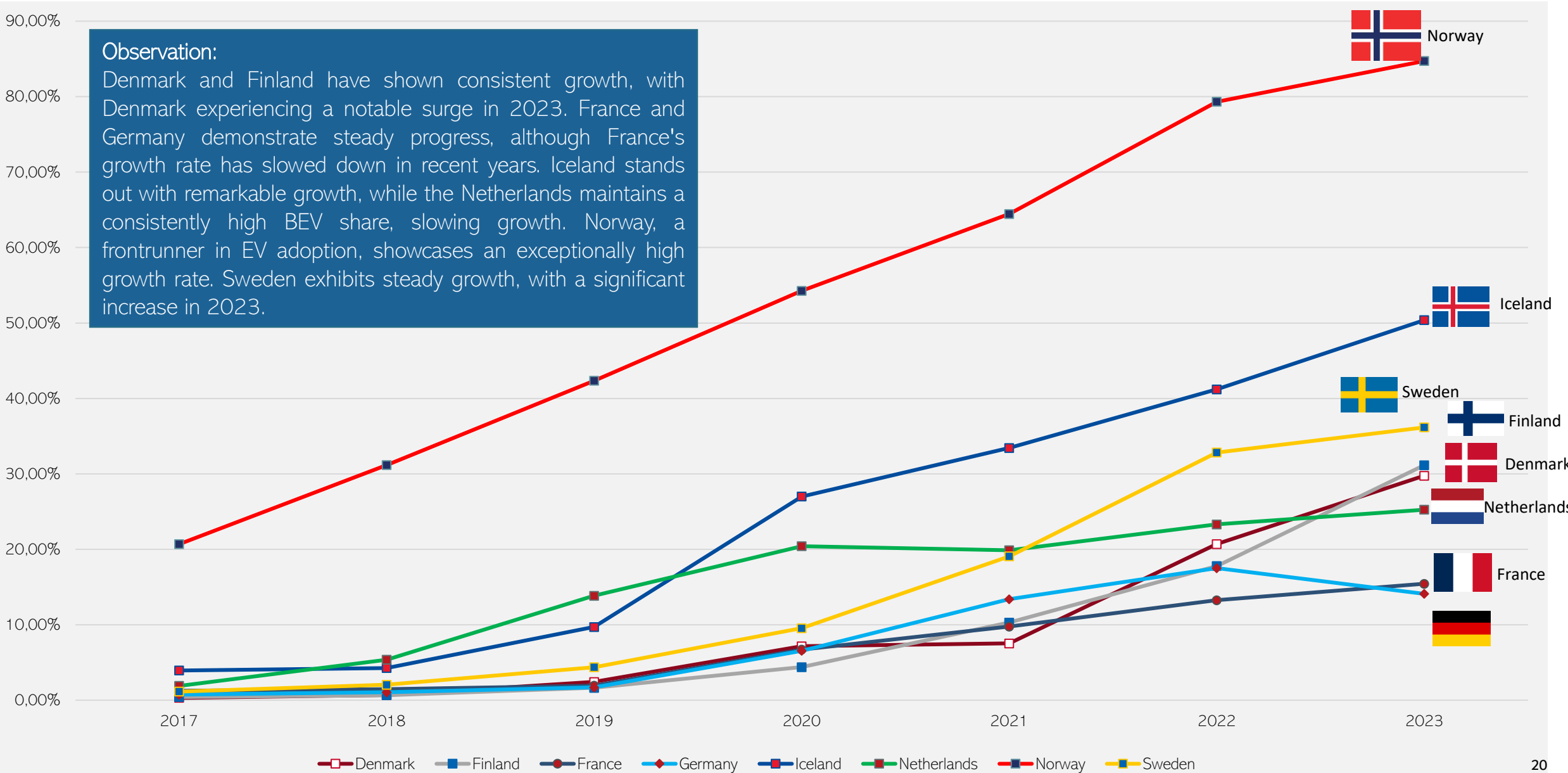
Relative change of selected countries in the growth - share matrix (2018 vs. 2022)



Observations
The competitive landscape of the BEV transition has evolved, with several countries excelling in both growth and market share. Sweden, Denmark, Iceland, Finland, and the UK have experienced considerable repositioning, setting a new benchmark in the BEV transition. The Netherlands's relative position shifted from a high share, high growth leader to a low share, low growth category member. Between 2018 and 2022, the Netherlands' relative ranking among its peers experienced the most significant decline in the BEV market.

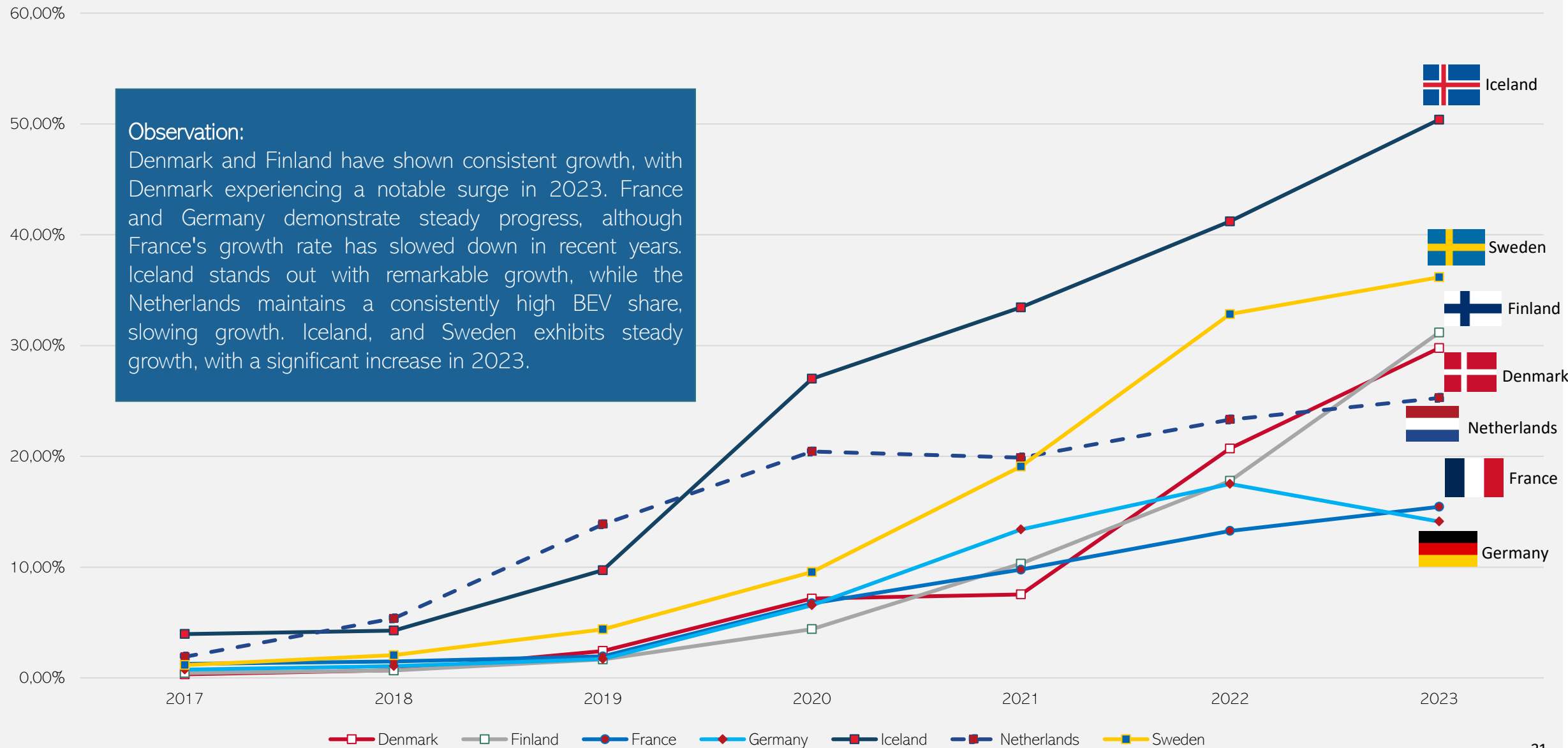
The selected countries are considered peer countries of the Netherlands (e.g., similar GDP per capita level). They were positioned in the matrix, based on their market share and YoY market share growth rate in 2018 and 2022. To ease comparison, data was normalized between 0-1, using Min-Max method.

Uptake of BEVs the selected countries (incl. Norway)

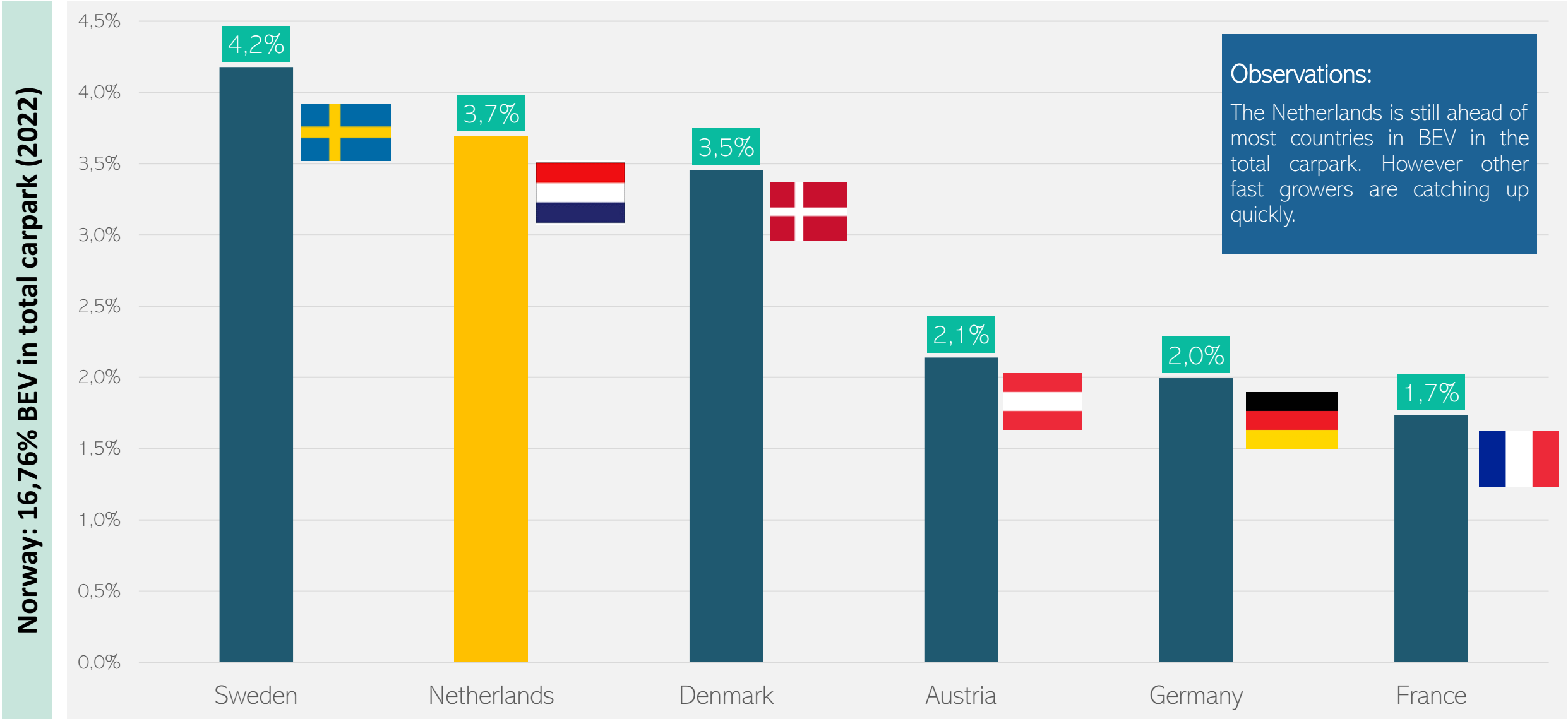


Uptake of BEVs the selected countries (excl. Norway)

Observation:
Denmark and Finland have shown consistent growth, with Denmark experiencing a notable surge in 2023. France and Germany demonstrate steady progress, although France's growth rate has slowed down in recent years. Iceland stands out with remarkable growth, while the Netherlands maintains a consistently high BEV share, slowing growth. Iceland, and Sweden exhibits steady growth, with a significant increase in 2023.



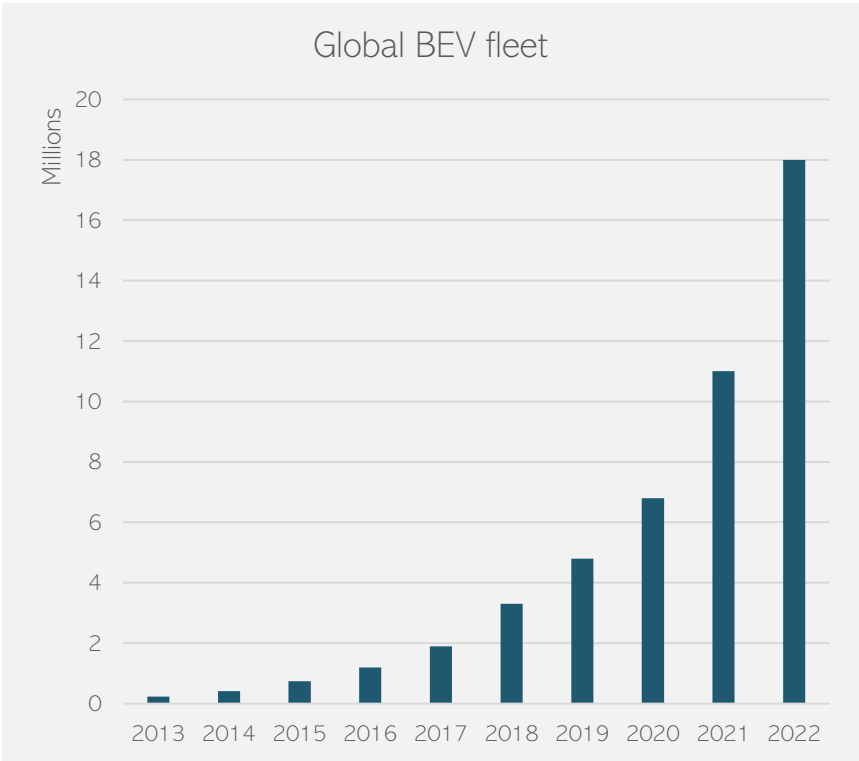
Comparison of the yearly BEV fleet size in the Netherlands, Sweden, France, and Germany (% of BEV in total carpark 2022)



Effects of BEV policies in selected countries

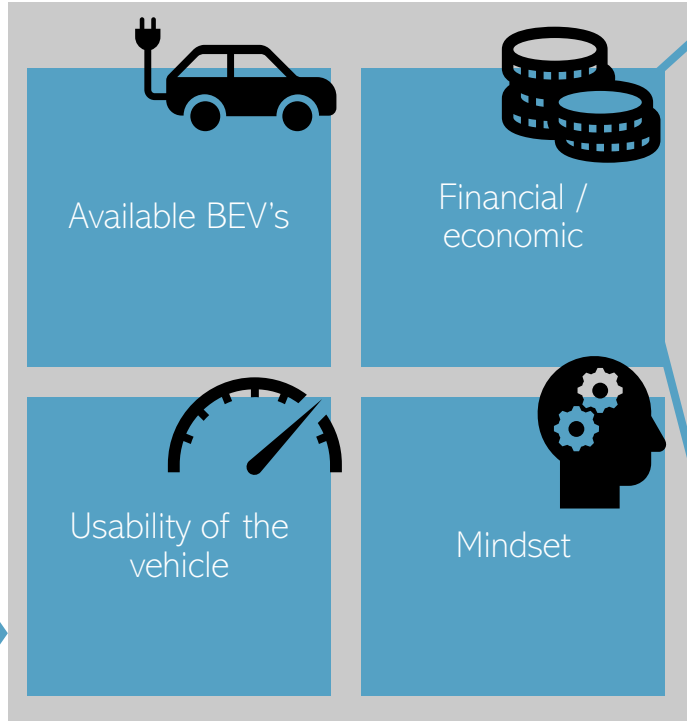
Success of BEV sales – which factors play a role?

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.

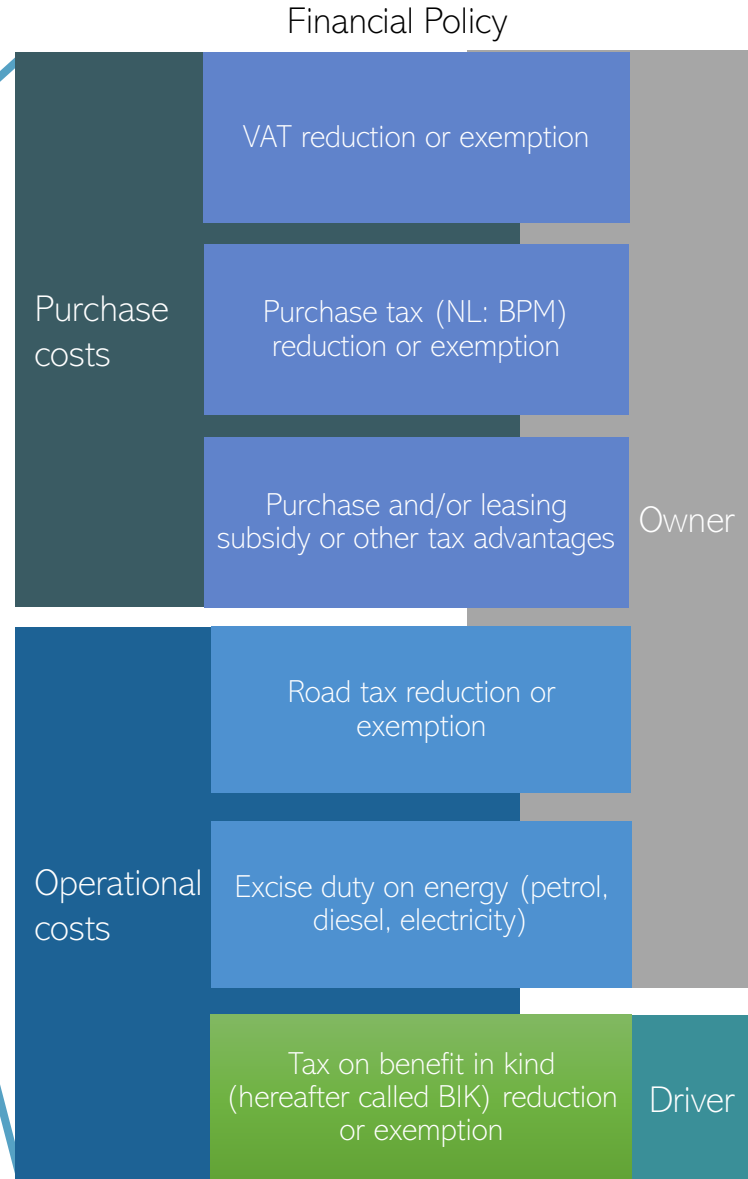


Source: IEA (2021)

General factors in purchasing behaviour

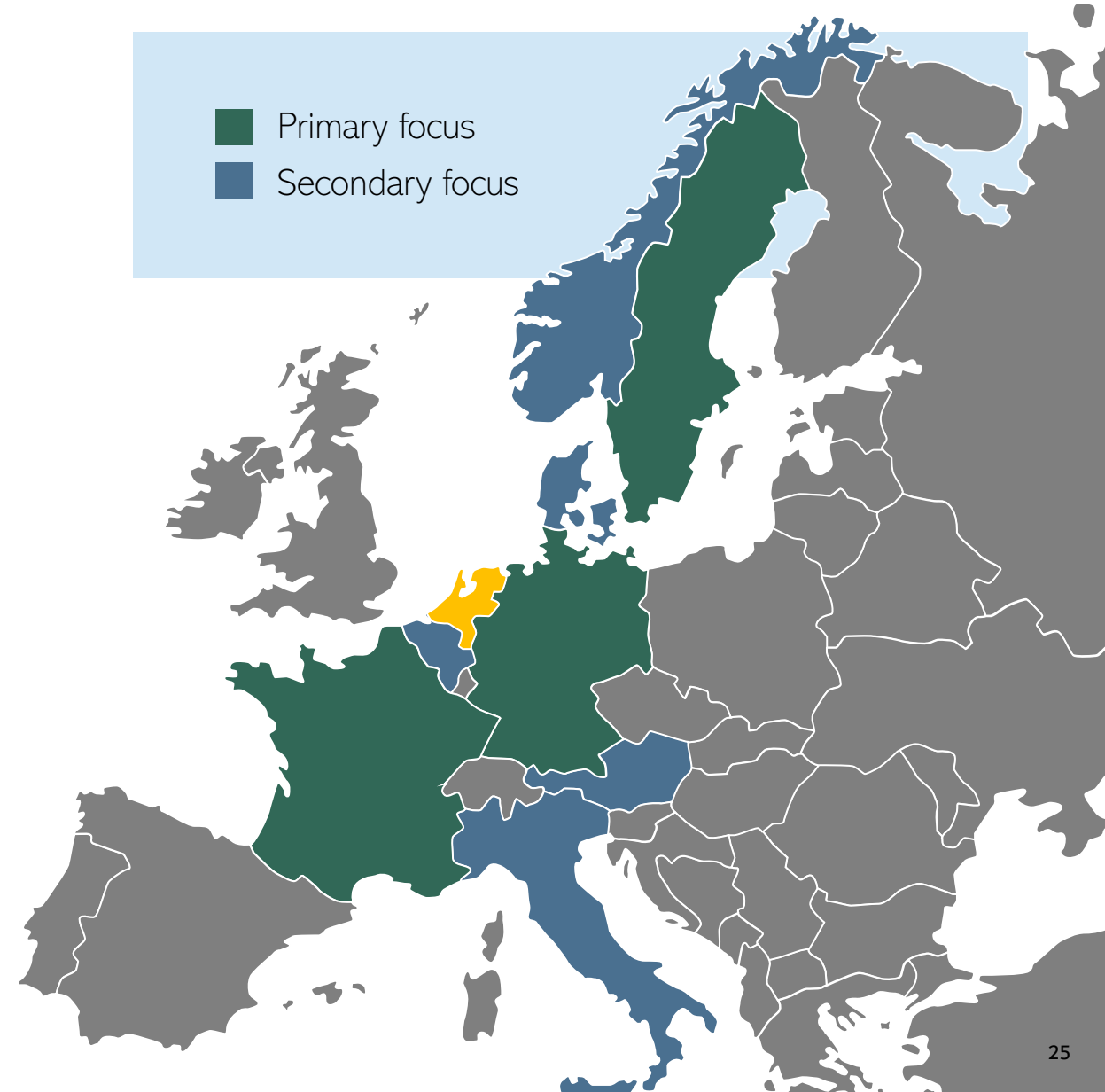


There are different (eco)systems in the countries discussed in this report, and therefore these factors play a different role when countries are compared.



The report starts with a general overview of the different countries (primary and secondary focus). This general overview includes the current (2023) applicable incentives, the EV uptake over several years, the growth of public available chargers as well as the top 5 BEVs sold. The report also provides an overview of available subsidies for used BEVs in European countries.

This is followed by an in-depth analysis of the Netherlands, Sweden, 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 (SEPP)

Funding rate (2023):

- € 2,950 for new BEV (€ 4,000 in '20/'21 and € 3,350 in '22)

Budget (2023):

- € 67 M for new BEV

Additional conditions (2023):

- List price between € 12,000 and € 45,000
- Purchase or leasing of the car
- At least 120 km range
- Required holding period 3 years for purchase and 4 years for leasing

Road tax (MRB)

- 100% discount until 2024,
 - 75% discount rate in 2025,
 - 0% discount from 2026
- Due to weight, BEVs pay more than ICE.

Recharging infrastructure

Subsidy: No installation subsidy for individuals. Companies can make use of the MIA/Vamil scheme.

Reduced energy tax for charging stations: € 470 per charging station per year.

Environmental Investments, Profit Tax (MIA/Vamil) - 2023

BEV passenger cars are excluded,

FCEV (H2) cars:

- MIA: max. 45% up to investment deduction.
- Vamil: write off 75% of investment cost.

BEV vans: only MIA, 45% tax deductible

Registration tax (BPM)

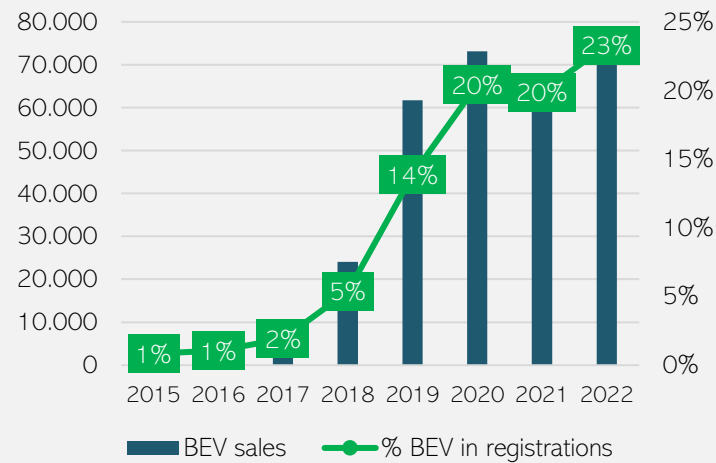
BEVs are exempt from paying registration tax until 2025. For petrol cars, with different levels of CO₂ emissions that are due different amounts of registration tax (cca. € 5,000 for a VW Golf)

BiK taxation

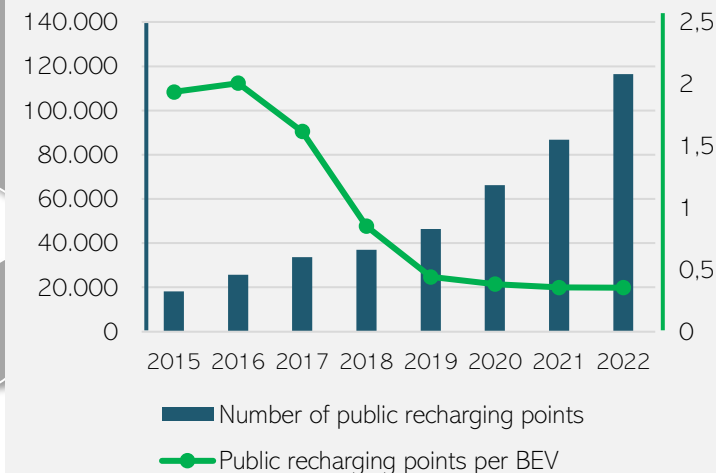
Rate: For petrol cars 22%. For BEVs it was 4%, increased to 8% in '20, 12% in '21, 16% in '22, this is currently still the rate. Planned to increase to 17% in 2025 and the benefit removed after 2025.

Discount cap for car list price: reduced from € 35,000 to € 30,000 in 2023. For the price above the cap, the 22% rate applies.

Percentage of BEV registrations of total



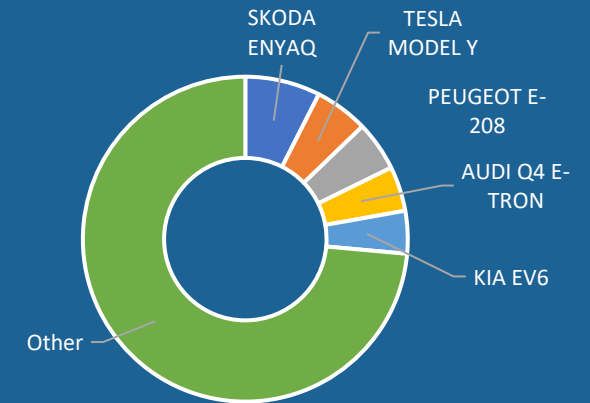
Recharging infrastructure (AC & DC)



Ambitions

- 2030: 100% of new M1 Zero Emission.

TOP 5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 2.726, 2026: EUR 3.746



BIK/yr VW Golf 2023: EUR 2.893, 2026: EUR 2.893

Observations

- Plans are to cancel new BEV subsidy and make only used BEVs eligible.
- 2025 phase out target for MRB, BPM, BiK BEV benefits. 2024 phase out for SEPP.
- The Netherlands' BEV market share growth has slowed, ranking as laggard compared to peer countries.
- Public infrastructure network volume and density is leader in Europe as of 2023.

Norway - Overview



VAT Exemption ("purchase subsidy")

Exemption rate (2023)

- VAT (25%) exemption for BEVs below € 42,000 price. (no price cap until 2022)
- Only amount exceeding price cap taxed (25%).

Budget (2023)

No budget limitation.

