

2020

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# Midterm review zero rate VAT for electric vehicles

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Appendix A: Price data for new passenger cars

Appendix B: VAT zero rate and consumer prices for BEVs

## 1 THE NOTIFICATION REVISITED

The plan for the midterm review states that the review will present updated information regarding the following topics:

- Norwegian government's climate policy and policy for zero emission vehicles
- Statistics about the market development i.e. electric vehicle<sup>1</sup> (EV) market share, in the light of the Norwegian government's goals for zero emission vehicles. This should also include numbers for other relevant European vehicle markets
- Examination of the technological changes and review the supply and sales of models in different segments
- Price and cost comparisons between comparable battery electric vehicles (BEVs) and internal combustion engines (ICEs).

The updated information will be compared with the information in the notification and the development is discussed to assess whether the assumptions and conclusions from 2017 are still valid. Based on the analysis, it should be possible to assess whether the conclusions that the scheme is necessary and proportionate, are still valid.

### 1.1 The Norwegian government's climate policy and policy for zero emission vehicles

As a part of the Paris Agreement, Norway is committed to take action to keep global warming in line with the global long-term temperature goal. Under the Paris Agreement, Norway has committed to reduce emissions by at least 50 per cent and towards 55 per cent by 2030 compared to 1990-levels. In EEA Joint Committee Decision No 269/2019, the EU, Iceland and Norway formally agreed to cooperate on fulfilling their respective emission reduction targets. By that decision, Iceland and Norway take part in all three pillars of the EU climate framework. This includes participation in the Effort Sharing Regulation, which regulates emissions not covered by the EU ETS.

Through the participation in the Effort Sharing Regulation, Norway has a legal commitment to reduce the non-ETS emissions by 40 per cent by 2030 compared to 2005 levels. The Government intends to reduce the non-ETS emissions by 45 per cent

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<sup>1</sup>In Norway electric vehicles (EVs) commonly is used as a reference to battery electric vehicles, but internationally EV often includes both battery electric vehicles and (chargeable) hybrid vehicles. To avoid possible unclarity, battery electric vehicles (BEV) are used most places in these document.

compared to 2005 levels. This represents a fulfilment beyond the 40 per cent commitment Norway will get under the Effort Sharing Regulation. The ambition is to reduce these emissions through domestic action. If strictly necessary, the flexible mechanisms within the Effort Sharing Regulation may be used.

Since Norway will receive an annual emission allocation for each year in the period from 2021 to 2030 under the Effort Sharing Regulation, it has a value to start the roll-out of available zero emission technology early.

Reducing GHG-emissions from transportation through the introduction of zero emission technology is therefore a cornerstone of the Norwegian government's climate strategy, with EVs in the passenger car segment being the most mature technology today.

In its White paper on the National Transport Plan for 2018–2029<sup>2</sup>, the Government established several new targets:

- In 2025, 100 per cent of new private cars and light vans will be zero emission vehicles. All new city buses will either be zero-emission vehicles or use biogas.
- By 2030, all new heavy vans, 75 per cent of new long-distance buses, and 50 per cent of new lorries will be zero-emission vehicles.
- By 2030, the distribution of goods in major city areas will be more or less emission free.

The White Paper on National Transport Plan 2018–2029 was adopted by the Parliament in June 2017. According to a recent report, *Klimakur 2030*<sup>3</sup>, the target for zero emission passenger cars has by far