BiK taxation

Benefit value calculation (2023)

- 30% of the car retail price (until € 28.689) + 20% on the excess amount

Benefit value calculation (2022)

- 30% of the car retail price (until € 27.908) + 20% on the excess amount.
- For BEVs 80% of the new price is considered.

Re-registration fee (2023)

- Full fee of one-off € 575 for used BEVs.
- 75% discount was removed in 2023.

Weight tax (from 2023)

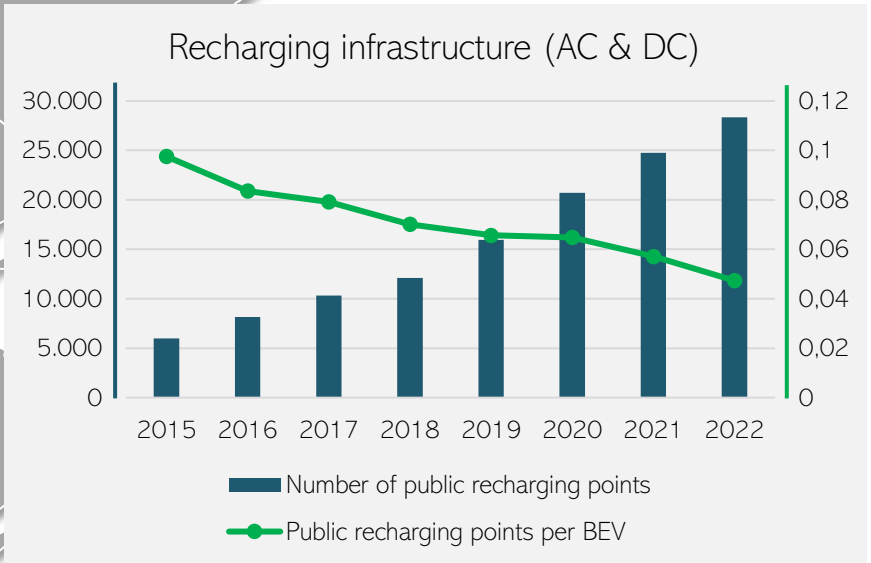
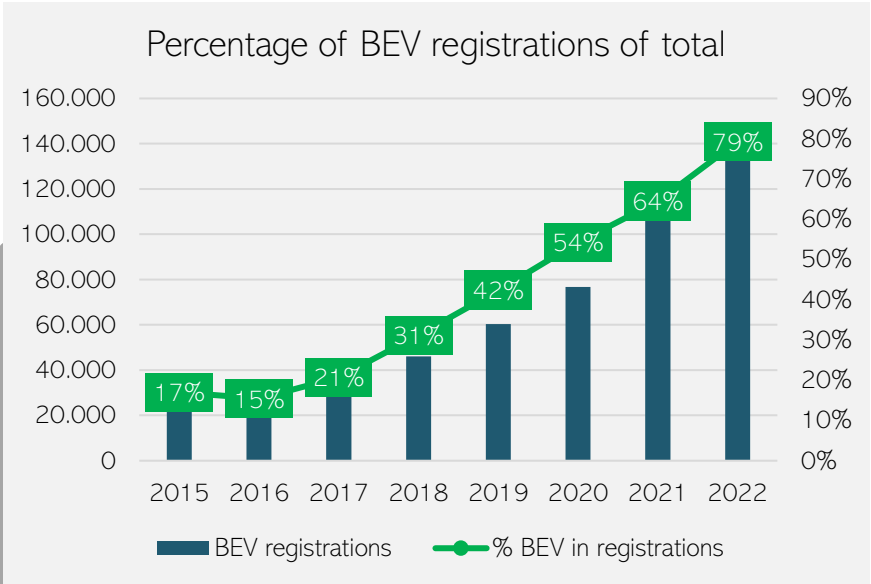
- One-off tax rate: 1 EUR/kg for weight above 500kg
- BEVs are not exempt. no weight correction

Road traffic insurance tax (from March 2023)

- BEVs pay lower rate, € 264 per year (15% discount)
- € 50 benefit to ICE per year
- 45% increase for BEVs since 2022

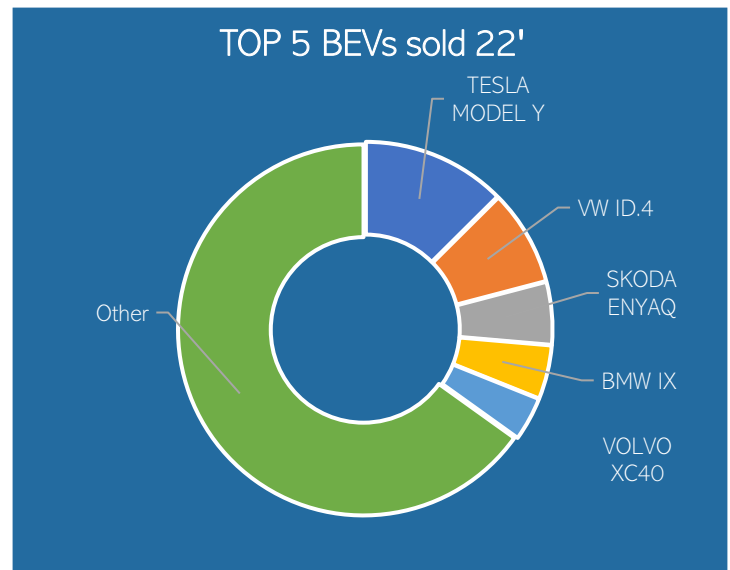
Road toll (2023)

- Max. cap of fee increased to 70% from 50% (compared to petrol cars)
- The annual road tax is €48.



Ambitions

- All new passenger cars (M1) and light vans (N1) sales should be zero-emission by 2025



BIK/yr VW ID 3 2023: EUR 2.992, 2026: EUR 3.740

BIK/yr VW Golf 2023: EUR 4.373, 2026: EUR 4.373

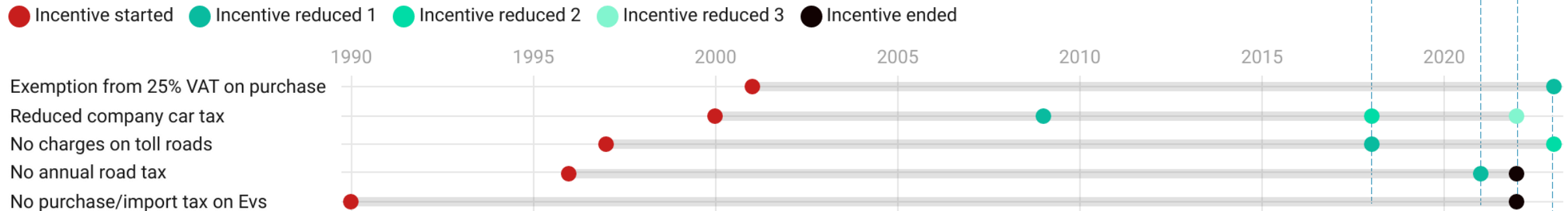
Observations

- Despite the benefits of BEVs are continued to be gradually reduced, organic growth still went on until 2022. Sales dropped significantly in 2023 Q1.
- Sales and availability of new ICE cars are expected to be marginal from 2023.
- All cars purchased by governmental bodies, must be emission free from 2022 on.

Premature Curtailment of Incentives: As leading country of BEV sales, Norway started to phase out incentives at 79% market share.

The Dutch government has been reducing stimulation measures prematurely, impacting growth. Examples include changes to the "bijtelling" (benefit-in-kind) taxation scheme and capping of purchase subsidies for new and second-hand BEVs. These decisions have led to a market share stagnation for BEV's just above 20% and a come back of Internal Combustion Engine Vehicles (ICEVs) and Plug-in Hybrid Electric Vehicles (PHEVs) in certain segments. In comparison front running country Norway started their phase out strategy with a first step when market share of BEV's was already above 30% and larger steps now their market is already in mass market phase (79%).

Overview of Norway's incentive phase-out policy



Source: Elbil.no • Created with Datawrapper

2018: 31%

2021: 64%

2022: 79%

2023: 85%
market share

France - Overview



Purchase subsidy

Funding rate private (2023):

- € 5,000 for new BEV (€ 6,000 in '22)
- € 1,000 for used BEV

Funding rate business (2023):

- € 3,000 for new BEV (€ 6,000 in '22)

Additional conditions (2023):

- List price max € 47,000
- Max 27% of retail price
- Weight less than 2,4 ton
- Less than € 14,100 income: up to € 7,000 subsidy
- Extra € 3,000 in Low Emission Zones

Conversion (scrappage) bonus

Bonus rate private (2023): max. € 6,000 (€ 5,000 in '22)

Additional conditions (2023):

- Max € 47,000 price
- Max 80% of price
- Income between € 14,1k – 23k: only € 2,500 subsidy

BiK taxation (until 2024)

- 50% reduction capped at €1,800 per year. If € 4,000 is due, only € 2,200 is payable.
- Charging at workplace exempt from the tax.

Registration tax benefits

- 50% discount for BEVs.
- 100% for license plate registration (carte grise) tax depending on the region.

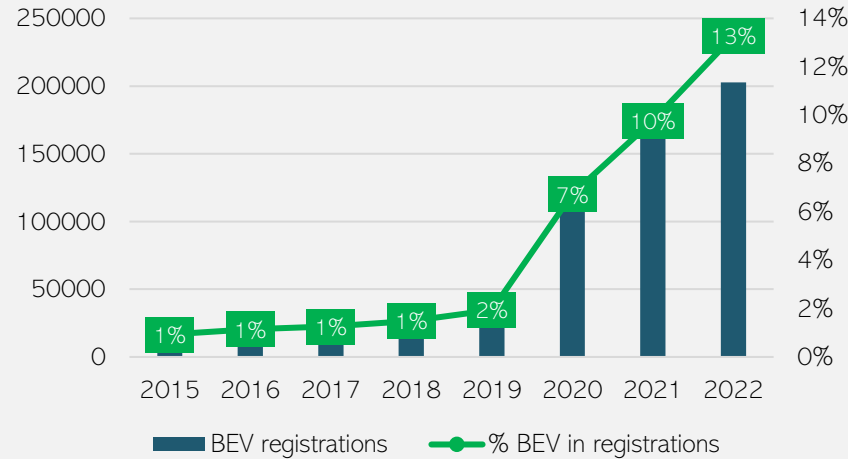
Recharging infra

- Residential EV charging stations: €300 tax credit
- 40% (company), 50% (condominiums) installation subsidy

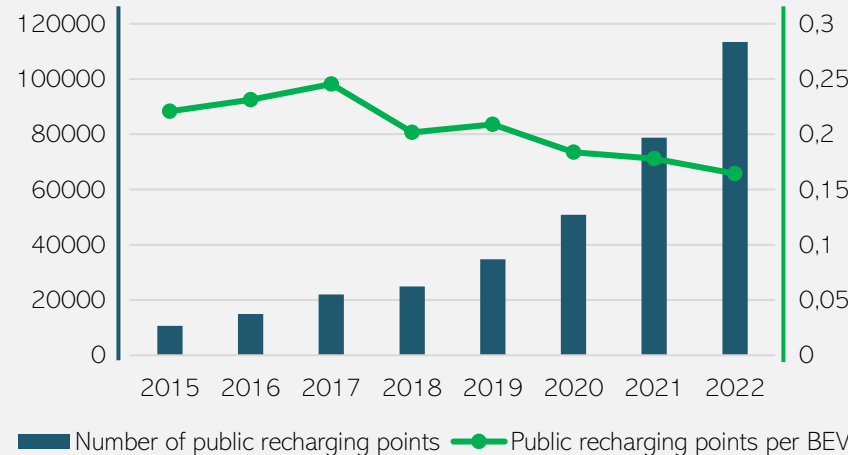
Company profit tax

- 100% discount for annual tax on CO2 emissions
- 100% discount for atmospheric pollutants (or vehicle age) tax

Percentage of BEV registrations of total



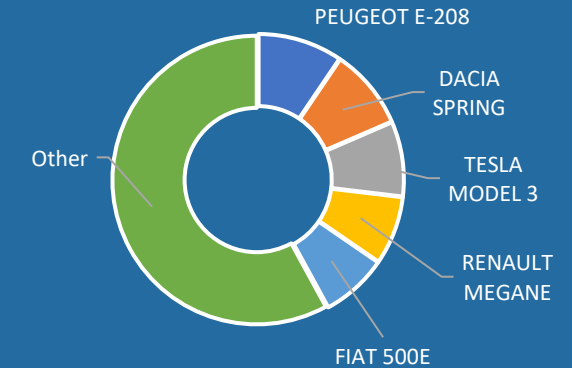
Recharging infrastructure (AC & DC)



Ambitions

- The French government's Multiannual Energy Programme aims to increase the Total BEV/FCEV fleet to 0.66M by 2023, and 1.8 million by the end of 2028.
- A ban on Sales of ICE from 2040 onwards

TOP5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 773, 2026: EUR 773



BIK/yr VW Golf 2023: EUR 1.183, 2026: EUR 1.183

Observations

- France adopted changes considering the growing local productions, budgetary restraints and market evolution.
- Funds allocated to lower income households and smaller car segments. Malus increased for ICE cars: threshold decreased to 123 g CO2/km from 128 – starting lower with same rates.
- Company car tax deductions made a significant impact on sales

France – Extended BiK taxation



BiK taxation (until 2024)

Actual Expenditure Calculation:

Suppose a company bought a car for €30,000. The annual fuel costs, tolls, and parking come to €2,000. The car was driven 20,000km in a year, out of which 5,000km were for private use.

$$\text{BiK} = (\text{€}30,000 + \text{€}2,000) * (5,000\text{km} / 20,000\text{km}) = \text{€}32,000 * 0.25 = \text{€}8,000$$

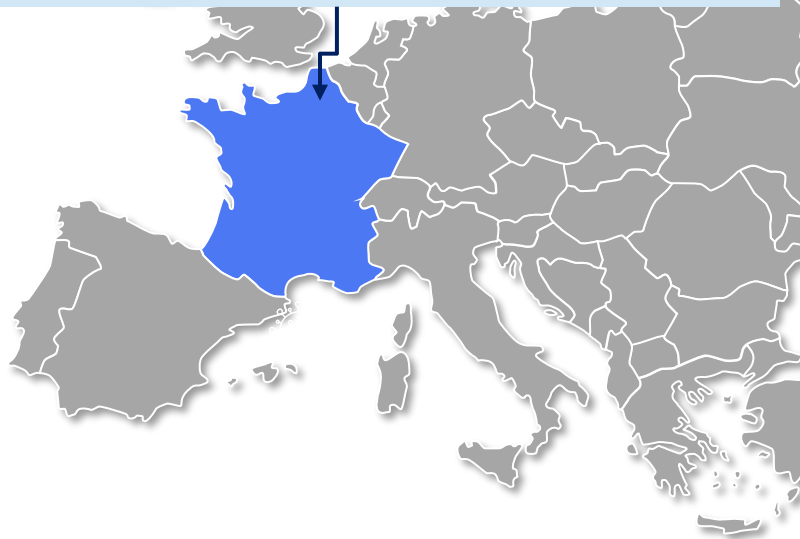
Flat-Rate Calculation (Purchased Car):

If the same car was less than 5 years old, the BiK would be 9% of the purchase price plus the fuel costs. If we consider fuel costs as a flat rate of 3%, we have:

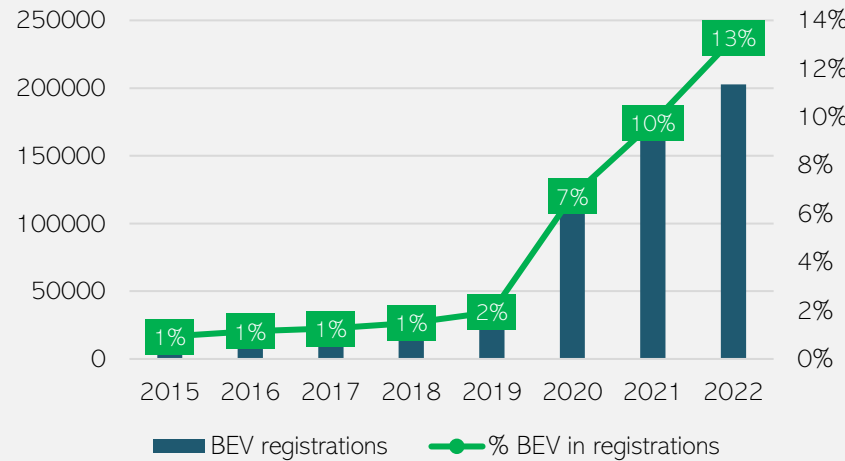
$$\text{BiK} = 9\% \text{ of } \text{€}30,000 + 3\% \text{ of } \text{€}30,000 = \text{€}3,600$$

Electric Car (Flat-Rate Calculation):

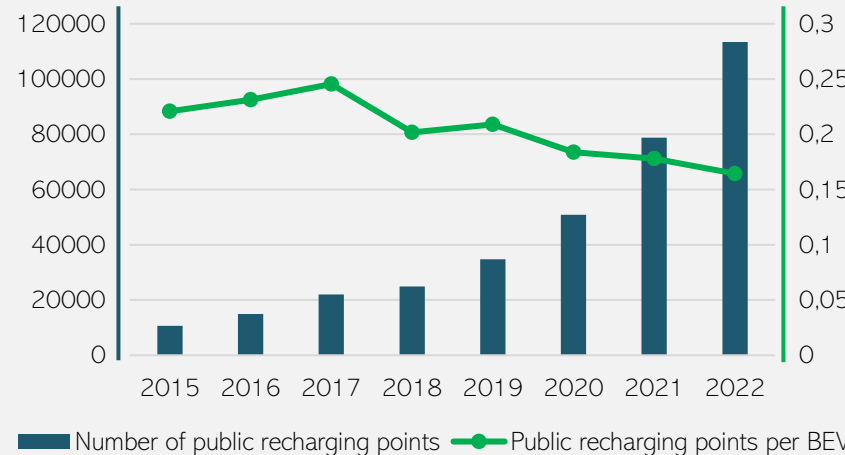
If the same leased car was an electric vehicle, we would apply the reduction:
 $\text{BiK} = \text{€}4,000 - 50\% \text{ (max €1,800)} = \text{€}4,000 - \text{€}1,800 = \text{€}2,200$



Percentage of BEV registrations of total



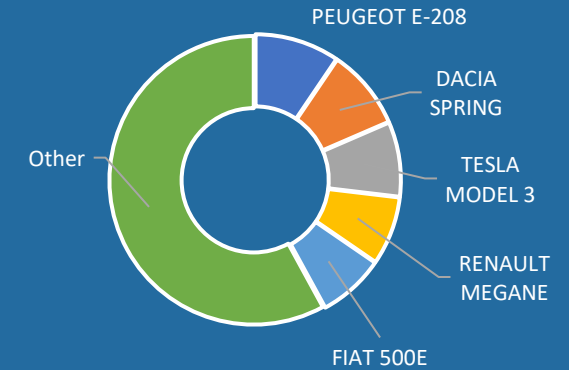
Recharging infrastructure (AC & DC)



Ambitions

- The French government's Multiannual Energy Programme aims to increase the Total BEV/FCEV fleet to 0.66M by 2023, and 1.8 million by the end of 2028.
- A ban on Sales of ICE from 2040 onwards

TOP5 BEVs sold 22'



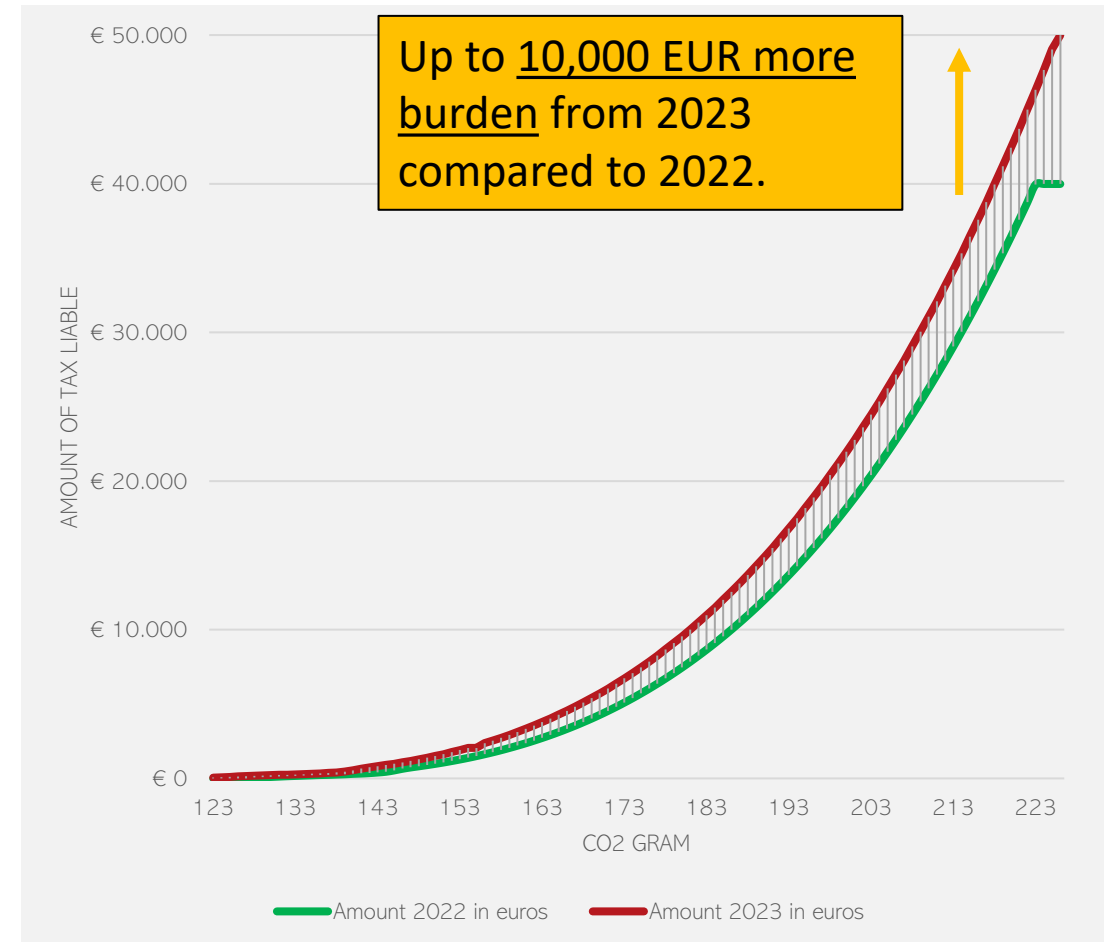
Observations

- France adopted changes considering the growing local productions, budgetary restraints and market evolution.
- Funds allocated to lower income households and smaller car segments. Malus increased for ICE cars: threshold decreased to 123 g CO₂/km from 128 – starting lower with same rates.
- Company car tax deductions made a significant impact on sales

French strategy: “The “carrot and the stick””: disincentives must be in place to ensure a still positive gap for BEV - the polluter pays principle

Disincentives for ICE vehicles must stay in place, and the phase out of incentives for BEVs shall ensure a still positive gap for BEV. As we see examples in Sweden or France, even with reducing, or phasing out incentives for BEVs, the burdens of ICE vehicles grow, or remain, so that the relative attractiveness of BEVs stay, and not a situation arises, where ICE vehicles become more attractive.

Increasing financial burdens (malus) in France for petrol car registrations



Germany - Overview



Purchase subsidy

BEVs max € 40,000 price (2023):

- € 6,750 for purchase or 2 year lease (€ 9,000 in '22)
- € 3,375 for less than 2 year lease

BEVs max € 65,000 price (2023):

- € 4,500 for purchase or 2 year lease (€ 7,500 in '22)
- € 2,250 for less than 2 year lease

Used BEVs max € 65,000 price (2023):

- € 4,500 for purchase or 2 year lease
- € 2,250 for less than 2 year lease

Additional conditions (2023):

- For used BEVs, max 1 year old registration, 15k mileage

Motor Vehicle Tax

- BEVs registered between 2016, and 2020, receive 10 years exemption.
- BEVs registered by 2025, are exempt until 2030.

BiK taxation (until 2030)

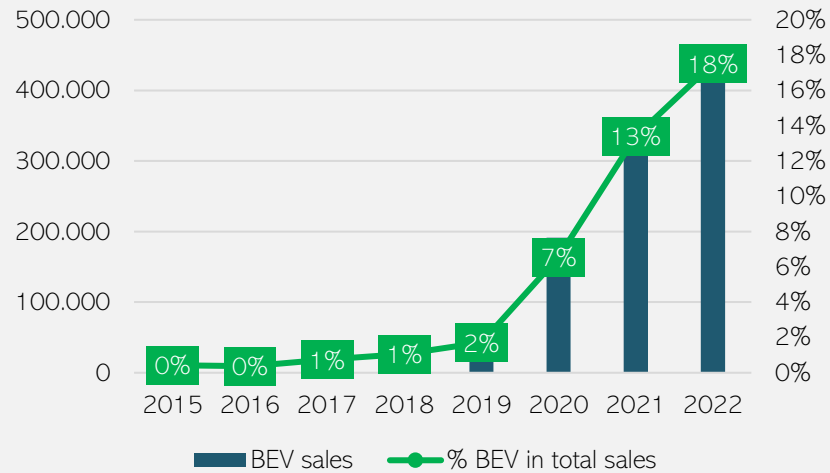
BEVs under € 60,000: monthly taxed at 0,25% of purchase price. (75% discount from ICE) and 0,0075% of purchase price as commuting tax per km (75% discount from ICE)

BEVs above € 60,000: monthly taxed at 0,5% of purchase price. (50% discount) and 0,015% of purchase price as commuting tax per km (50% discount from ICE)

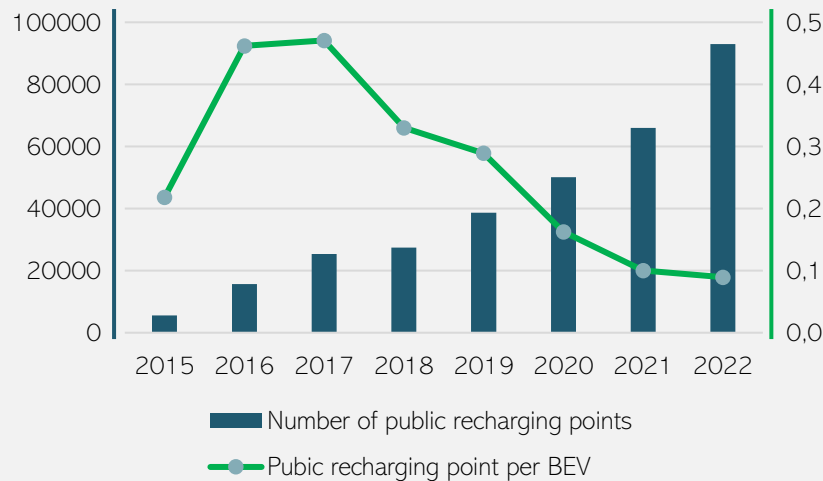
Recharging infra

- €130 billion for infrastructure development, tax cuts, and further subsidies.
- BEV owners are exempt from declaring charging their cars at their employer's premises as a cash benefit in their income tax return.
- 900 EUR residential support program is no longer available.

Percentage of BEV registrations of total



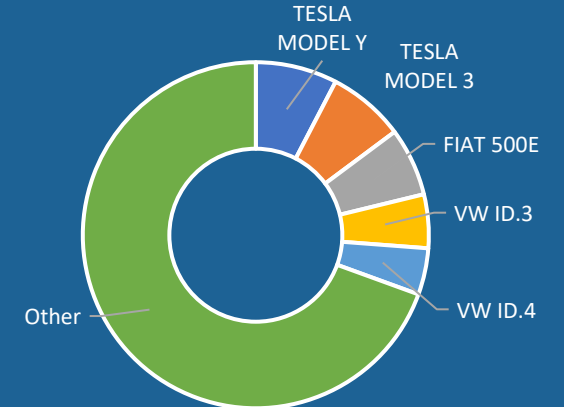
Recharging infrastructure (AC & DC)



Ambitions

- 15 million BEVs (M1) by 2030.
- 50k recharging points by 2025. 1M recharging points 2030 (DC focus).
- 3 billion investment to large scale battery production value chain.

TOP5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 1.115, 2026: EUR 1.115



BIK/yr VW Golf 2023: EUR 3.708, 2026: EUR 3.708

Observations

- Purchase subsidies will decrease to max. € 4,500 in 2024.
- The high growth of BEV registrations in 2022 mostly likely happened due to expected subsidy cuts. 2023 YTD (March) shows slight slow-down.
- 2022 saw a big increase in public DC chargers. 32

Germany



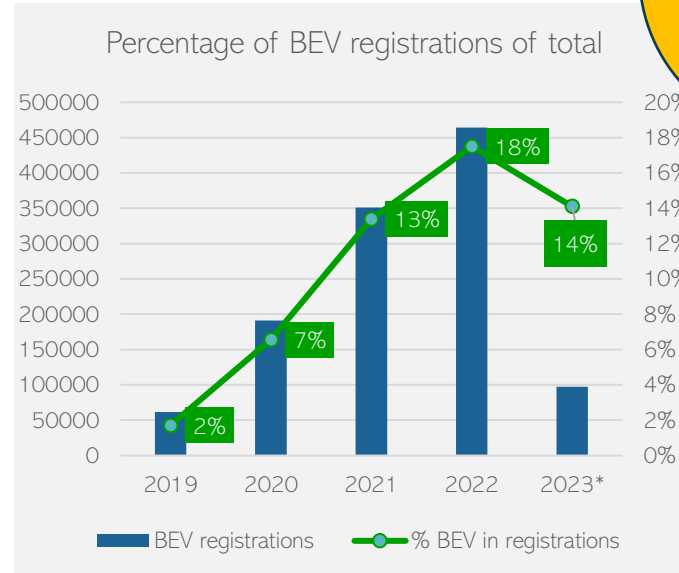
German subsidy program

BEVs max € 40,000 price (2023):

- € 6,750 for purchase (2023) was € 9,000 in '22

BEVs max € 65,000 price (2023):

- € 4,500 for purchase (2023) was € 7,500 in '22



Drop in volumes and market share in 2023 Q1

Targeting:

- Smaller segments, due to high subsidy on amortisation, which matters more for Economy segment vehicles.
- No differentiation between private and business.
- No differentiation on household income.

Source: EAFO(2023)



Purchase subsidy

- No national or regional purchase subsidy available or planned as of 2023.
- Some cities offer purchase subsidies (€ 4,000)

Registration tax

Flanders:
No registration tax for BEVs

Wallonia and Brussels:
Minimum amount (min: € 62, max: € 4960) for BEVs.

BiK Tax

- Fixed minimum rate of 4% (max.. 18%, minimum € 1,400 per year.
- Formula: list price vehicle x age % x CO2 % x 6/7. The base % CO2 is 5,5%, with emissions of 91 g/km, for every gram higher or lower 0,1% is added or deducted.

Road tax

Flanders:
No road tax for BEVs

Wallonia and Brussels:
Minimum amount for BEVs.

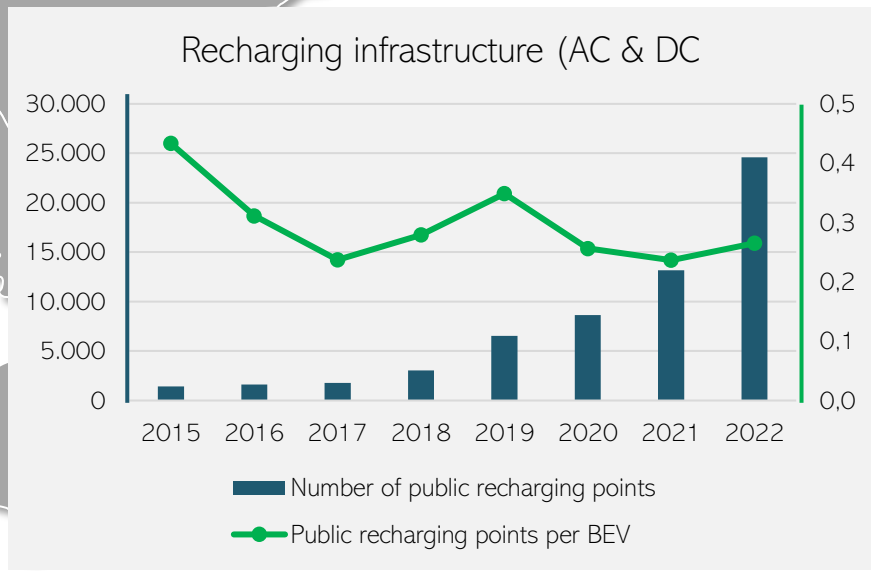
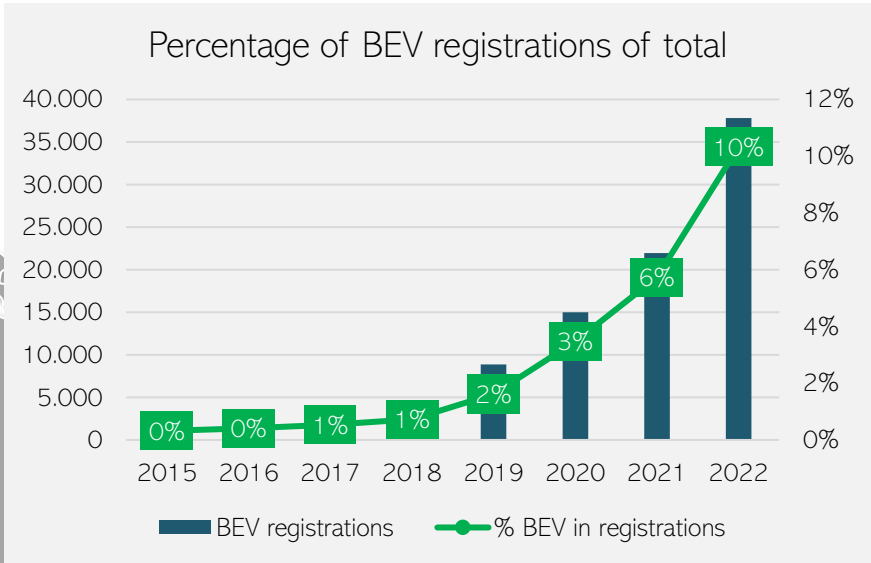
Company car tax

- BEV cars will be 100% tax deductible by 2026.
- For BEVs, deductibility will taper from 100% in 2026 to 67.5% in 2031.
- Tax deductibility for ICE cars purchased between July 2023 and Dec 2025 will decrease over time. Maximum deductibility will be 75% in 2025, 50% in 2026, 25% in 2027, and 0% in 2028.

Home charging

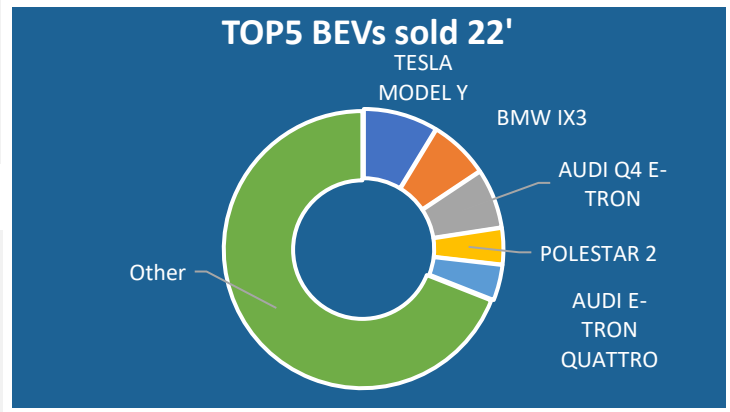
Home:
2023: 30% tax deduction (max. € 1,500)
2024: 15% tax deduction

Company:
150% cost deduction until 2024



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.



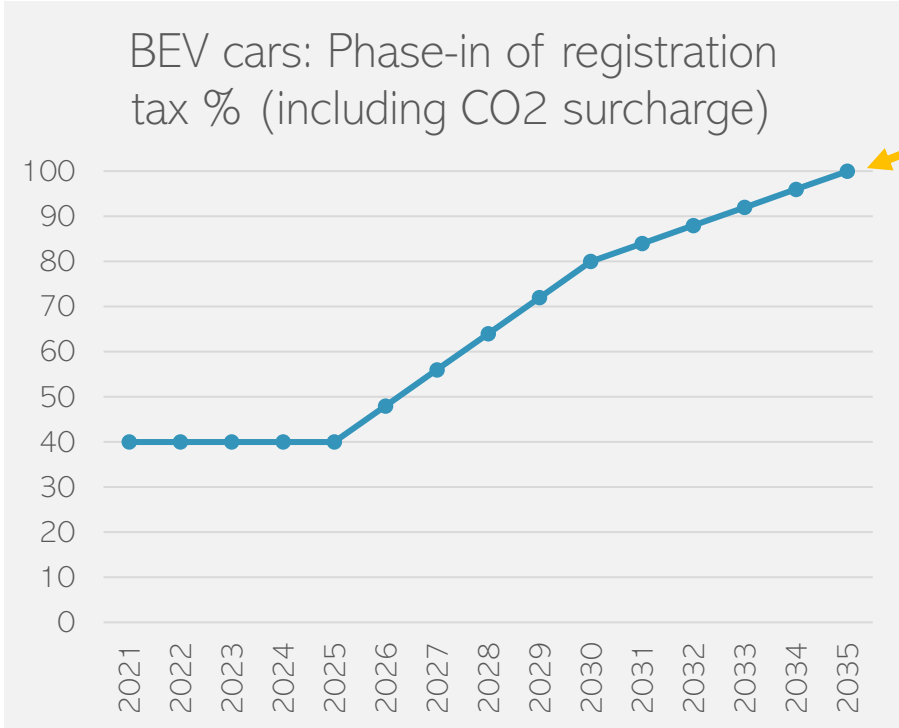
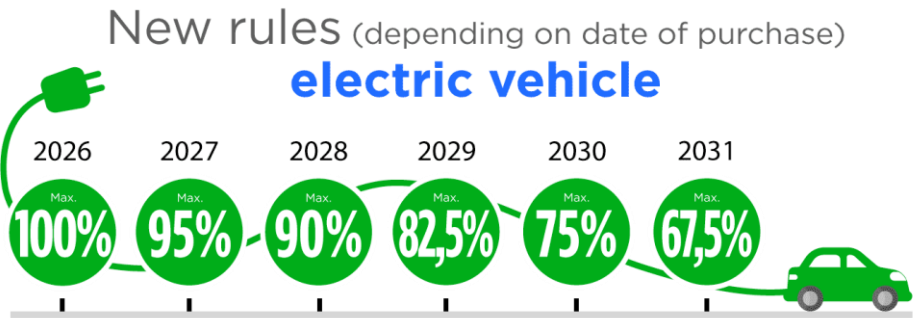
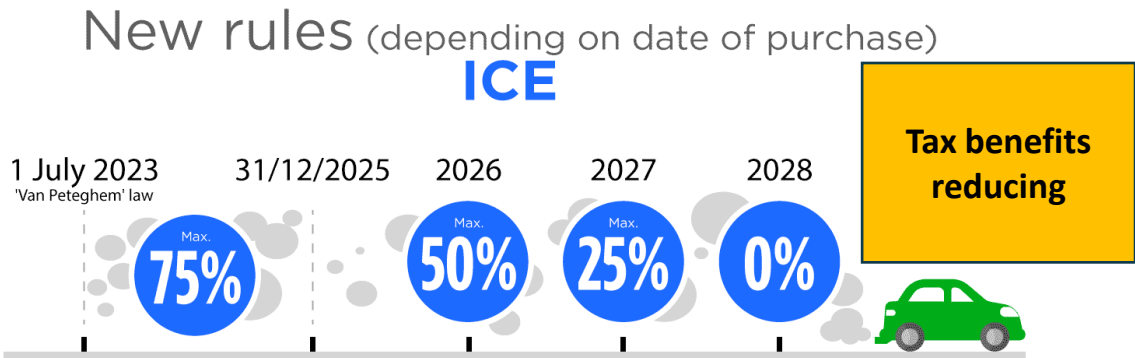
Observations

- Company car tax deductibility have a clear vision for BEV and ICE cars until 2031.
- Belgium has more governmental levels than other European countries, this leads to different incentive programs in different parts of Belgium.
- Charging point density has been relatively stable. Home charging tax cuts available until 2024.

Premature Curtailment of Incentives: Long-term and predictable incentive policies are driving BEV sales growth.

Belgium gradually phasing out incentives for BEVs, and increasing financial burdens on ICE cars

Denmark gradually reduces incentives for BEVs until 2035



No more tax benefit from 2035

Sweden - Overview

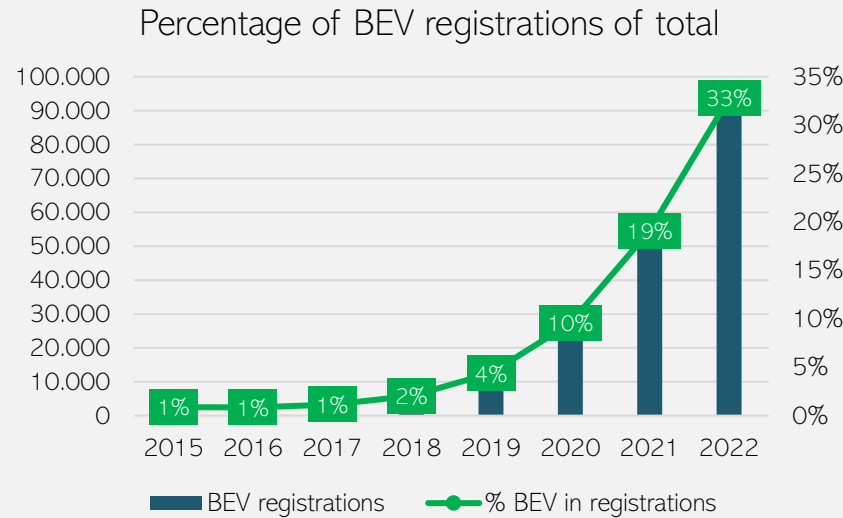


Purchase subsidy

- No subsidies available for cars registered after 8th November 2022.
- BEVs enter traffic in 2023, the bonus amount is reduced to € 4,365 if it was registered before 2022 November (stock models).
- From 2023, max 30g CO2/km emission cars are eligible.

Road Tax (2023)

- BEVs pay lowest amount, appx. € 32.
- VW Golf pays € 355 annually.



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.

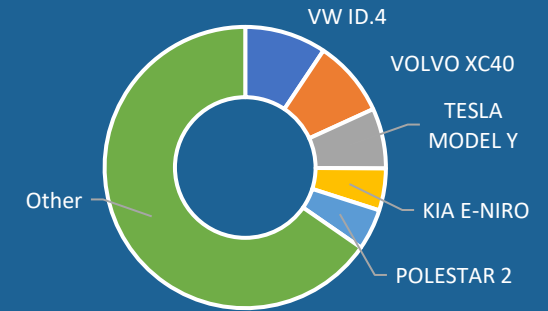
BiK taxation

- 270 EUR benefit to VW ID.3
- 50% discount to the tax base calculation for BEVs.
- Max € 30,550 reduction of tax base.

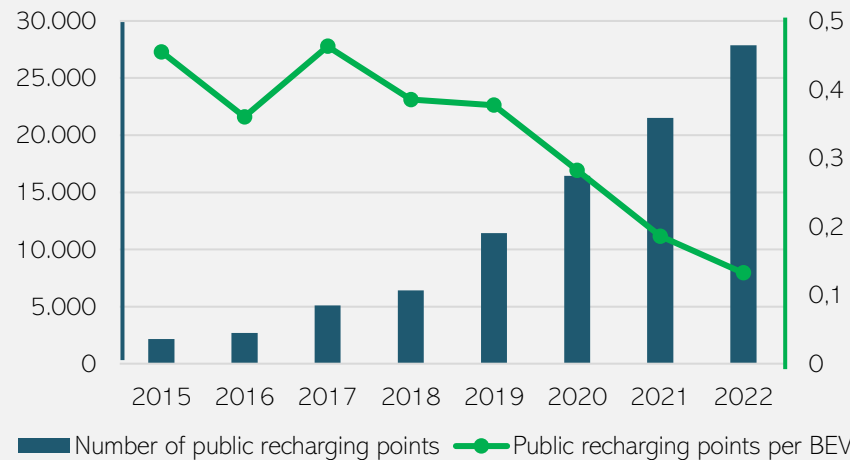
Circulation tax

- BEV exemption for 5 years,
- €170 benefit per year.

TOP5 BEVs sold 22'



Recharging infrastructure (AC & DC)



BIK/yr VW ID 3 2023: EUR 3.333, 2026: EUR 3.333



BIK/yr VW Golf 2023: EUR 3.603, 2026: EUR 3.603

Observations

- Sweden is reducing benefit of BEVs over petrol and diesel cars sooner than other countries, due to budgetary restrains (to balance bonus malus) and balanced price differences.
- Larger and luxury car segments are now more taxed and excluded from benefits to promote smaller vehicles.
- Dealerships and industry associations reported sudden disinterest towards BEVs after the subsidy disappeared.

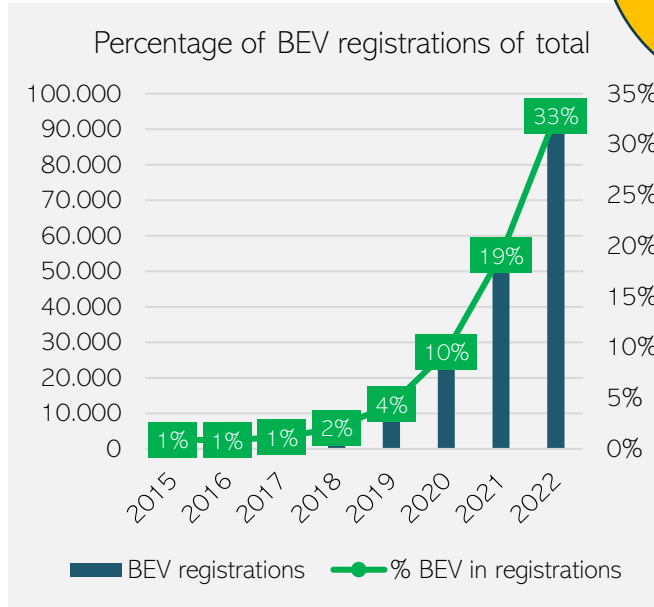
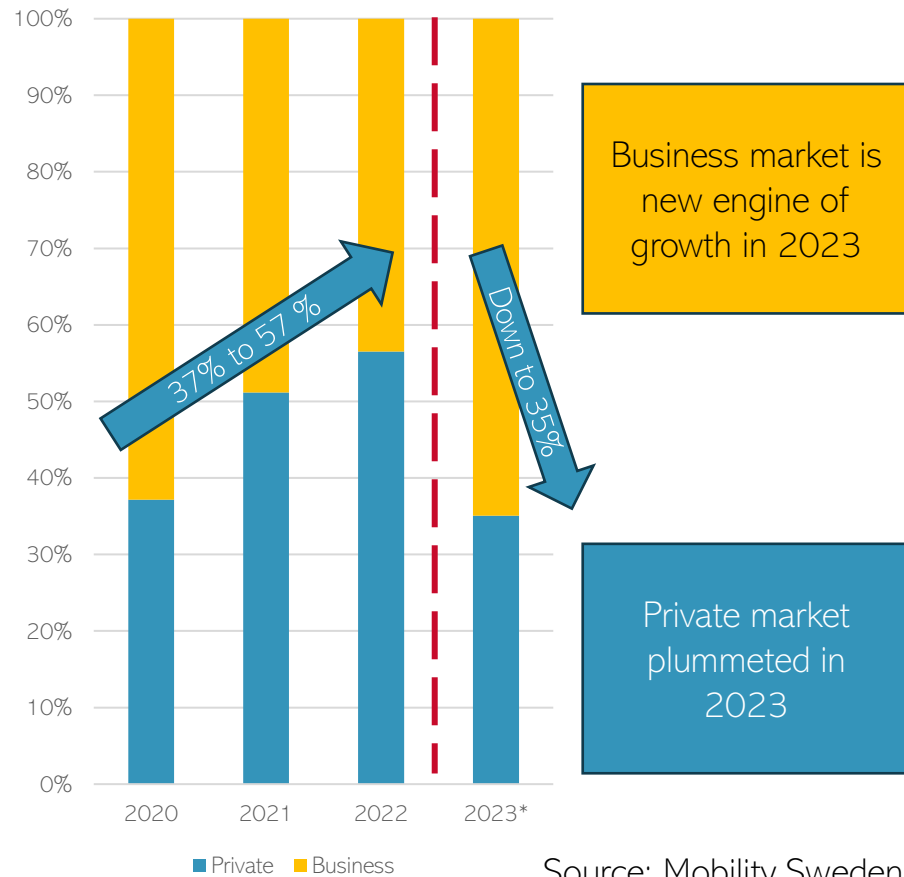
Sweden stopped 6000 EUR subsidy on a short notice

Result: collapsing private market in 2023, growing business market

Sweden



2022 Nov: 6000 EUR Subsidy phased out



Increase to **36% market share and sales volumes in 2023 Q1**

Sweden targeted the private market with purchase subsidy, which collapsed after phasing it out, and business market took over, growth engine role.

Market share still growing in 2023!

Austria - Overview



Purchase subsidies (until 03/24)

Funding rates

- BEV subsidy amount for private: € 5.000 (€ 3,000 federal + € 2,000 importer) - same in '22
- BEV subsidy amount for business: € 2.000 – € 4,000 in '22

Addition conditions

- BEV list price cap: € 60.000
- Max 50% of list price
- Min 60 km WLTP
- Max 12 months since 1st reg.
- Budget: € 32 million

Registration tax

- Pollution tax (NoVA): 100% exemption. Max. 70% for ICE ('23), 80% in '24.
- Motor insurance tax: 100% exemption.

Recharging infrastructure

For private

- € 600 for single homes (max. 50% of the expenses)
- € 900 for individual installations and €1800 for shared installations (max. 50% of the expenses)

For companies:

- €900 for a 11/22kW charger (max 30% of the expenses).

Investment premium

- 14% investment bonus for companies purchasing BEVs
- Max. € 60,000 list price

VAT benefits (2023):

Below €40.000 list price:

- VAT is fully deductible

Between €40k and €80k of list price:

- Amount exceeding €40k is taxable

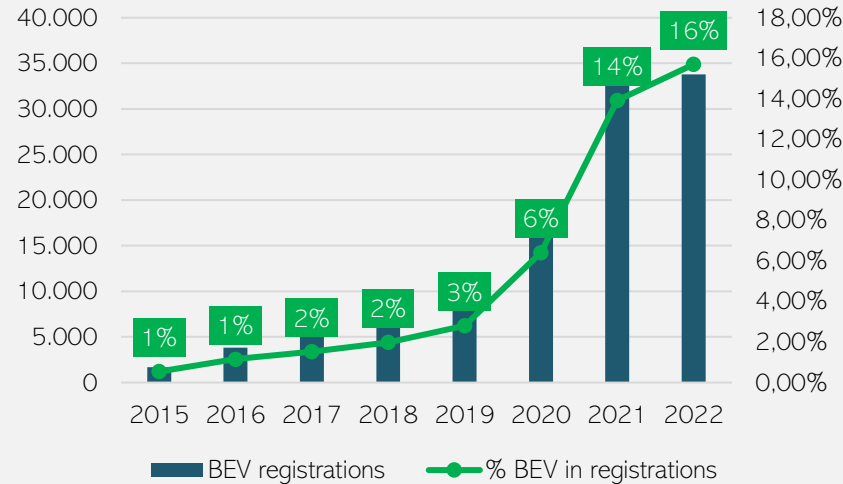
List price above €80k:

- No VAT deduction available

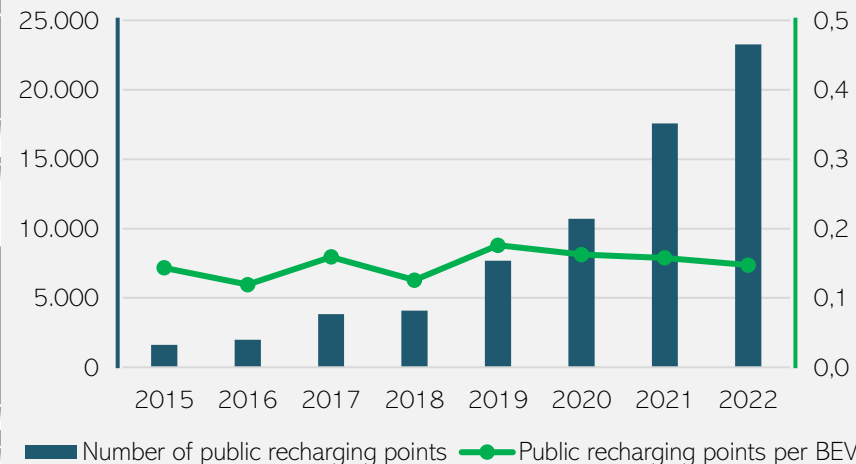
BiK Tax

- 100% exemption of BiK taxation for BEVs.
- ICE cars with CO2 emission <132 gr/km taxed at 1,5%, All other cars taxed at 2%(max. € 960 per month).
- Emission limit reduces to 126 g CO2/km until 2026.

Percentage of BEV registrations of total



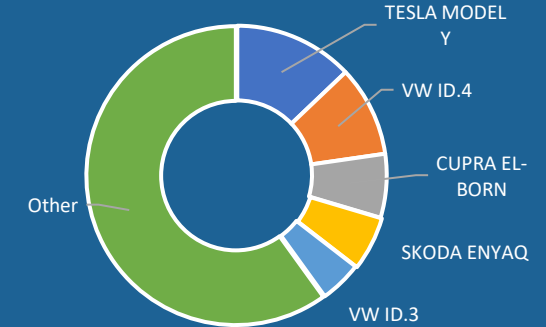
Recharging infrastructure (AC & DC)



Ambitions

- The Austrian government aims to be carbon neutral by 2040. The ambitious plan includes heavy decarbonization of the mobility sector.
- 100% share of ZEV's in new car and light commercial vehicles by 2030.

TOP5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 0, 2026: EUR 0



BIK/yr VW Golf 2023: EUR 2.282, 2026: EUR 2.282

Observations

- The Austrian government, maintained subsidies in 2023 without significant changes – list price caps applied still.
- Despite significant subsidy programs for vehicles and infrastructure, growth decreased in 2022.

Denmark - Overview



Registration tax

No reg. tax for BEV, for PHEV cca. € 11,000, for ICE (VW Golf) cca. 14,000 EUR

1. Taxable value:

List price of BEV – battery reduction

Battery deduction

- 2023: - €120/kWh (175 in '22)
 - 2024: - €67/kWh
 - 2025: - €0/kWh
- Max. 45 kWh reduction.

3 phase for tax base calculation:

- 1st € 9,100: 25%
- 2nd € 19,200: 85%
- 3rd above € 19,200: 150%

2. CO2 allowance

- 100% exemption for BEVs
- 0-117 g CO2 / km: - € 35 per g CO2
- 117-150 g CO2 / km: - € 70 per g CO2
- 150 g + CO2 / km: - € 133 per g CO2

3. Phase-in deduction for BEVs

- Until 2025: 40%
- 2025-2035: gradual increase to 100%

4. Basic deduction

€ -22,150 for BEVs (only € 3,000 for ICE cars)

Ownership tax (weight, CO2)

- Based on weight and emission
- BEVs pay min. amount: €92/year (VW Golf €330 as reference)

BiK Tax

Value of the car (2023):

- 23,5% until € 40,200
- 21,5% for exceeding amount
- 2024: 23% / 22%
- 2025: 22,5% / 22,5%

Environmental allowance

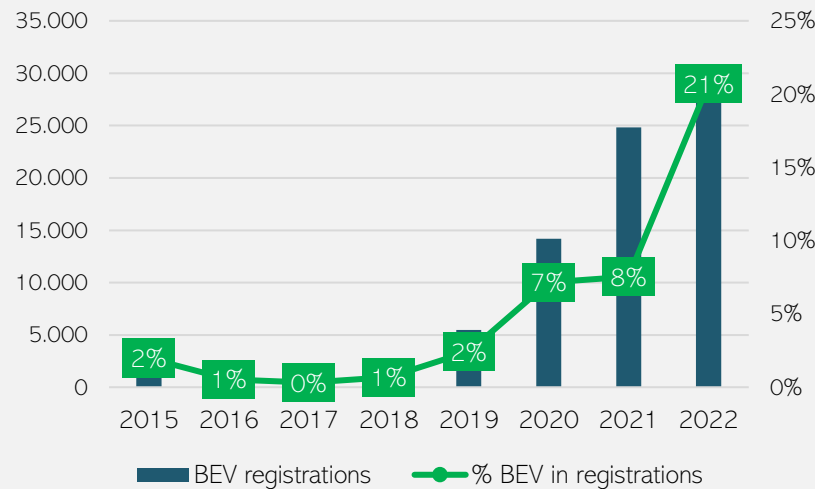
- 450% of green ownership tax
- BEVs are exempt

Monthly tax: (value of car + environmental allowance)/12

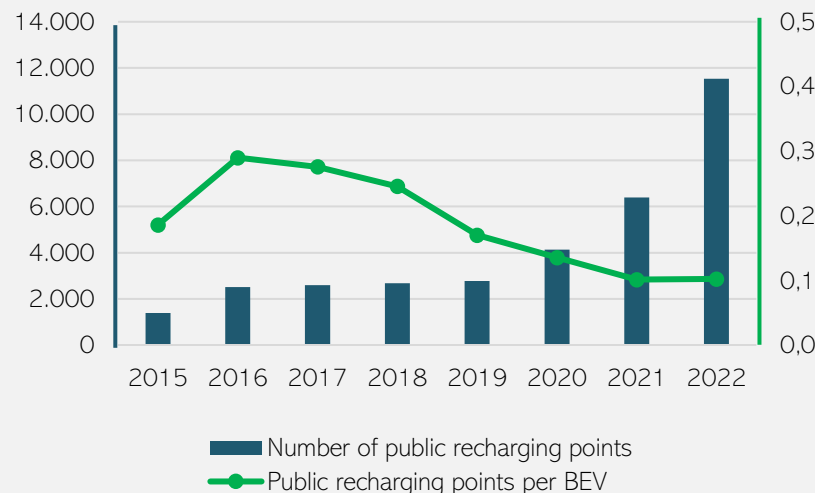
Recharging infra

- Tax-free BEV charging at work (2023 - 2026)
- Housing association charge point installation subsidy (2023-2025)
- 25% of total costs.

Percentage of BEV registrations of total



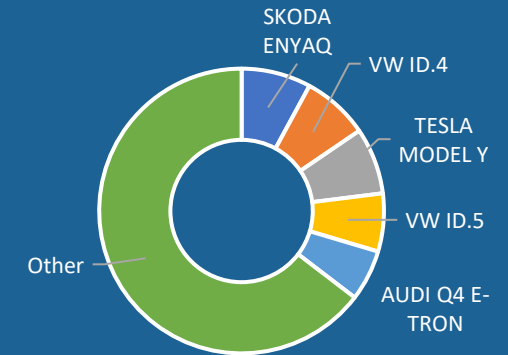
Recharging infrastructure (AC & DC)



Ambitions

- The Danish government is aiming to put at least 1 million BEVs on the road by 2030. In this year they also aim to ban ICE vehicles
- Aim to ban PHEV' sales from 2035 onwards and a fossil free car park by 2050

TOP5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 5.232, 2026: EUR 4.983



BIK/yr VW Golf 2023: EUR 5.940, 2026: EUR 5.964

Observations

- Changing incentives made a huge impact on both sales share and growth in 2022 and in Q1 2023, making Denmark leader in Europe.
- Incentive phase out targets have a long vision in Denmark (until 2035).
- Denmark lowered their tax rebates on PHEVs, leading to a significant increased share of BEVs in 2022.

Italy - Overview



Purchase subsidy (2023 - 2024)

Private individuals

For income <€ 30.000

- Subsidy amount: €4500
- Additional scrappage bonus: €3000

For income above €30.000

- Subsidy amount: € 3000
- Additional scrappage bonus: €2000

Additional conditions

- Only brand new
- Businesses can lease
- Max. € 35.000 net retail price
- 1 year holding period, 2 years for business lease

Budget of € 250 million for BEVs in 2022, 2023 and 2024.

Regional subsidy (Lombardy):

- Max. € 4.000 (€1,000 without scrapping)
- Max. € 45.000 net retail price

Charging infra

Natural and legal persons:

- 80% subsidy of total costs (max. € 1500).
- Budget: €40 million

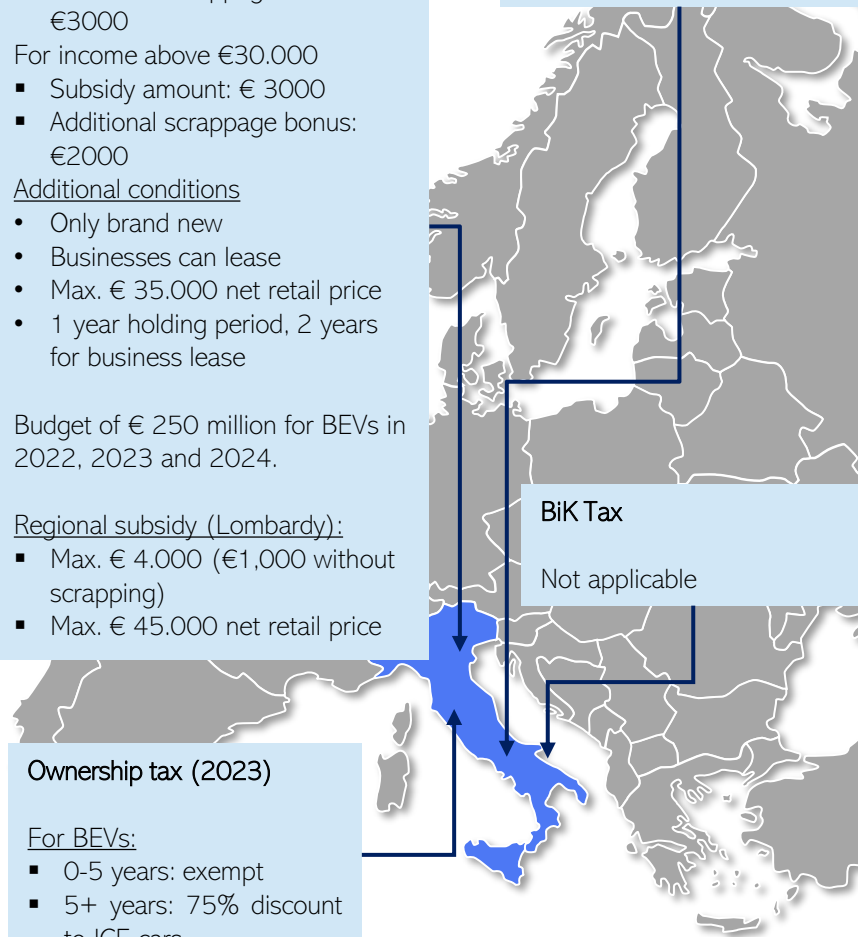
BiK Tax

Not applicable

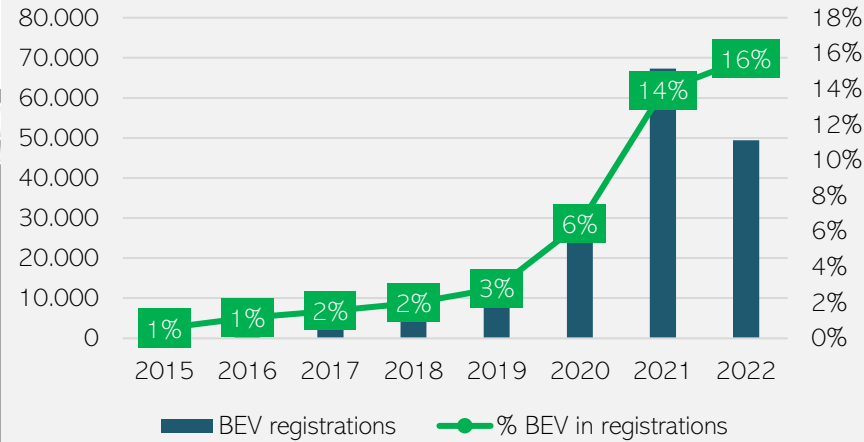
Ownership tax (2023)

For BEVs:

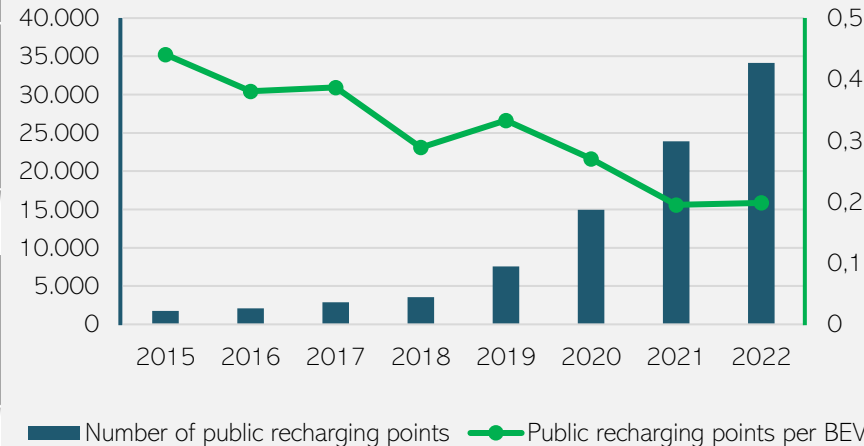
- 0-5 years: exempt
- 5+ years: 75% discount to ICE cars



Percentage of BEV registrations of total



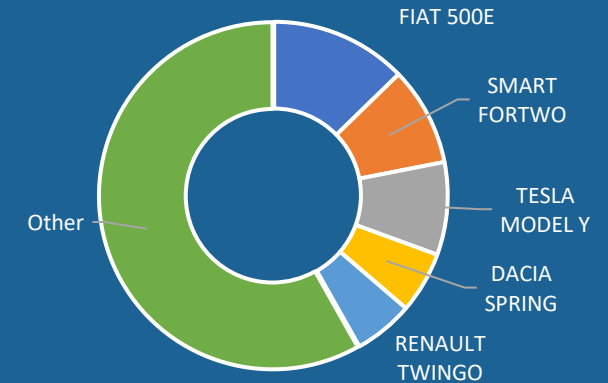
Recharging infrastructure (AC & DC)



Ambitions

- Italy aims to have at least 6 million electric vehicles (BEV + PHEV) on its roads by 2030
- 4,500 DC fast charging points and 7,000 DC ultra-fast charging points by 2030.

TOP5 BEVs sold 22'



BIK/yr VW ID 3 2023: EUR 0, 2026: EUR 0



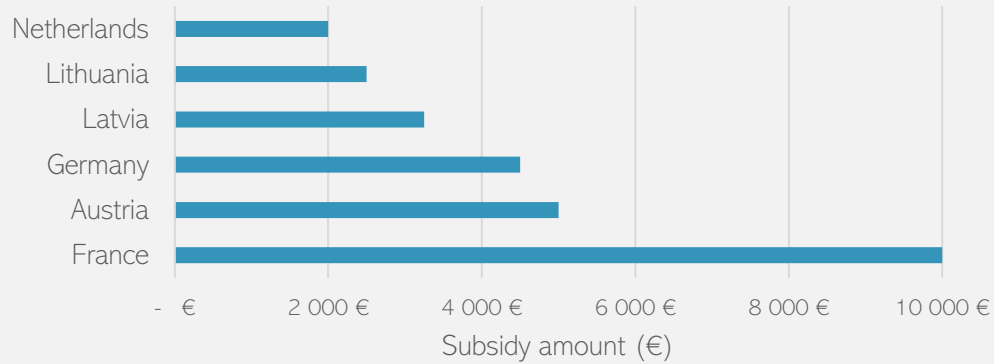
BIK/yr VW Golf 2023: EUR 0, 2026: EUR 0

Observations

- Abrupt end of incentives and political/economic uncertainty discouraged BEV adoption. Low public funding allocated. Consumers saw disruption of local economy.
- Limited availability of affordable small BEVs and underdeveloped charging infrastructure halted sales
- Increased competition from PHEVs reduced BEV demand.

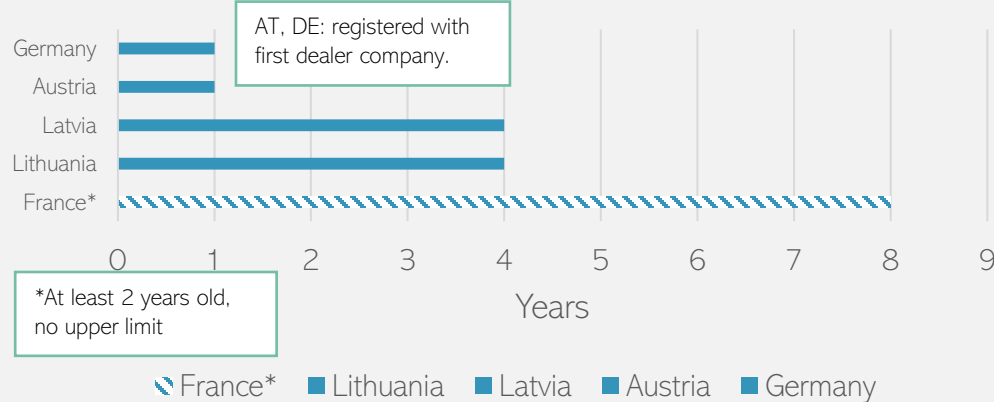
Overview of used vehicle subsidies

Maximum funding for used BEVs (M1, private person)



For France: Ecological Bonus (max. € 1,000) + Conversion Bonus (max € 6,000) + Bonus for residents in Low Emission Zones (max € 1,000 national + € 2,000 Municipal bonus) = max. € 10,000.

Maximum age of vehicle



France

Ecological bonus
€1,000 bonus for private buyers.

Vehicle conditions:

- 2 years ownership
- Already in France for min. 2 years
- BEV of FCEV
- Only one payment per 3 years

Optional extra amount on top of € 1,000

- Conversion (scrappage) bonus:** €2,500 - €6,000 based on income and vehicle type.
- Bonus for residents or workers in **Low Emission Zones (LEZ):** €1,000 for those who live or work in a LEZs. Extra bonus from local authority: max: €2,000.

Germany*

Purchase subsidy

- Used BEVs max € 65,000 purchase price (2023): € 4,500 for purchase or 2-year lease.
- Max 1 year old registration to the dealership, max. 15k mileage.

Latvia

Purchase subsidy

- €2,250 for used BEVs

Scrappage bonus

- Extra €1,000 to the subsidy

Vehicle conditions:

- Purchase price max. €50,000
- Max. 4 years old vehicle

Budget: € 10 M (2023)

Lithuania

Purchase subsidy

- €2,250 for used BEVs

Vehicle conditions:

- Min. 4 years ownership

Budget: €50 million (2022-2026) or 10 million per year.

Austria*

Purchase subsidy

- €5,000 for used BEVs for private, €2,000 for company purchases

Vehicle conditions:

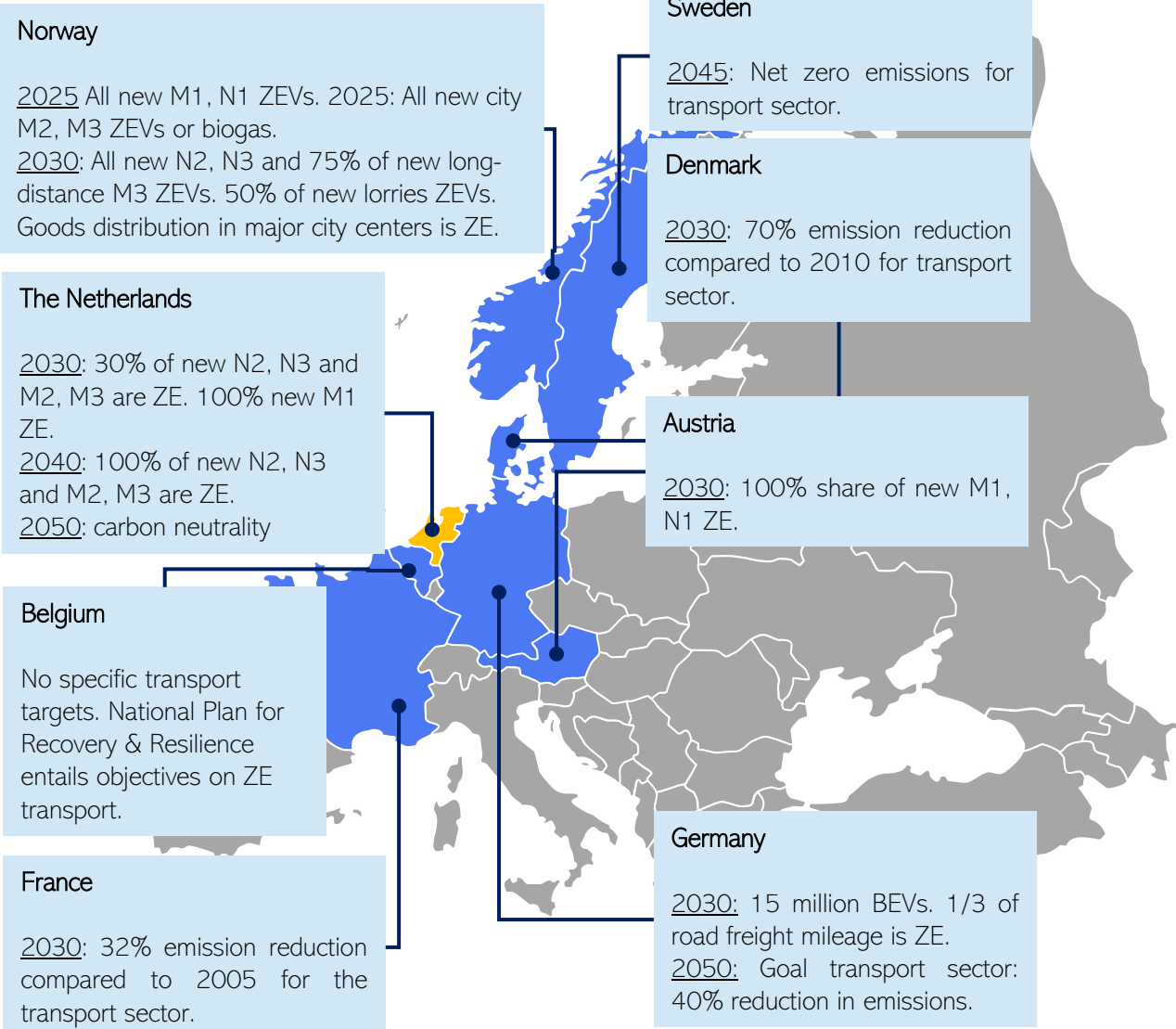
- Max 1 year old registration to the dealership, no minimum age required.

- New and used BEV subsidy available
- Only new BEV subsidy available
- No subsidy available as of May 2023

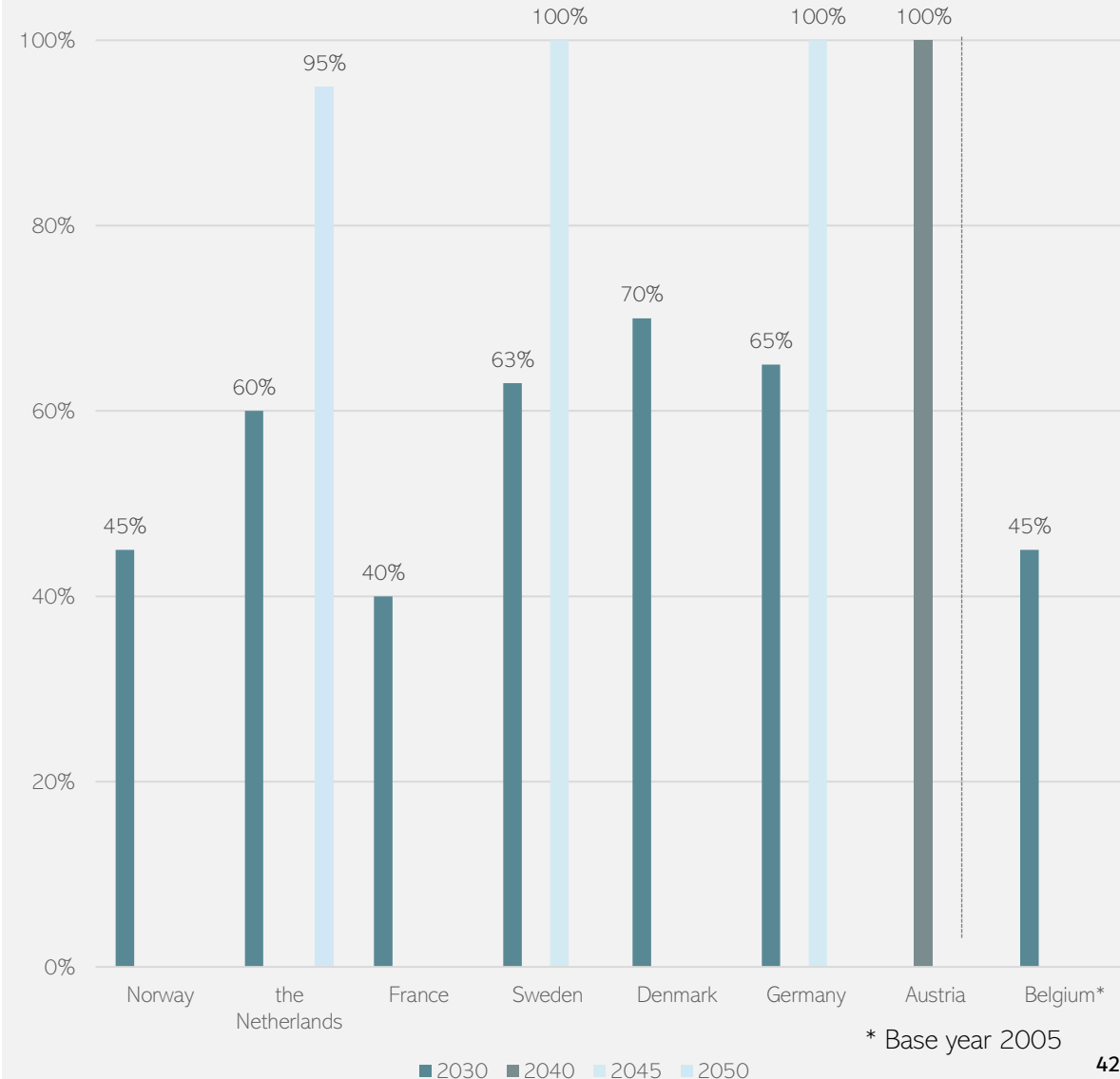
*For Germany and Austria, technically the purchase subsidy is also available for BEVs no older than 1 years.

Emission reduction goals in transport sector and general emission reduction goals

Transport Sector Emission Reduction Goals, Sales Targets



Goals of emission reduction (base year 1990)



Overview of road tax system in the Netherlands and researched countries

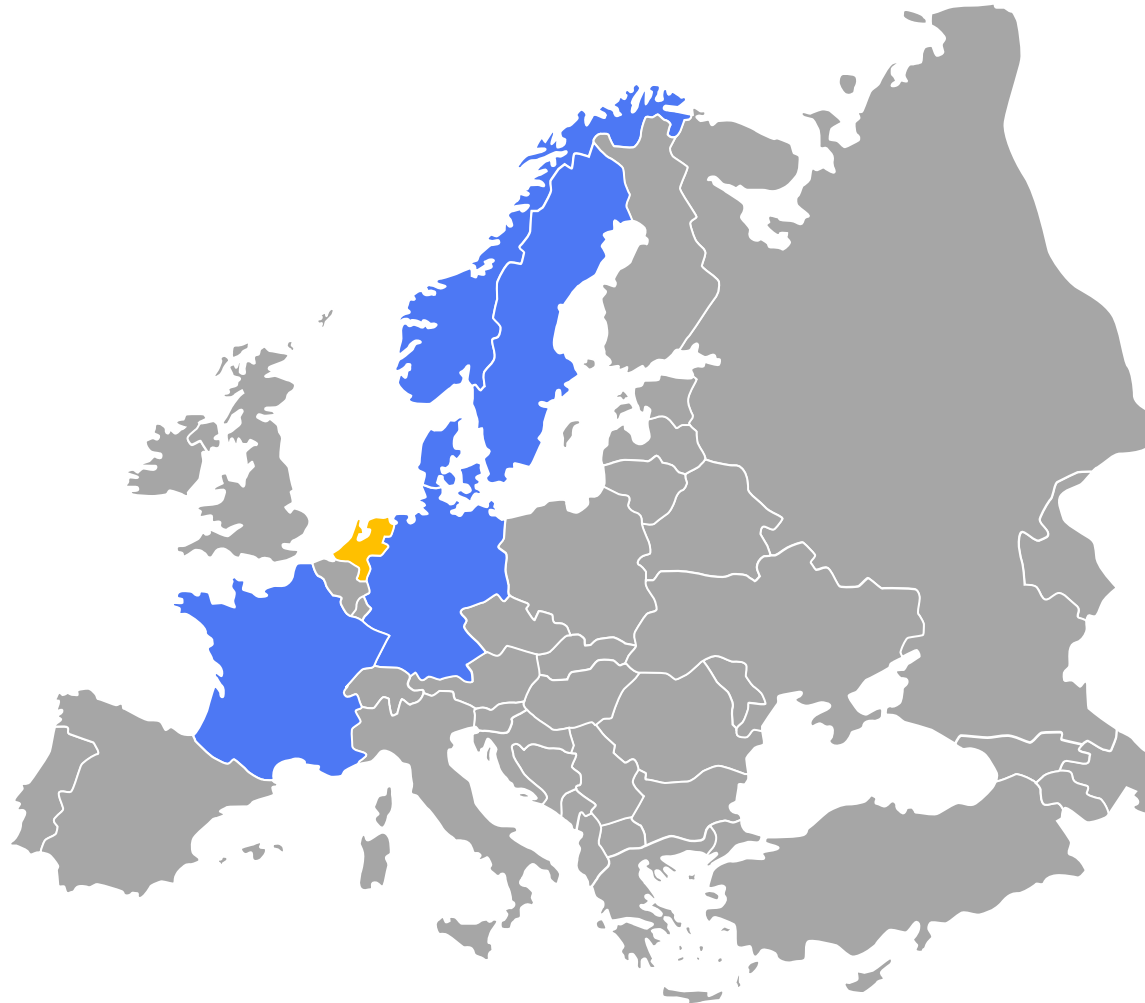


Country	BEVs are exempted from road tax	Incentive phase-out Timeline	Tax calculation method	Petrol rate Reference car (VW Golf – 124 g CO ₂ /km, 96 kW, 1302 kg) (year)	BEV rate (year)	Difference between ICE and BEV (year)
Netherlands	☑	2024.12.31	For ICEV cars the average amount is in between €20-€60 per month	€592	€0	€592
Italy	☑	First 5 years after registration. <i>2029 earliest.</i>	BEV: (rated kW/4)*tariff amount based on region Petrol/Diesel: rated kW*tariff amount based on region	€273 in Rome	First 5 years: €0 From year 5: 75% discount	€273
France	☑	No final date announced	Triggering limit: 123g CO ₂ /km = €50 (from 128g in 2022) Above this limit every emission amount has a pre-determined tax value Above 1800 kg: €10/kg – 100% discount for BEVs	€354 (one-off tax) <u>New VW Golf emission is low</u>	€0 in Paris	€354
Sweden	☑	No final date announced <u>VL: 2030</u>	75g-125g CO ₂ /km: € 9 /gram 125g < CO ₂ /km: € 11 /gram	€483 (first 3 years) €56 (after 3 years)	€31 <u>Basic amount</u> for every vehicle	€452
Norway	✗	2023.03.01	Annual road tax was replaced by traffic insurance tax since 2018. Fixed rate for every car below 7,5 tons. <u>(High reg. tax!)</u>	€260	€260	€0
Austria	☑	No final date announced	Based on engine kW, pre-determined EUR per kW based on certain brackets of performance. (Link)	€538	€0	€538
Germany	☑	2030.12.31	Petrol: 2€/100 cm ³ + CO ₂ value tax amount Diesel: 9.50€/100 cm ³ + CO ₂ value tax amount	€89	€0	€89
Denmark	☑	No final date announced. Until 2027 not increasing	Based on CO ₂ g/km emission (the pollutes pays), progressive scale. Electric cars pay the lowest amount. <u>(High reg. Tax!)</u>	€161	€99	€62 ⁴³

Overview of registration tax system in the Netherlands and researched countries



Country	BEVs are exempted from registration tax	Incentive phase-out Timeline	Tax calculation method	Petrol rate Reference car (VW Golf – 124 g CO2/km, 96 kW, 1302 kg) (year)	BEV rate (year)	Difference between ICE and BEV (year)
Netherlands	☑	2024.12.31	BPM	€4729	€0	€4729
Italy	✘	No final date announced <u>Depends on Region</u>	Imposta provinciale di trascrizione – IPT	€337	€337 in Rome <u>No increased rate</u>	€337
France	☑	No final date announced	Malus CO ²	€170	€0 in Paris	€170
Sweden	Not relevant	Not relevant	No registration tax at the purchase	-	-	-
Norway	☑	2025.12.31 <u>(planned)</u>	One-off registration tax: Tare weight tax + Basic fee for own weight + CO2 tax + NOx tax	€9510	€1635	€7875
Austria	☑	No final date announced	NoVA – CO2, kW, price based components.	€450	€0	€450
Germany	✘	Not relevant	Registration fees apply to all vehicles	€26.30	€26.30	€0
Denmark	☑	2034.12.31 Gradual decrease of discount	Based on CO2, weight, price, power train, vehicle category.	€14.000	0	€14.000

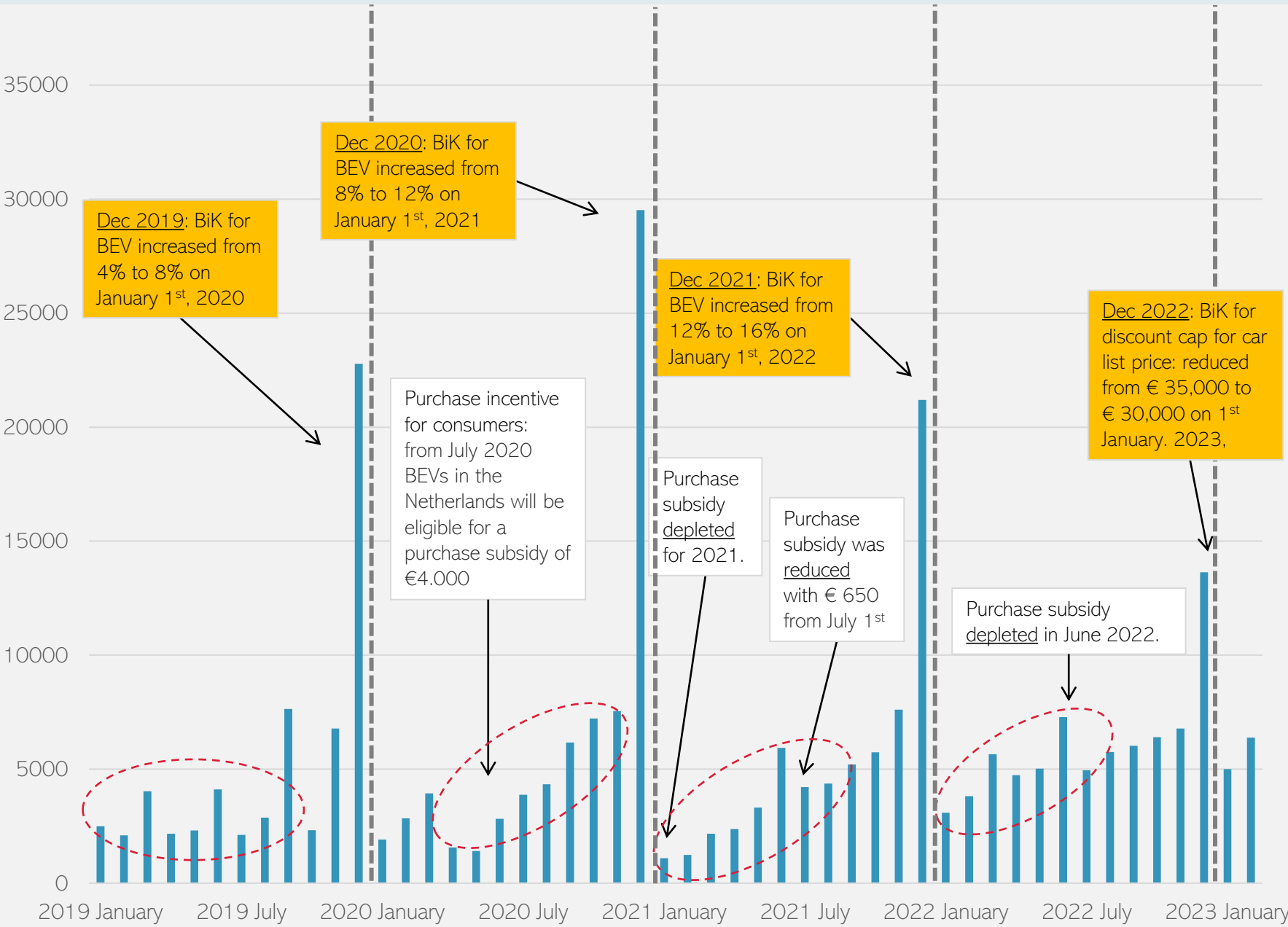


Conclusion on BEV incentives per country

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 ICE 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 person's 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.

Deep dive in effect of BEV policies

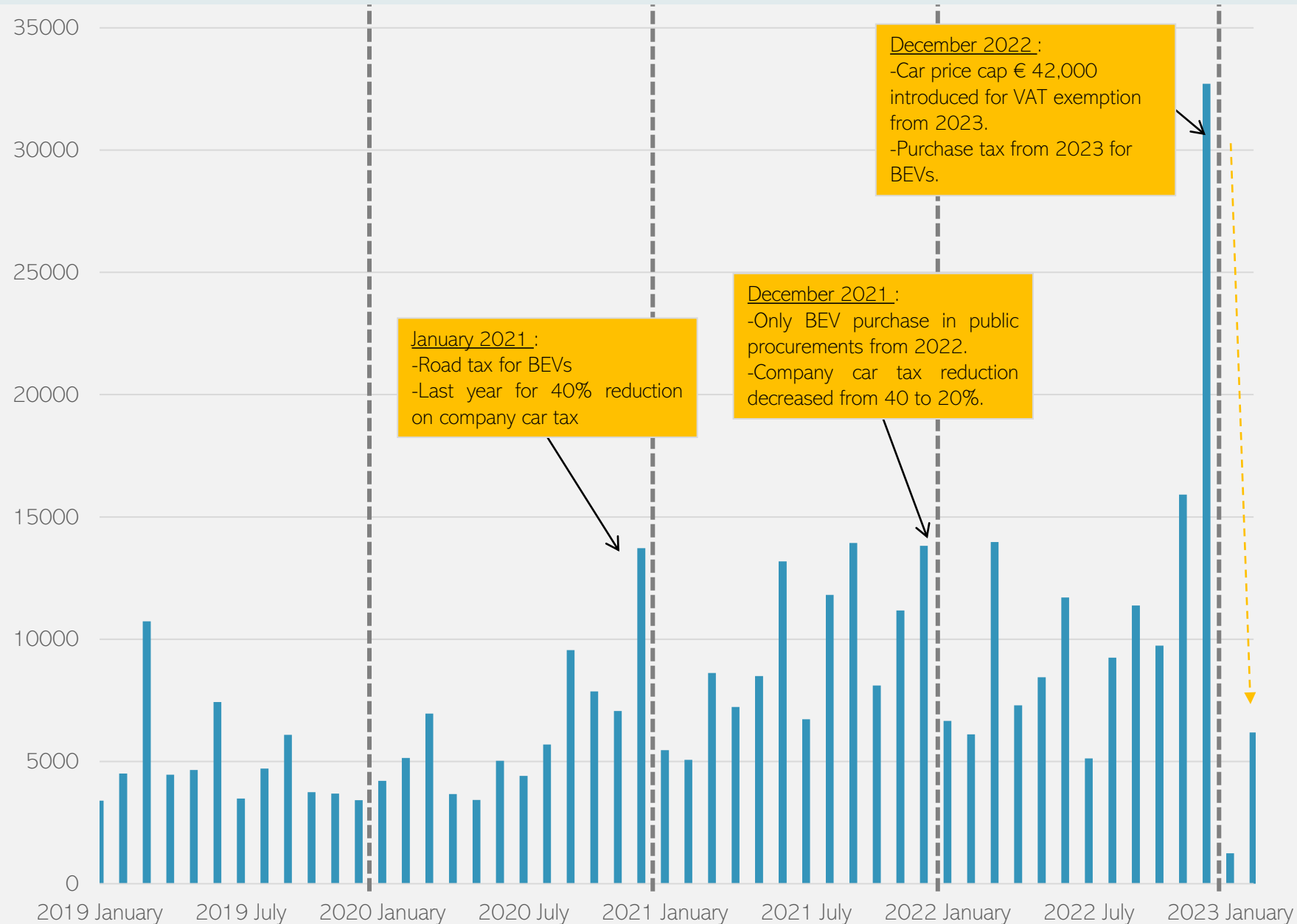
The Netherlands, Sweden, France, Germany, Norway, Denmark



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;
- The effect of the purchase subsidies is expressed in peak months when the budget was depleted (06/22), or amount reduced (06/21).
- Growing intra-year trend can be observed as deliveries are completed after purchase subsidy depletion.

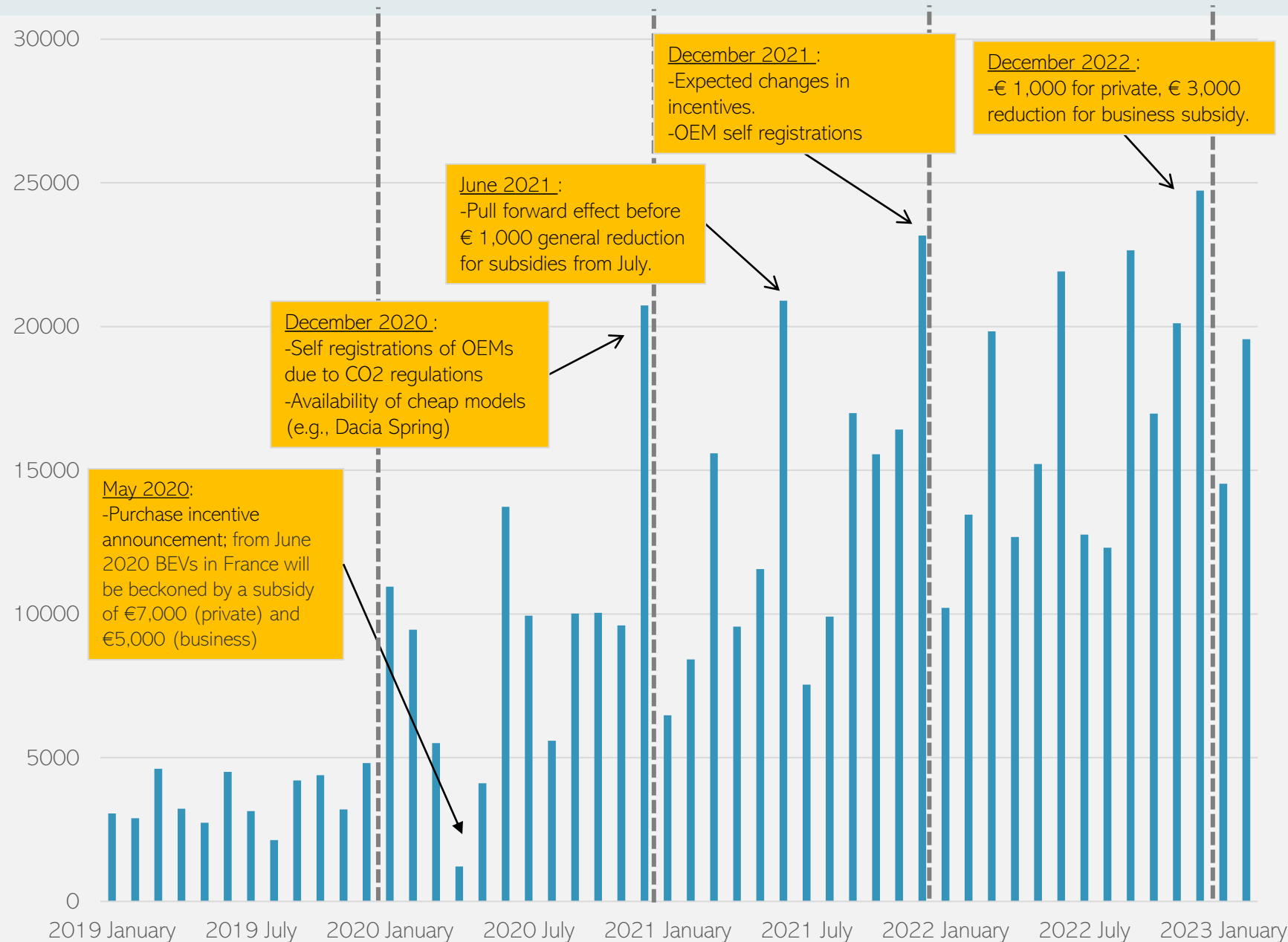
Norway - Chronology



Observations

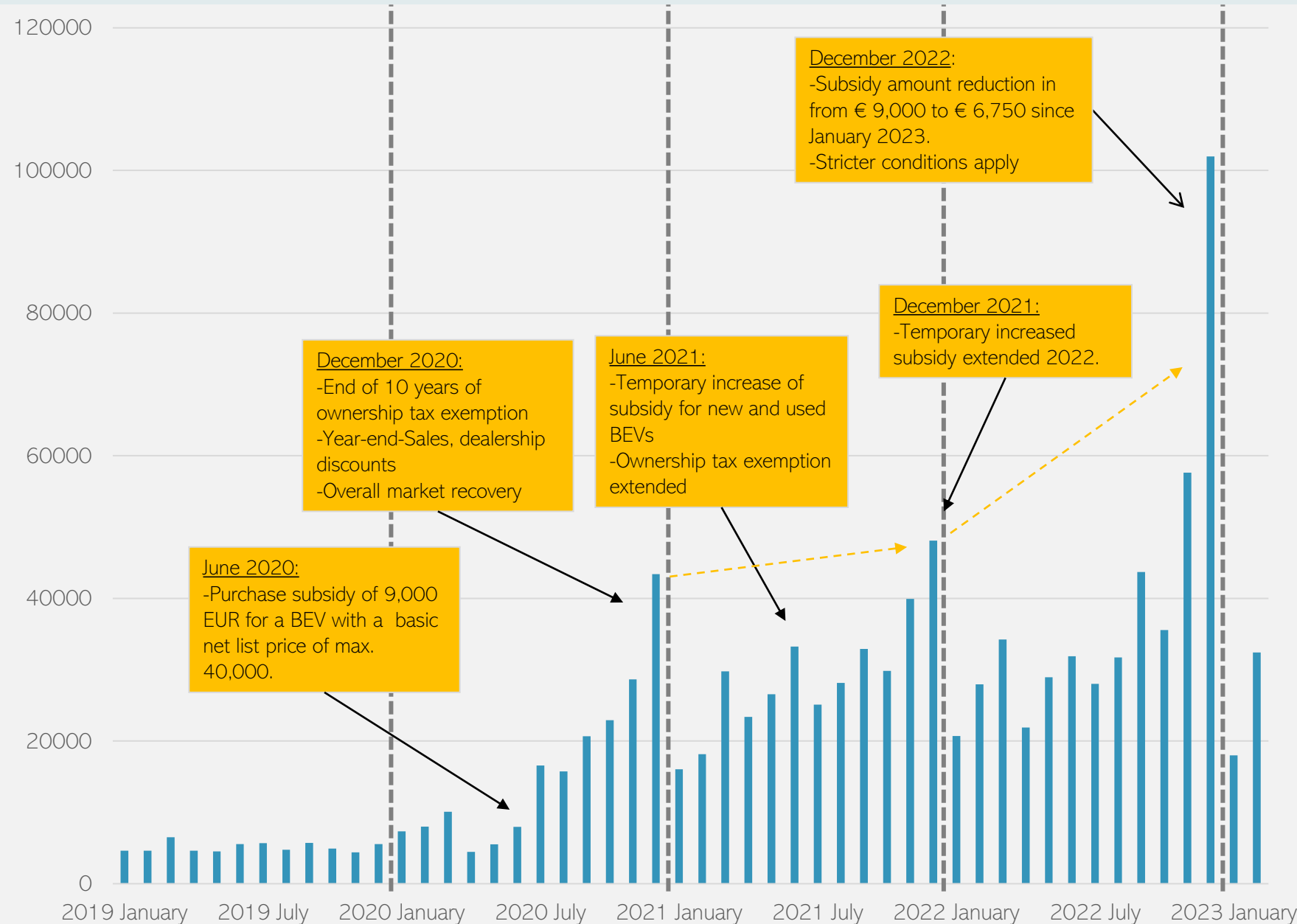
- 2023 January sales dropped to unprecedented levels since 2019. This indicates the significant impact of the VAT discount for luxury BEVs.
- December 2022 sales was an all-time-high record.
- End of year (December) sales peaked in the last 3 years, indicating changes in policies.

France - Chronology



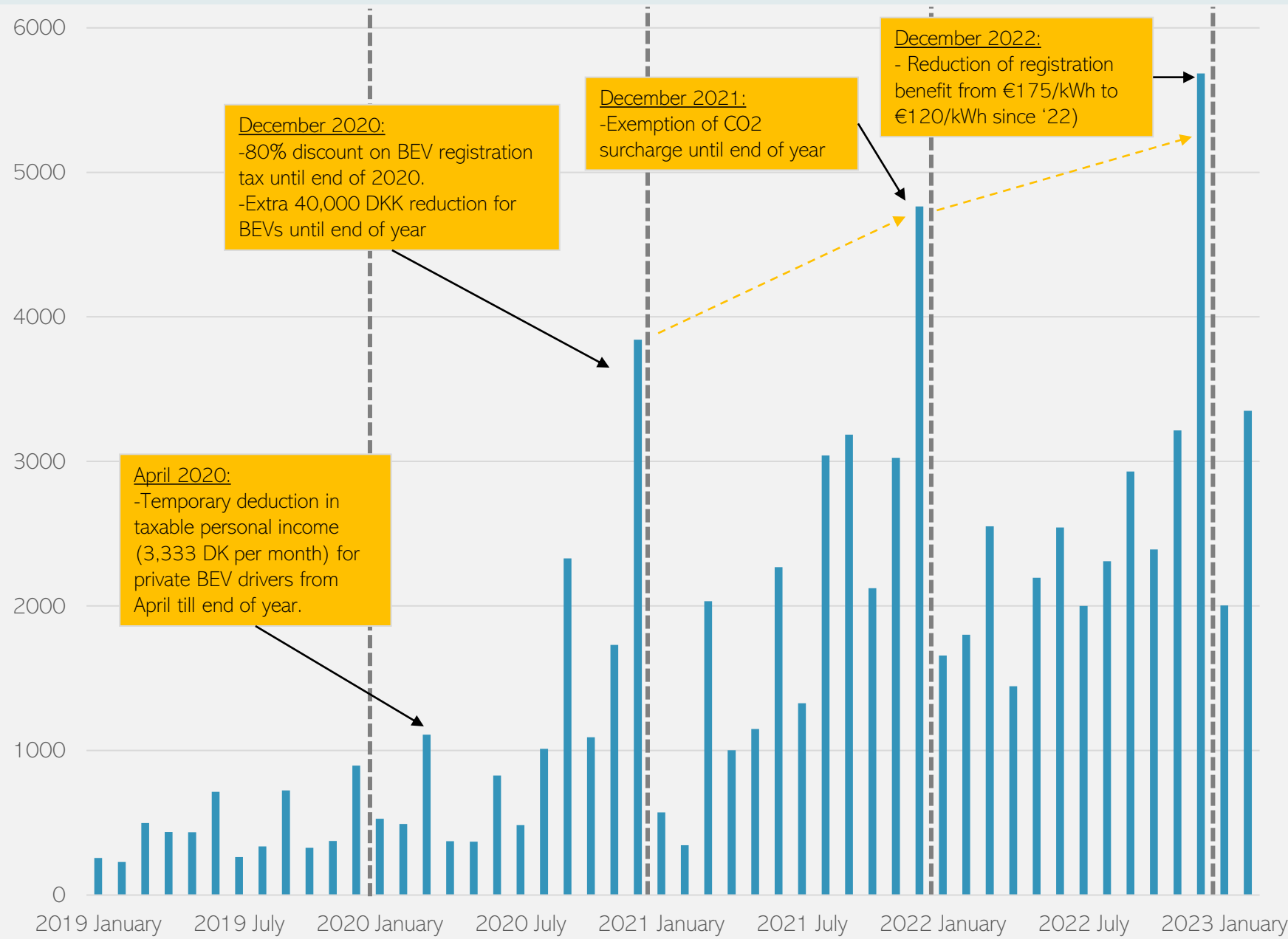
Observations

- The purchase subsidy kick started the steady growth in the increase of BEV registrations, since June 2022.
- Various pull forward effects can be observed prior reduction or limitation of subsidies.
- OEM self registrations in December distorts peak sales end of the year.
- The general unpredictability of incentives also boosted end of year sales.
- Availability of cheaper models also contributed to higher growth.



Observations

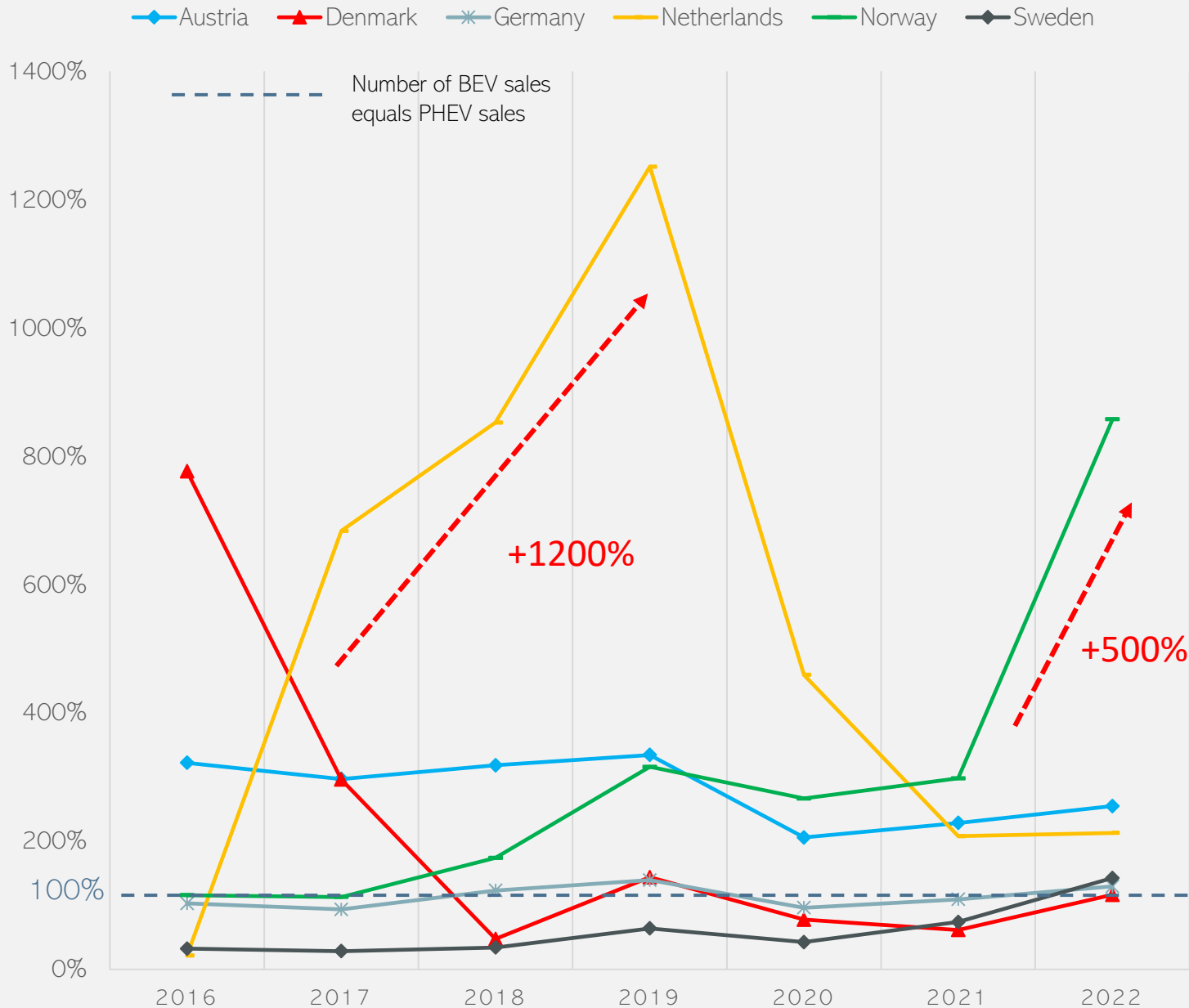
- Purchase subsidy had key impact on the BEV sales.
- Annual trend of sales showed growth, with peaks at December, then.
- The stricter conditions applying since 2023, lead to lowest registration since 2021, but February sales showed quick recovery.



Observations

- Registration tax benefits and BiK tax rebates had key impact on the BEV sales.
- BEV sales soared after reducing benefits for PHEVs in the registration tax and BiK.

Share of PHEVs and BEVs in sales (BEV sales / PHEV sales)



Observations

Besides solely focusing on BEV sales, the ratio of BEV to PHEV sales is also an important factor to consider, because the relatively high emissions of PHEV can jeopardize transport emission reduction targets.

The Netherlands achieved a significant shift from PHEVs to BEVs since 2016 to 2019, which stabilized in 2021 and 2022 at above 200%. This means that more than two times more BEVs are sold than PHEVs.

A notable example of successful shift in Norway, with 300% in 2021 jumping to 857% in 2022, when one-off tax on registration significantly increased for PHEVs (CO₂, NO_x components of the tax).

As another example, Denmark introduced the well predictable registration tax, yearly reducing benefits on various values, made the PHEVs overall less attractive.

Benchmarking the Netherlands

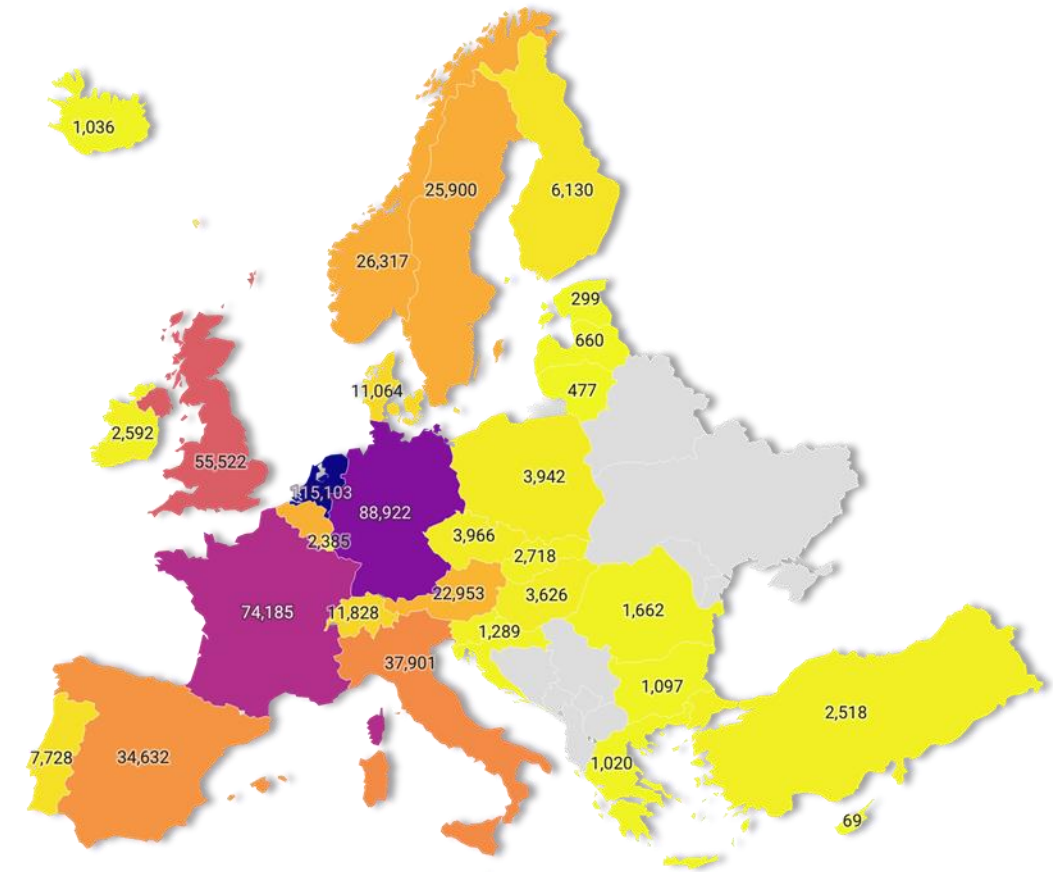
Market conditions, BEV sales and fleet
Development charging infrastructure
Effect on purchase price and TCO

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. Fast DC ($50 \text{ kW} \leq P < 150 \text{ kW}$) and Ultra-Fast ($150 \text{ kW} \leq P$) recharging points are also becoming pivotal on the TEN-T network.

Since 2021, the amount of public recharging points in the European Union has grown from 156,779 AC and 18,267 DC to 402,018 AC and 45,570 DC in 2022. The Level 1 – Ultra-fast DC recharging points (150 kW to 350 kW) grew significantly in 2022 (281%).

Number of public recharging points in Europe (2022)



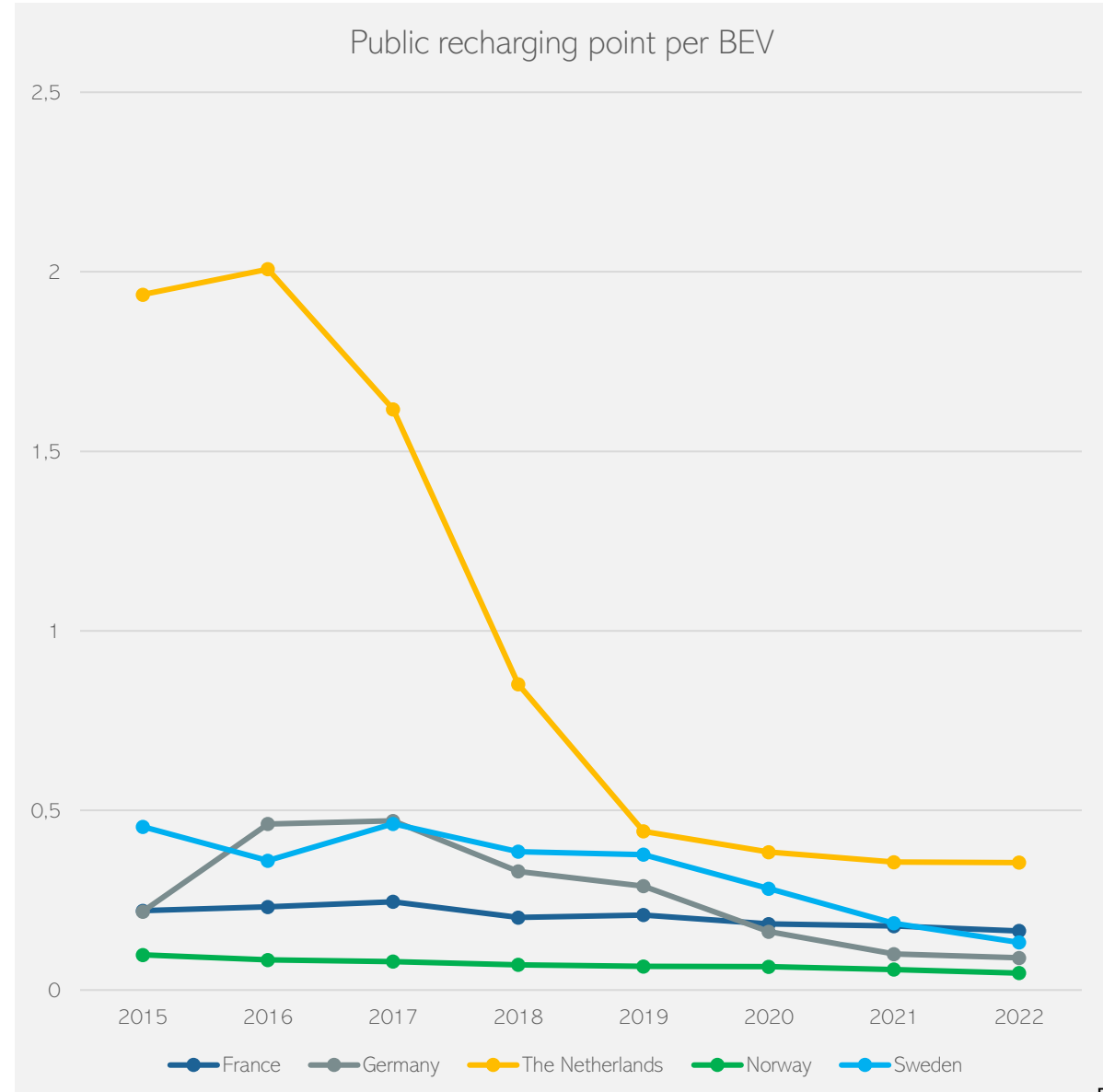
Source: EAFO • Created with Datawrapper

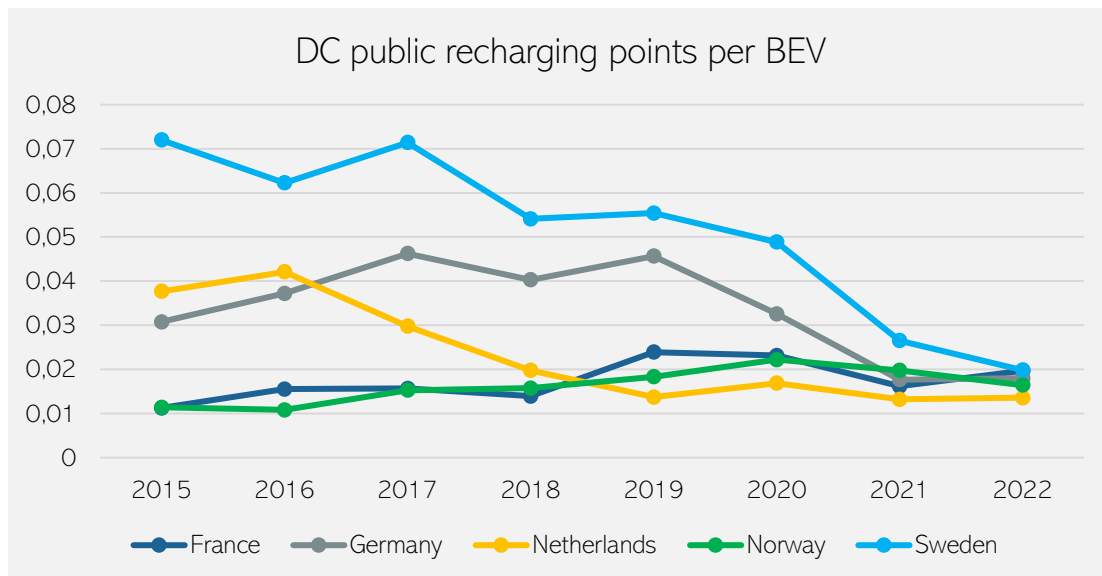
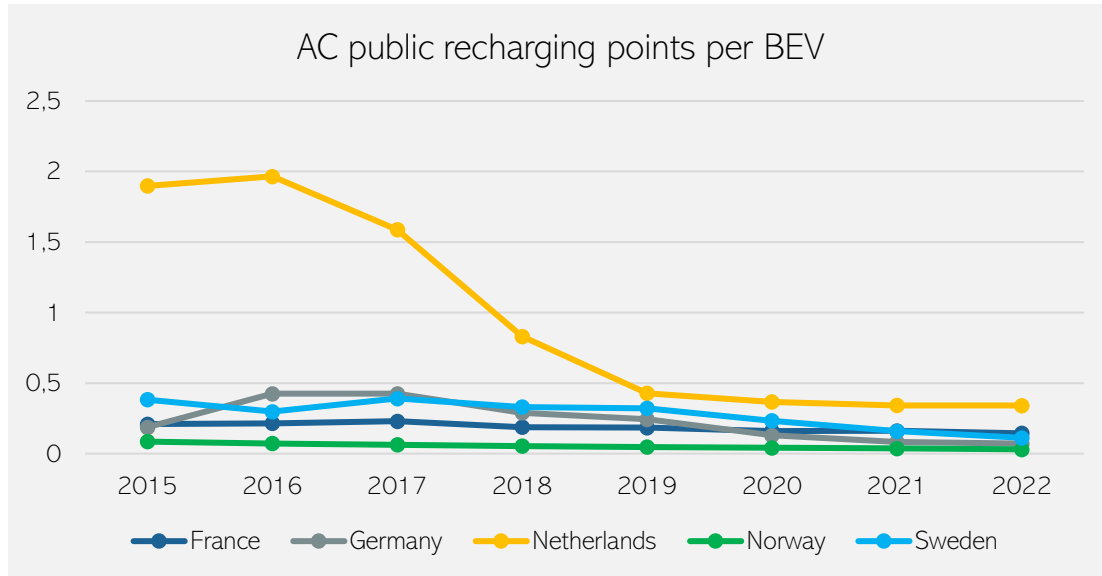
Observations

The amount of public recharging points per Battery Electric Vehicle (BEV) in Norway continues to be low, with a further decrease observed in 2022. This is due to the rapid increase in BEV adoption in recent years. The implementation of new public recharging points has struggled to keep pace with the quick uptake of BEVs. However, the context in Norway differs from that of other countries. A larger proportion of BEV owners in Norway have access to a private recharging point, reducing the necessity for public recharging points. This trend was corroborated by a 2019 study from Elbil, which showed that BEV owners mainly recharge their vehicles at home overnight.

The high adoption rate of BEVs in Norway implies that these vehicles are increasingly being used for longer trips. High-power recharging is employed to facilitate these extended journeys. Studies show that the highest percentage of EV drivers experiencing queueing is found in Oslo. This seems to suggest that individuals living and working in Oslo city do not have the option to "slow charge" at home or at work due to a shortage of standard recharging points, and are therefore relying on high-power recharging points more frequently.

In countries like the Netherlands, Germany, Sweden, France, and Austria, a consistent downward trend is noted in the number of public recharging points per BEV from 2016 through 2022. BEV sales in these countries are growing at a pace faster than the installation of public recharging points. An uptick in the rate was seen in Belgium in 2022, but it's not yet clear whether this is the start of a new trend or an anomaly.





Source: European Alternative Fuels Observatory

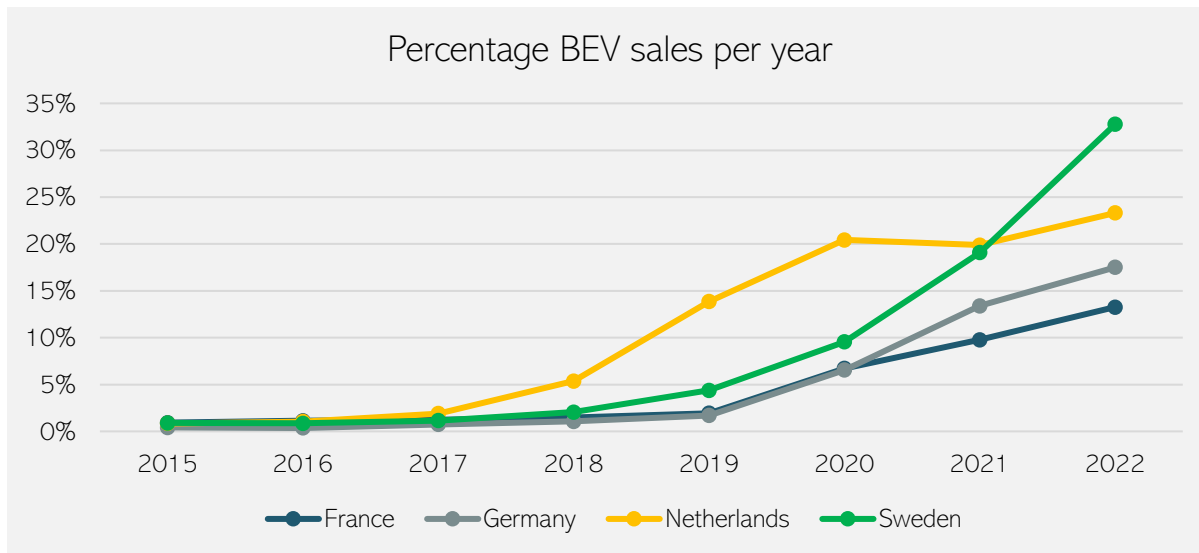
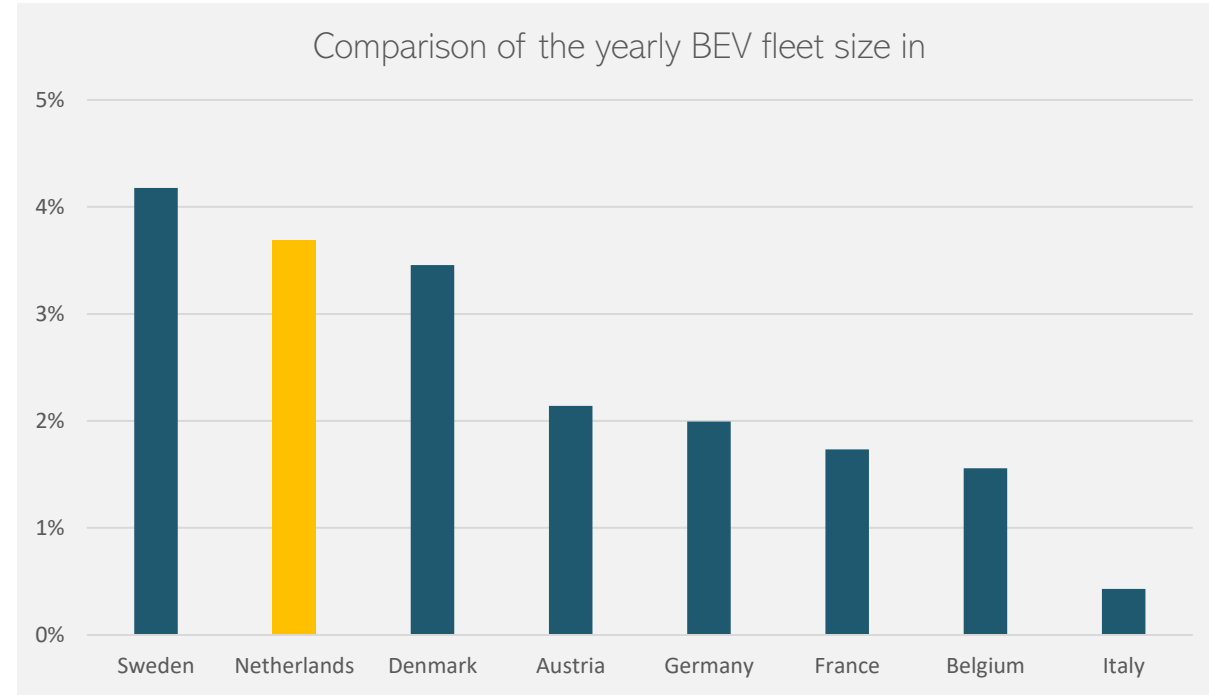
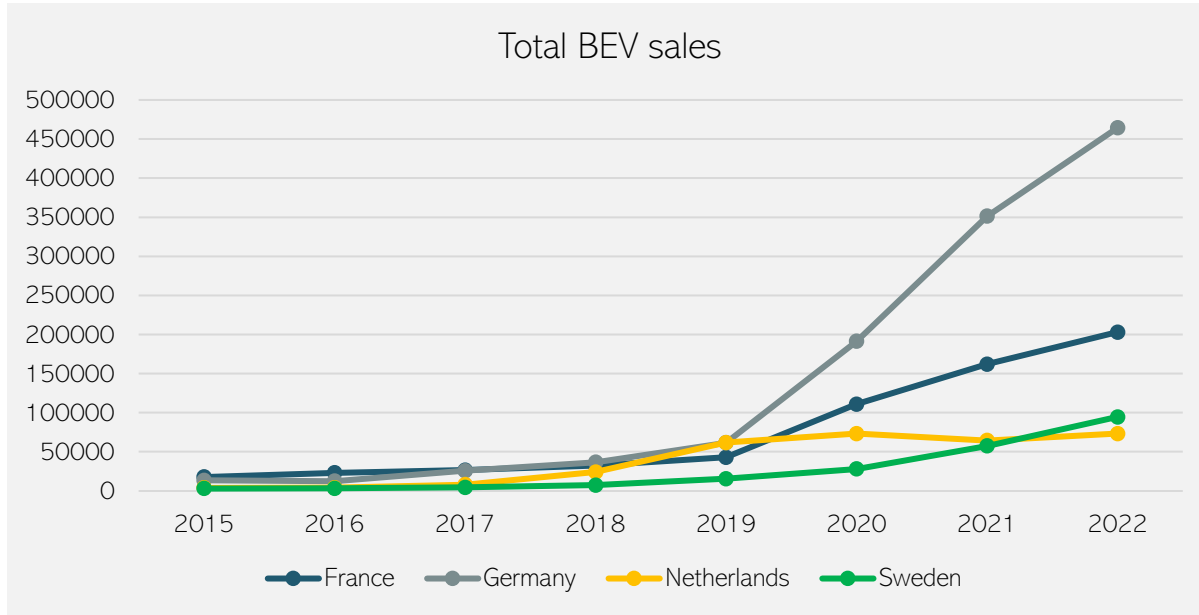
Observations

The amount of public recharging points per BEV is low in Norway due to the very fast uptake of BEVs in the last years. Clearly, the roll-out of new public recharging points did not keep up with the fast uptake of BEVs. However, the context in Norway is different than in other countries. A higher percentage of BEV 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 BEV 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.

In the Netherlands, Germany, Sweden, France 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.

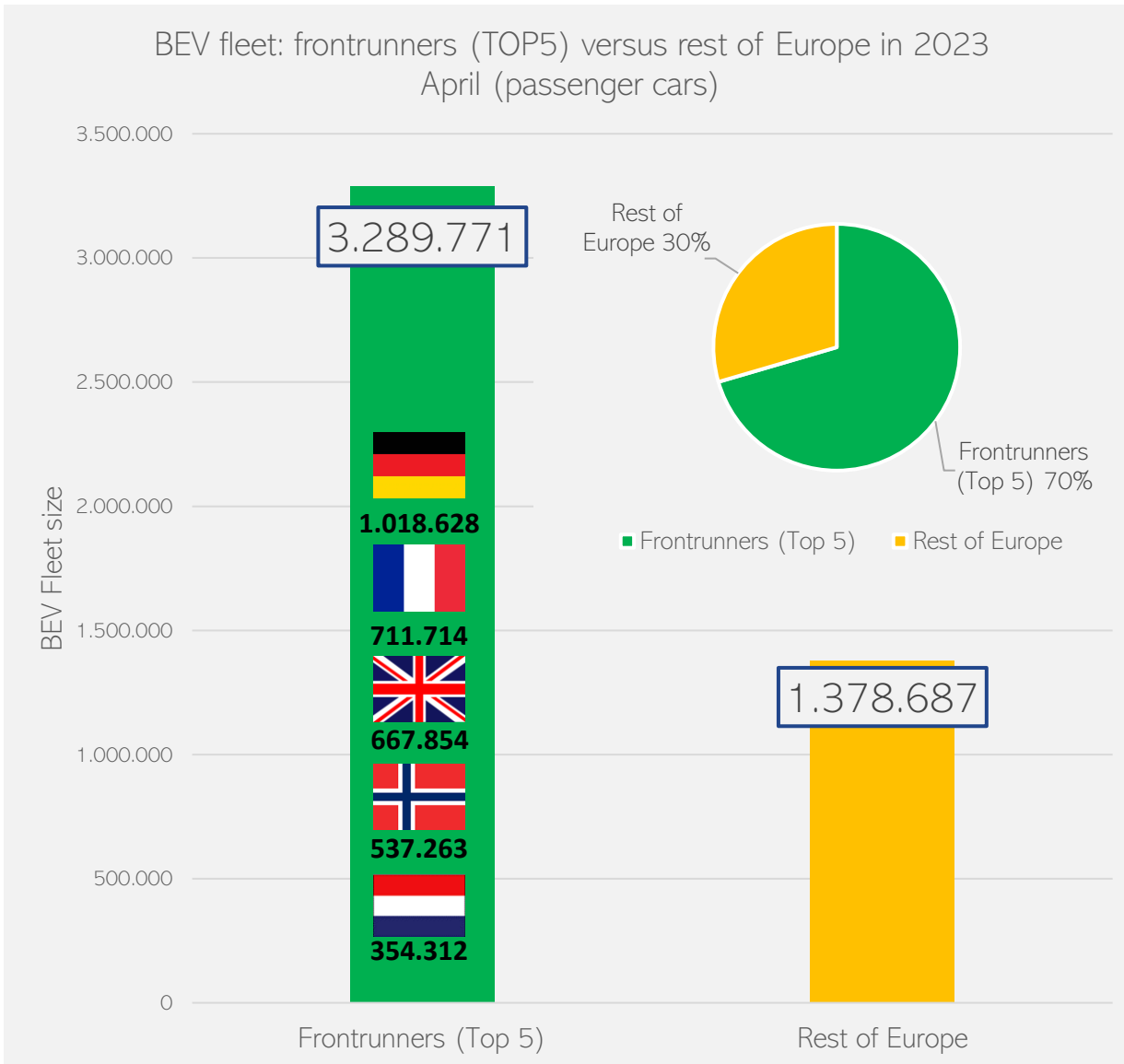
Comparison of the BEV yearly sales- and fleet development in the Netherlands, Sweden, France, and Germany



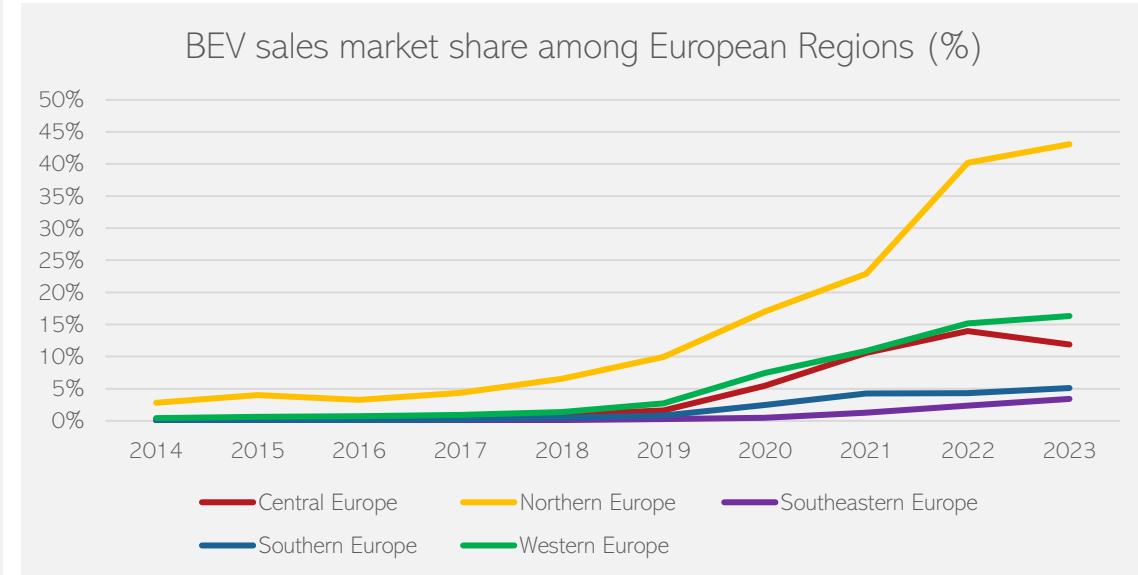
Observations

- In 2022, Sweden led the pack among non-Norwegian countries with BEVs making up 4% of their total fleet, followed by the Netherlands (3.69%) and Denmark (3.46%). Interestingly, despite having the highest BEV registration in 2022, Germany's BEV fleet percentage (2%) was lower than these countries, highlighting a slower transition.
- Comparing the percentage of BEV in registrations, we observe a massive growth from 2015 to 2022 in all countries, with Sweden leading in the EU. It shows an accelerating acceptance of BEVs, potentially indicating a faster transition in the near future.

European differences: regional concentration



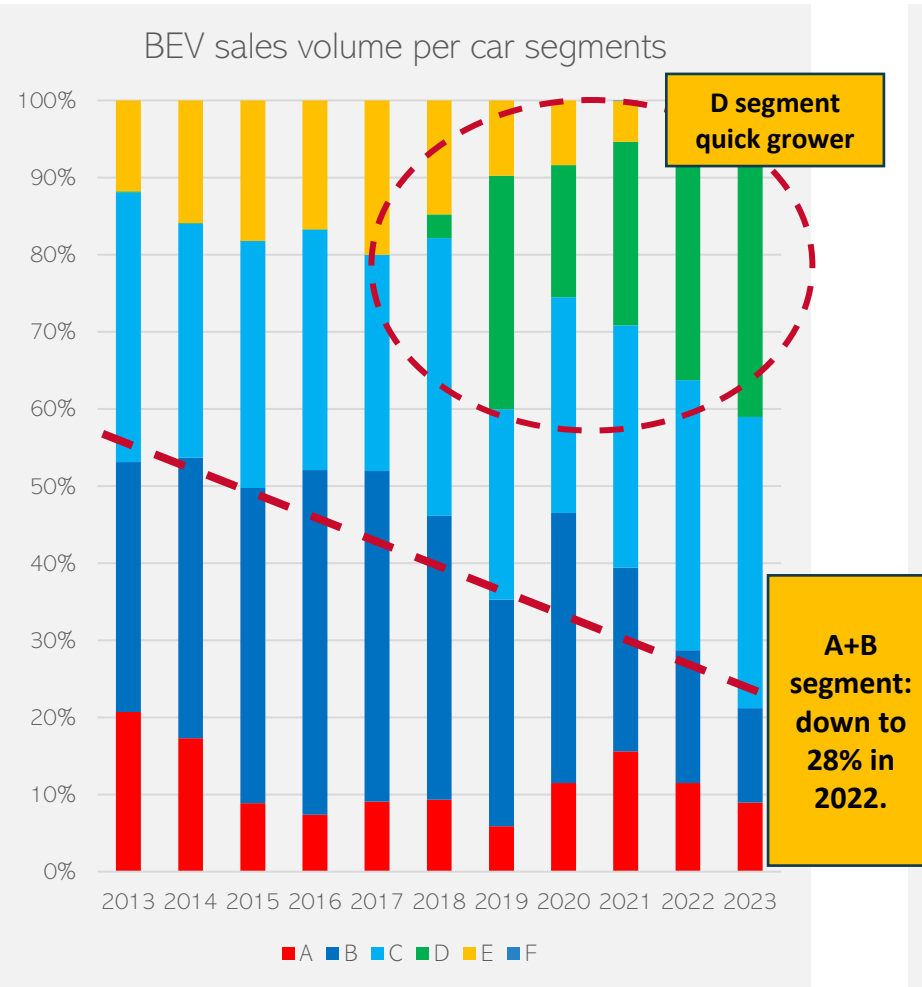
Source: EAFO (2023)



Source: EAFO (2023)

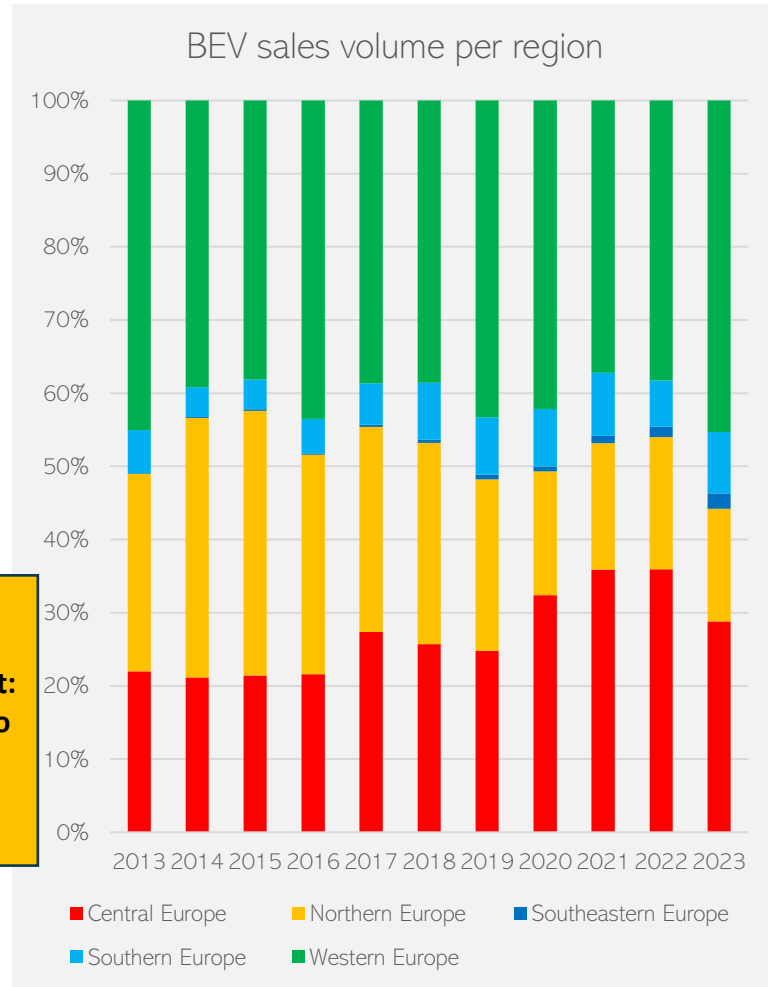
There is a high concentration of the BEV fleet in the TOP 5 frontrunner countries. Other regions such as Southern and Southeastern Europe are lagging behind.

Significant shift from smaller to larger segments (2013-2023)



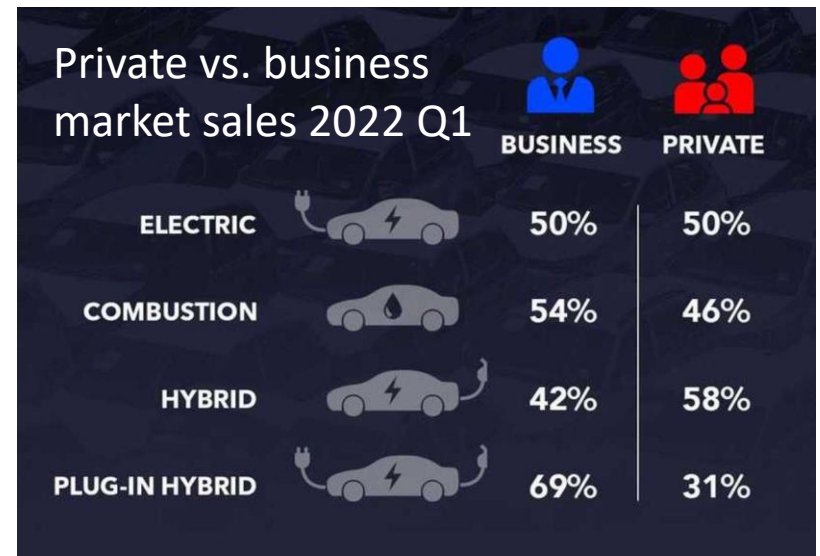
Source: EAFO (2023)

Significant shift from Northern region with Western and Central Europe catching up (2013-2023)



Source: EAFO (2023)

Even sales between business and private markets in overall Europe, but significant differences between countries



Source: JOTA (2022)

Race for cheaper BEVs started

Hyundai Confirms Small, Affordable Electric Car Coming For Europe

Hyundai aims to price the entry-level offering from €20,000 (~\$20,500).



Tesla Did Introduce The Model 2 This Week At \$29,000, But Kept It Quiet

Brad Templeton Senior Contributor @ I cover robo-car technology & previously worked on Google's car team.

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Mar 3, 2023, 03:52pm EST

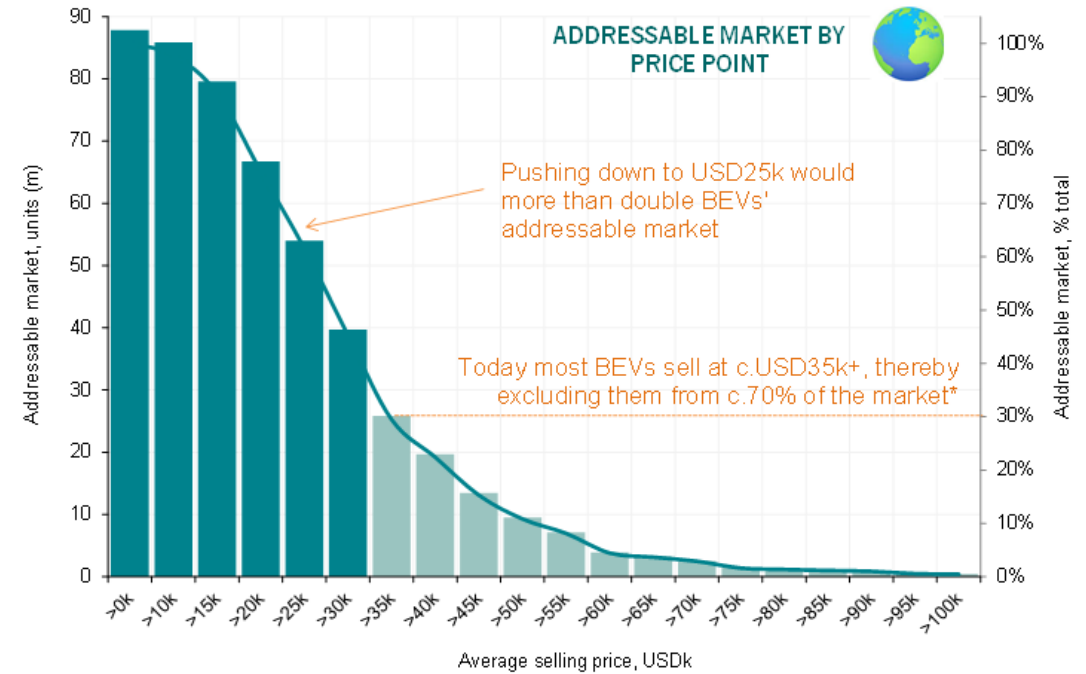
Our Next Drive Unit Will Be Even More Scalable

75% ANY 50% ~\$1,000

Reduction In Silicon Carbide Battery Chemistry Accepted Reduction In Factory Footprint All-In Cost

Tesla's low-cost new model, under a drape in a graphic about the cost of its power train being just ... [+] TESLA

BEV addressable market will double with new models starting at 25,000 USD.



Source: S&P Global, BNP Paribas Exane estimates

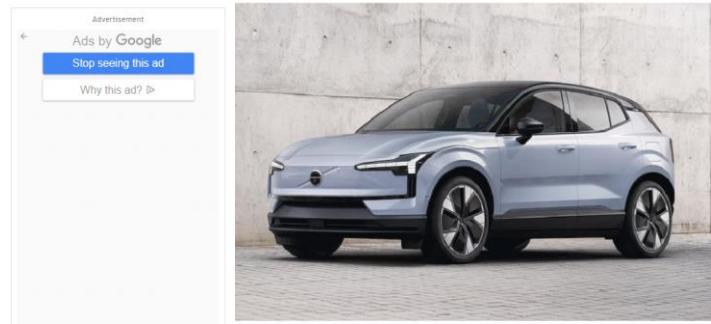
Addressable market: appx. 55% of all car market transactions are below 25,000 USD. If BEVs are more expensive, half of the market is missed. 60

New Volkswagen ID.2all concept previews future affordable electric car

The production version of the Volkswagen ID.2all concept will arrive in 2025 to rival the Peugeot e-208 and Vauxhall Corsa Electric



We've been waiting for a couple of years now to see how Volkswagen plans to make electric motoring more affordable for the masses - and, after one false start with the ill-fated ID. Life concept, here's the company's proposed solution: the ID.2all, an all-electric supermini that will be a rival for the likes of the Peugeot e-208 and Vauxhall's Corsa Electric when it goes on sale in 2025.



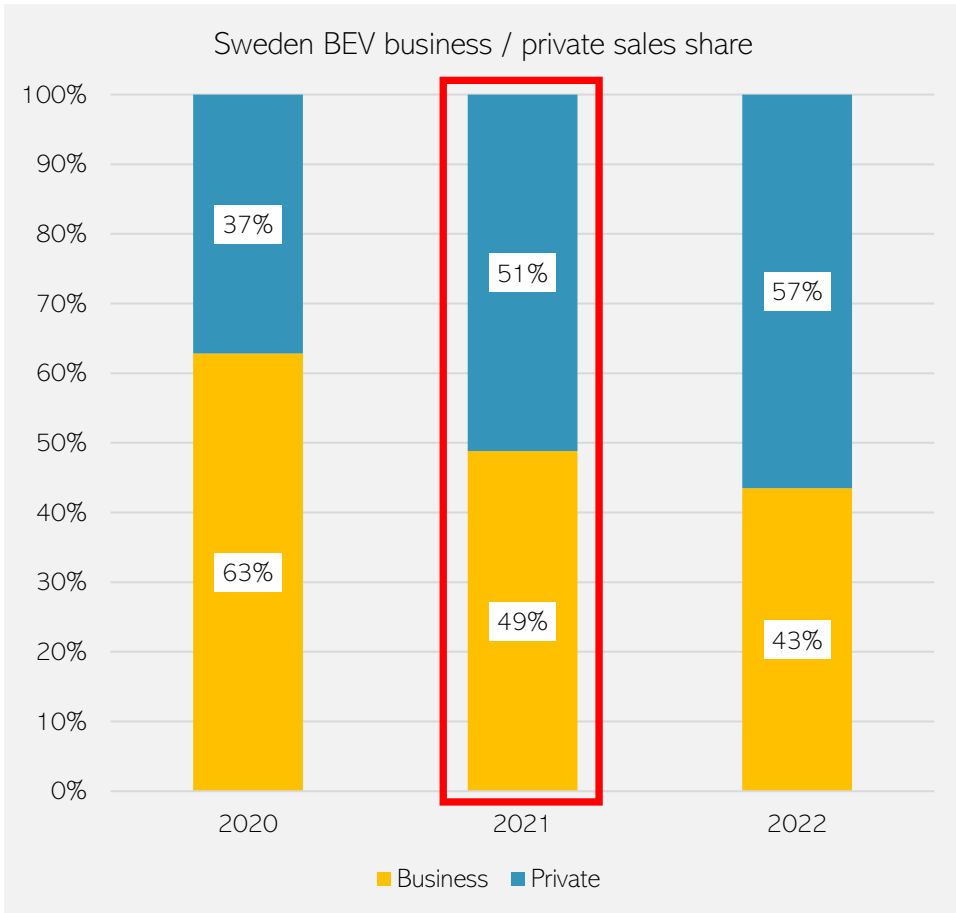
EX30. Credit: Volvo

Volvo's EX30 Is Shaking Up the EV Market with Its Low Price and High Performance

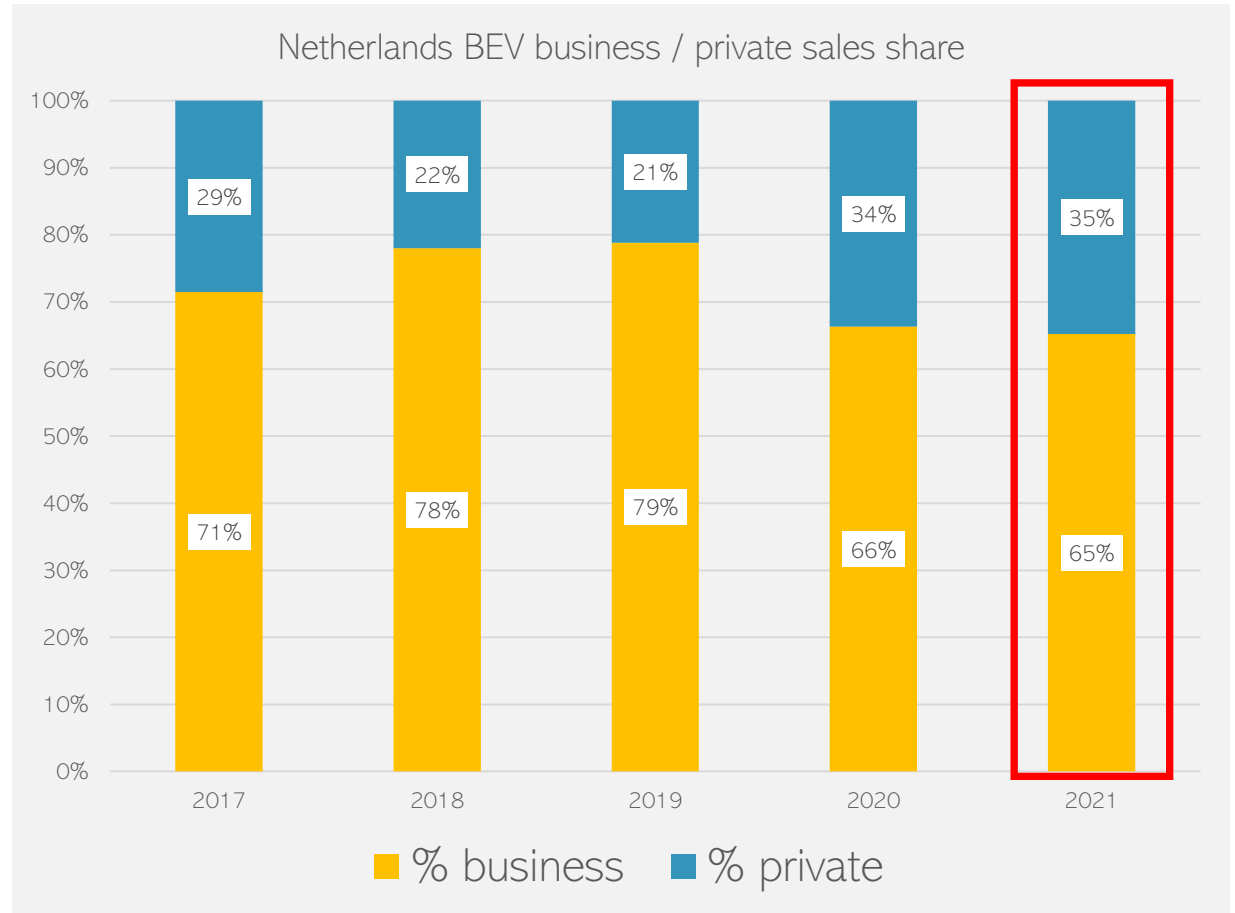
European differences: BEV private market and business market



2 leading markets in the EU, still totally different market compositions
51% private market share in Sweden vs. 35% in the Netherlands in 2021



Source: Mobility Sweden (2023)

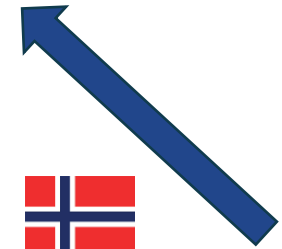
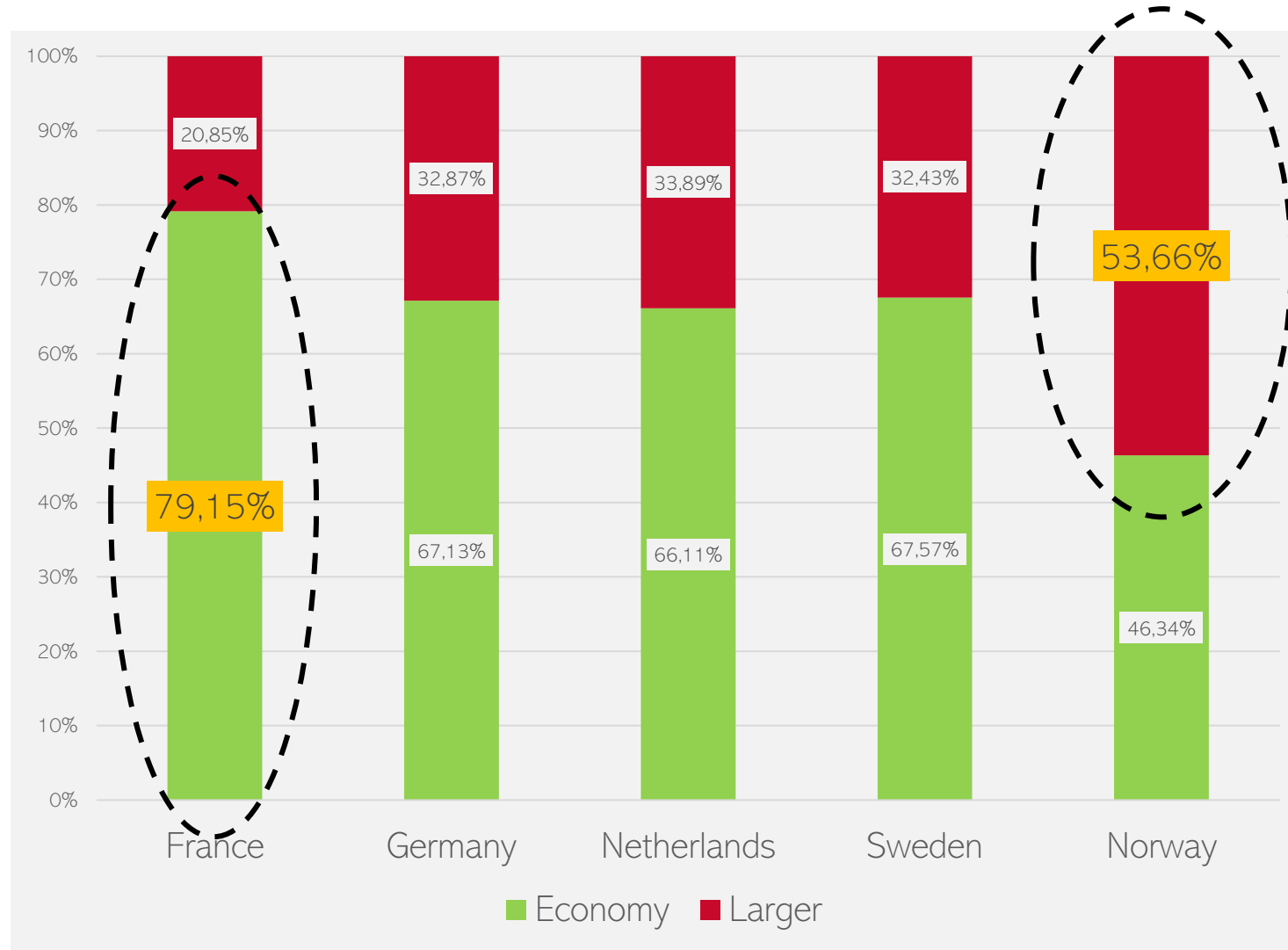
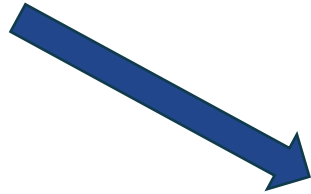


Source: RAI / Bovag (2023)

European differences: some countries support Economy and some countries Larger segments (sales market share in 2022)



The French policy favors smaller car segments (A,B,C)



The Norwegian policy favors larger car segments (D, E, F, +)

Source: EAFO (2023)

Deep dive comparing TCO

Netherlands, Germany, France and Sweden

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

TCO Calculation and Vehicle Selection

- A usage period of four years was used in 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.
- Vehicle selection was based on the best-selling BEVs of 2022, excluding Norway due to its unique BEV market dynamics.
- Calculations were performed on the cheapest variant of BEVs and the second cheapest of petrol cars, considering the typically superior equipment of BEVs.
- Energy costs: Calculations are based on 80% private charging and 20% public charging share; Household Energy Price Index's data has been used for private and EAFO's data has been used to calculate the public charging fees.
- Used an assumption to split home (80%) and public charging (20%) pattern to better reflect reality for BEV energy costs. Energy costs reflect
- The selection of countries were based on peer countries of interest. Due to the very restricted availability of new ICE cars in Norway, it was excluded from the analysis.

Residual value calculation

- The analysis for 2019-2022 focused on high-registration models in the studied countries, using INDICATA's database (March-April 2023) for current resale values.
- Each model's residual value was sales-share-weighted for each segment (B, C, D), ensuring realistic depreciation representation in the Total Cost of Ownership (TCO) calculations.
- The method typically resulted in higher BEVs' residual values, with respect to last years and benchmark TCO calculations (e.g., Formula E-Team) reflecting realistic resale values. The analysis incorporated vehicles' original retail prices from 2019.

Governmental Influence and Other Considerations

- The average prices of selected vehicles reflect the latest prices as of the end of April 2023, weighted with the related market share in 2022.
- Available subsidies for each selected model were considered in the pricing, deducted from the depreciation.
- The total effect of governmental influence on the purchase price and TCO includes purchase taxes, VAT, purchase subsidies, and road taxes.
- An annual income of €40.000 was assumed for determining eligibility for purchase grants.

Comparison average purchase price of private and business the Netherlands, Germany, Sweden, and France

Observations

The private purchase prices differences between BEVs and petrol cars are still slightly higher in the Netherlands. Except the B segment, other segments are close to parity, C and D in the business and C in private being positive.

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.

For Sweden, the current high negative prices represent the removal of purchase subsidies and tightening of incentive conditions since 2023.



Purchase

	Purchase					
	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
Netherlands	-€ 6.771	-€ 4.902	€ 955	-€ 6.174	-€ 4.138	-€ 562
Germany	-€ 3.106	€ 2.194	€ 4.788	-€ 4.917	€ 1.328	€ 4.899
Sweden	-€ 6.258	-€ 8.614	-€ 3.244	-€ 9.610	-€ 12.703	-€ 5.378
France	-€ 10.405	-€ 3.320	-€ 2.650	-€ 11.143	-€ 2.662	-€ 2.253

**Note: The deltas of the B segment are disproportionately 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.*

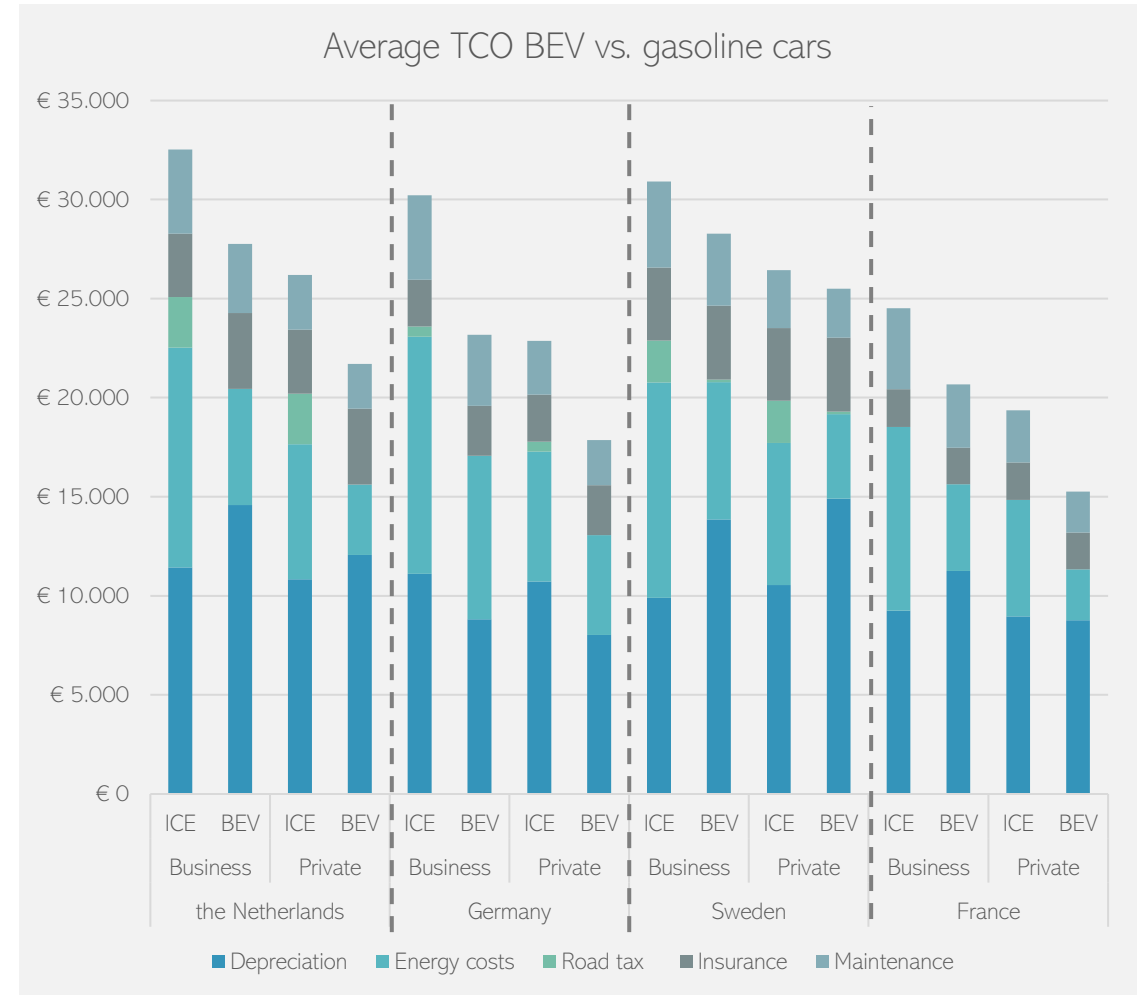
Comparison average TCO of the Netherlands, Germany, Sweden, and France

Observations

In the Netherlands, the TCO benefit of BEVs over petrol cars is smaller than in Germany. The private and business market in the Netherlands are both, where BEVs are more positive than ICE vehicles.

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

The TCO of the individual segments show the effect of a progressive tax system. Cars with higher CO₂ emission, generally in higher segments, are taxed higher. This creates a greater benefit for BEVs over petrol cars in higher segments as in Sweden. The introduced price caps and exclusion of luxury SUVs from benefits decreased benefit of D segment since 2021.



The assumptions on prices of energy is in the annex.

	TCO					
	Business			Private		
	B segment	C segment	D segment	B segment	C segment	D segment
Netherlands	€ 1.435	€ 4.849	€ 8.022	€ 2.990	€ 4.979	€ 5.479
Germany	€ 3.802	€ 8.356	€ 8.983	€ 3.409	€ 6.150	€ 5.469
Sweden	€ 1.729	€ 434	€ 5.762	€ 120	-€ 991	€ 3.657
France	€ 1.725	€ 5.666	€ 4.135	€ 2.178	€ 5.896	€ 4.243

No subsidies still make smaller popular segments unattractive, especially the purchase price for the private market

No financial incentives scenario applied to the purchase price of selected countries and car segments (2023)

Purchase price		B segment	C segment	D segment
Business	Netherlands	-€ 6.771	€ 34	€ 955
	Germany	-€ 9.533	-€ 4.556	€ 588
	Sweden	-€ 10.723	-€ 13.079	-€ 6.826
	France	-€ 13.703	-€ 6.681	-€ 5.759
Private	Netherlands	-€ 9.124	-€ 1.379	-€ 562
	Germany	-€ 11.344	-€ 5.422	€ 700
	Sweden	-€ 14.075	-€ 17.168	-€ 8.960
	France	-€ 16.441	-€ 8.023	-€ 6.902

No financial incentives scenario applied to the TCO of selected countries and car segments (2023)

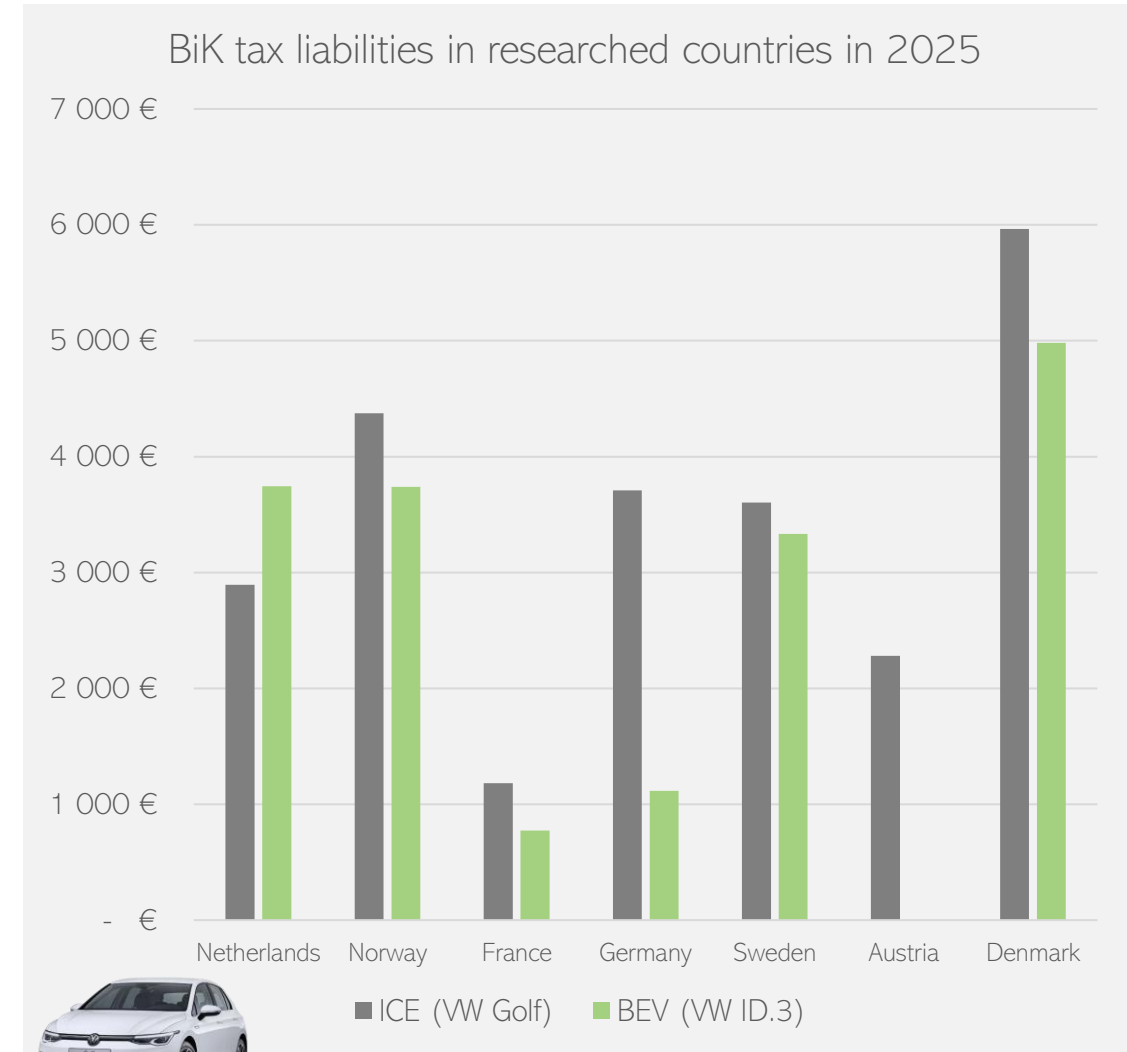
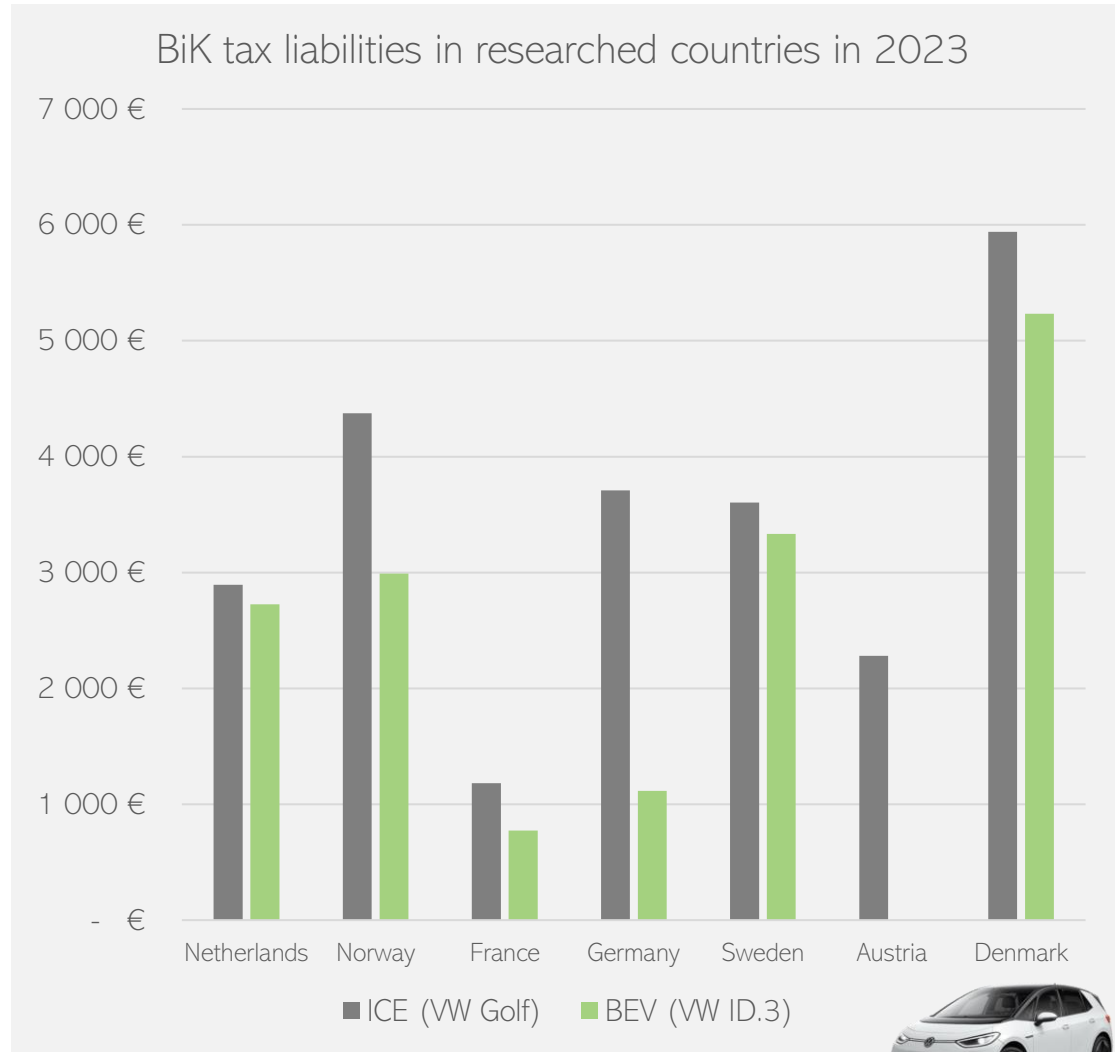
TCO difference		B segment	C segment	D segment
Business	Netherlands	-€ 3.501	€ 2.108	€ 522
	Germany	-€ 2.626	€ 1.606	€ 4.784
	Sweden	-€ 1.588	-€ 3.139	€ 1.790
	France	-€ 1.399	€ 2.515	€ 1.491
Private	Netherlands	-€ 4.279	-€ 401	-€ 1.149
	Germany	-€ 3.019	-€ 600	€ 1.270
	Sweden	-€ 2.816	-€ 4.182	-€ 9
	France	-€ 2.921	€ 777	€ 128

Assumptions: BEVs receive no preferential treatment

Comparison Benefits in Kind for drivers

Netherlands, Germany, France, Norway,
Sweden, Austria and Denmark

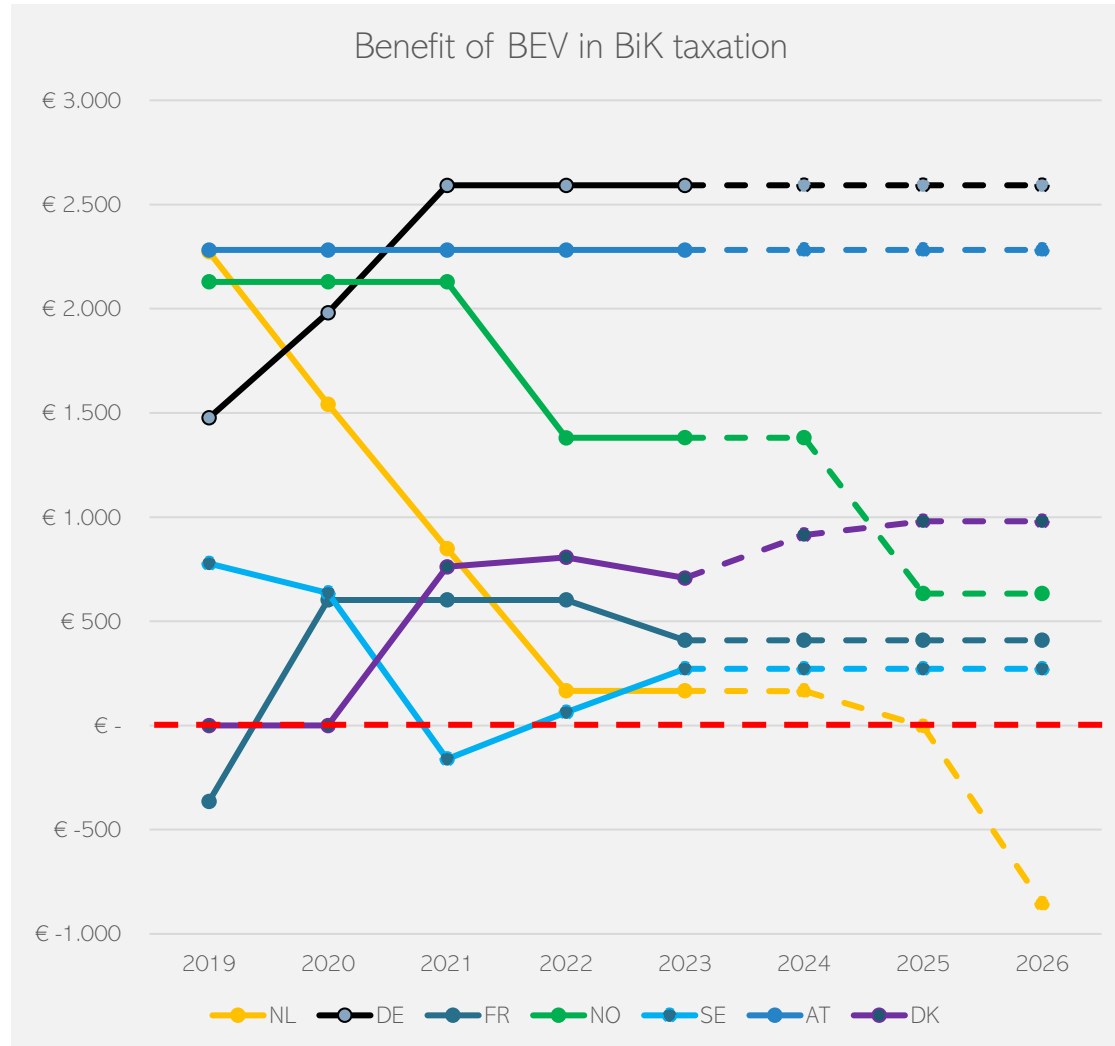
Benefit-in-Kind: relative benefit of BEVs expected to shrink only in the Netherlands and Norway, until 2025.



VW ID.3 vs. VW Golf

Based on vehicle prices of 2023

Advantage for Driver: if the Benefit in Kind taxation difference is positive, it is benefit for the BEV driver



If the BiK taxation difference is above zero, then the BEV driver has an advantage over ICE driver.

Until and after 2025, all researched countries have a positive BiK difference for BEV drivers. Exemption is the Netherlands, which is phasing out the advantage with a disadvantage from 2025 onwards.

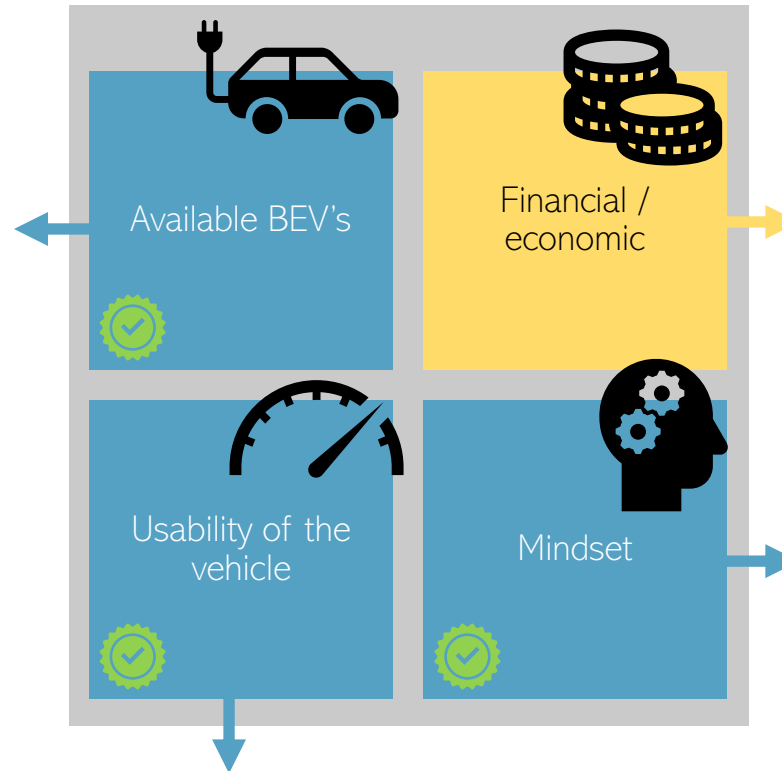
Conclusions

Vehicle availability

The number of BEV models available in the B, C and D segment is rapidly growing in the last few years, from 25 in 2018 to 244 model variants in 2022. 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 more balanced list price than petrol cars in C, D vehicle segments, the difference is relatively highest in the smaller segments (B). The predicted price reductions have been accelerated since 2023, Tesla starting the price competition. 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 past few years, the usability of Battery Electric Vehicles (BEVs) has seen significant advancements. This is evident from the increased driving ranges across all segments, reduced charging times, and improved battery quality. Despite these strides, challenges remain. One such hurdle is standardization across borders, which has not yet reached the desired level. Even though BEVs have made remarkable progress in terms of usability, they have not reached parity with their petrol counterparts. However, the gap is steadily narrowing. According to this research, the surge in BEV sales has resulted in a decreasing ratio of public charging points per BEV. This trend highlights the continued necessity for investments in publicly available charging infrastructure to ensure that the growth in BEV usage is supported by adequate charging facilities.

Mindset

In the Netherlands, public opinion on BEVs is shifting rapidly in favour of BEVs. For instance, the survey of EAFO from 2022 showed that 24% of respondents consider buying a BEV within 5 years.

There are, however, still problematic misunderstandings that negatively influence the public opinion. The survey, together with the "Elektrisch rijden monitor" by the ANWB shows that 41% of drivers don't know about and understand the incentives in place for BEVs in the Netherlands.

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 2022 and phase out many other from 2025 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. However, they also started with specific segments, and still maintained benefits for smaller segments with more economic options.

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 or purchase subsidy (decreased with 400 EUR since 2022)

Norway mainly incentivizes the private market and the Netherlands mainly the business market. Swedish growth shifted from private to business after the phase out of purchase subsidy.

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, but differentiate between households (income status), and also residence location (France).

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.

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. Caps on maximum car retail price eligibility for incentives have been introduced all over Europe in 2022, showing a quick shift from luxuries larger BEVs to promoting smaller, economic segments. However, the relative benefit of larger segments shall still remain to be attractive in every market.

Depreciation is the biggest cost in the TCO currently, but the depreciation of BEVs has been lowered to petrol cars and the gap is closing since 2021.

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 growing, but still limited focus on the occasion market in all countries within this research.

The Netherlands, France, Germany, Latvia, Lithuania, Austria are thus far the countries with purchase grants for second-hand BEVs, of a modest one- and two thousand euro, respectively. The number of countries increased, since 2021, however, Germany and Austria has a limitation of max. 1 years at the first dealership. On the other hand, France can provide an accumulative subsidy to second hand BEVs to 10k EUR (if all conditions apply). The Netherlands has plans to decrease the available subsidy to 1,000 EUR from 2,000 EUR.

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 – 2026: from 2026 onwards, several significant changes are expected which may affect the BEV uptake negatively

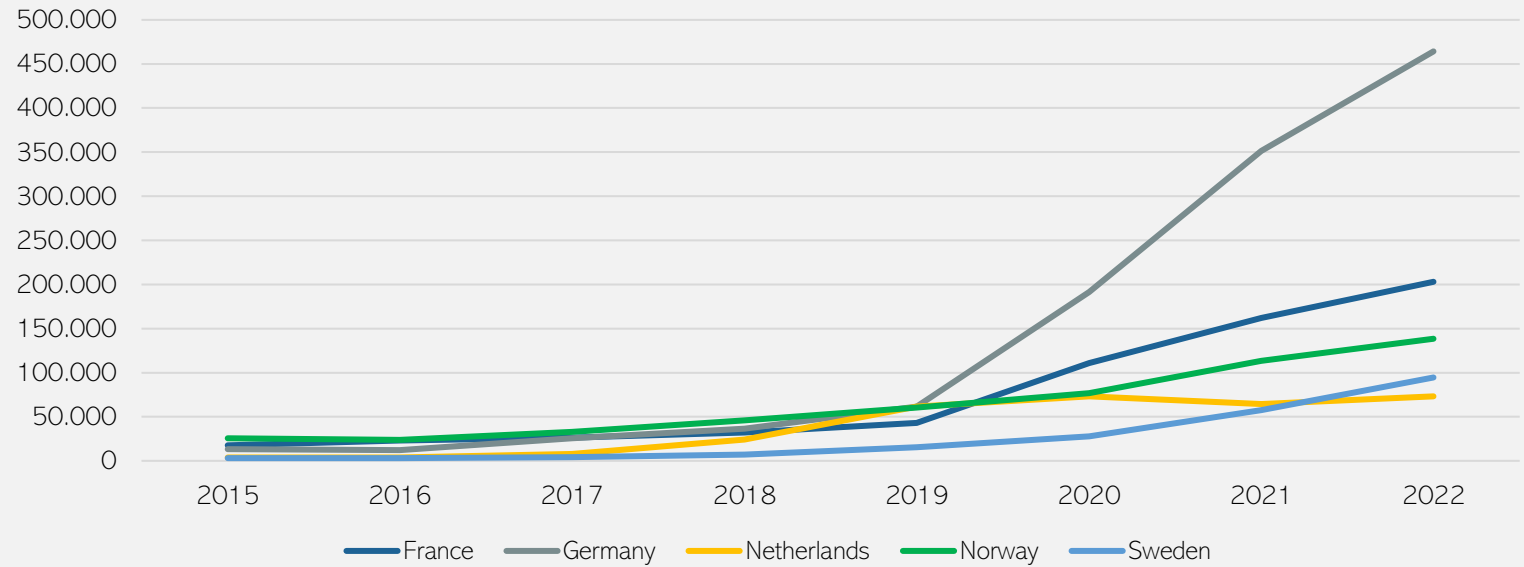
- BiK tax advantage for BEVs will be removed by the end of 2025, making ICEVs cheaper from a driver's perspective, unless BEVs achieve price parity by then. Furthermore, there's no mandate requiring all new company cars to be electric from 2025 onwards, which will likely reduce BEV demand.
- The MRB exemption for BEVs will also end by 2025. The MRB is weight-based, and since BEVs are typically heavier, this means they could be more expensive than ICEVs in terms of MRB from 2026. It's worth noting that the MRB is not only an important factor for the Total Cost of Ownership (TCO), but also for the used car market, where relative benefits are larger.
- Current subsidies will end by 2024. While no new subsidies have been announced for new vehicles, there is a reserved budget of €600 million for used vehicles. However, this includes execution costs and the reduced tax income for the Netherlands due to higher EV sales. Thus, the actual amount available for the vehicles will likely be less than half, spread over five years. The specific subsidy amount per vehicle is not yet set, although there are doubts whether a proposed €1000 per vehicle would be sufficient to make a significant impact.

<p>Gradually reduce incentives for plug-in hybrid vehicles (PHEVs)</p>	<p>As Norway aims to increase BEV adoption, it is reducing incentives for PHEVs to ensure that they do not hinder the overall goal of transitioning to zero-emission vehicles. Other countries can consider a similar approach, gradually phasing out PHEV incentives to encourage BEV adoption. PHEVs might cannibalize BEV markets, and greatly hinder CO2 target attainments.</p>
<p>Growing trends on tailor-made incentives</p>	<p>European countries are reshaping their incentive schemes for BEVs to focus more on equity and environmental benefits. These revised strategies primarily target lower-income households, support smaller-budget vehicle segments (price caps), and cater to residents living in low-emission zones. The aim is to make cleaner, greener mobility options more accessible to a broader demographic, thereby stimulating a more inclusive and fair transition to zero-emission mobility. By prioritizing those who stand to benefit the most from reduced vehicle operating costs and those living in areas with strict emission controls, these policies aim to mitigate climate change while addressing socio-economic disparities in access to sustainable transportation. Such a shift in incentive structures could be pivotal for driving BEV adoption at scale, reducing pollution levels in urban areas, and fostering an environmentally sustainable future.</p>
<p>The “carrot and the stick”</p>	<p>Disincentives for ICE vehicles must stay in place, and the phase out of incentives for BEVs shall ensure a still positive gap for BEV. As we see examples in Sweden or France, even with reducing, or phasing out incentives for BEVs, the burdens of ICE vehicles grow, or remain, so that the relative attractiveness of BEVs stay, and not a situation arises, where ICE vehicles become more attractive.</p>

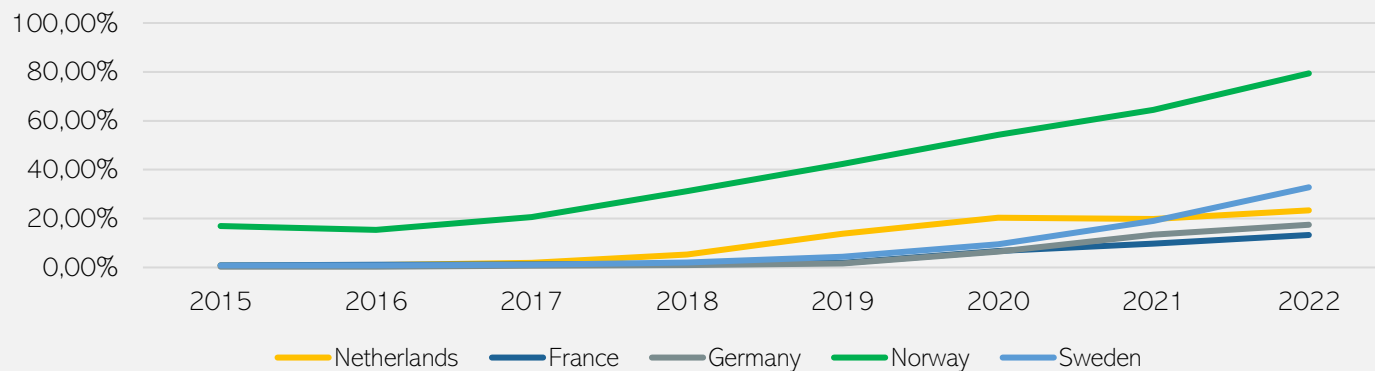
Success of BEV uptake

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.

Total BEV sales (per year, per country)



Percentage BEV sales per year



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 2022 indicates a significant increase of the percentage of BEV sales in Sweden, and moderate in France, Germany.

In Q1 2023 the sales percentages increases for most countries, also the Netherlands, but other countries such as Denmark or Finland are overtaking the position of the Netherlands.

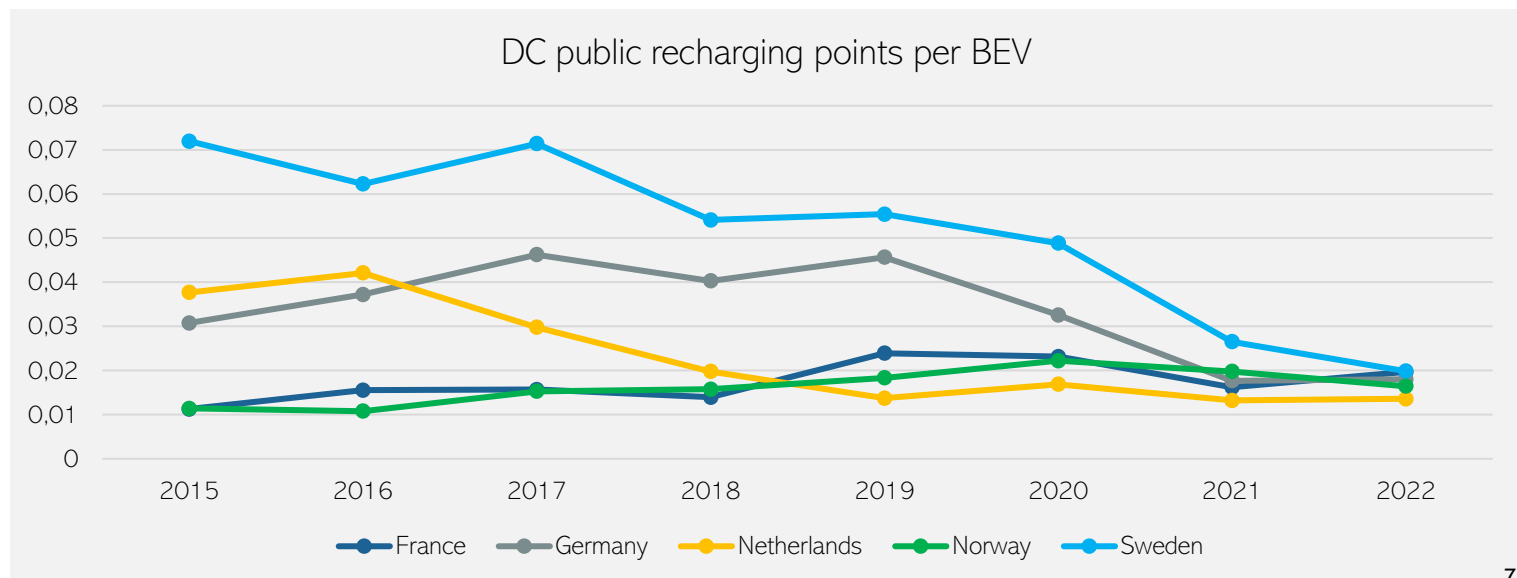
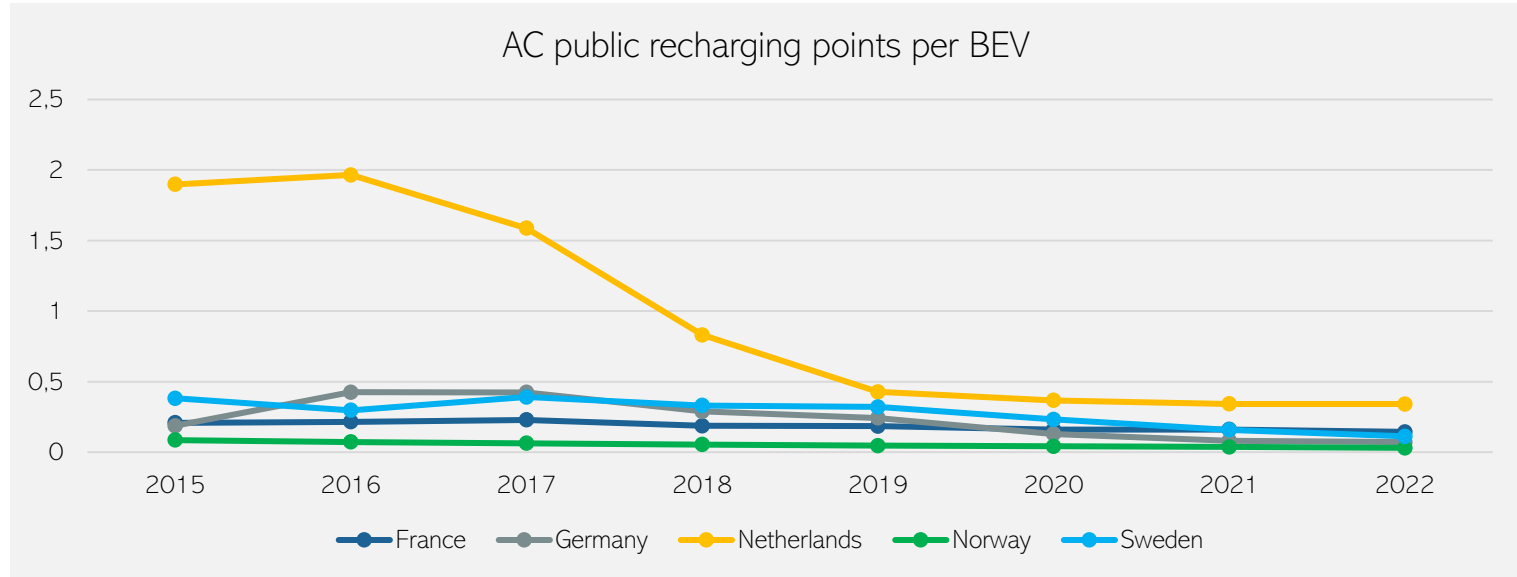
Recharging infrastructure

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 ($\leq 22\text{kW}$) 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

- 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.

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)

Energy prices used across countries in TCO calculations

Countries	Petrol prices		Electricity prices*	
	Business	Private	Business	Private
Netherlands	1,60€	1,90€	0,28€	0,34€
Germany	1,44€	1,78€	0,46€	0,54€
France	1,41€	1,69€	0,21€	0,24€
Sweden	1,48€	1,85€	0,37€	0,44€
Norway	-	-	0,13€	0,17€

Yearly driven kilometers (estimations):
 Business: 28.000 km
 Private 15.000 km

When calculating the energy costs for the BEVs 20% public and 80% home charging were assumed.

Countries	Energy fee (Public recharging)**
Netherlands	0,49€
Germany	0,48€
France	0,39€
Sweden	0,48€
Norway	0,38€

*<https://www.energypriceindex.com/price-data>

**EAFO, Eco-Movement

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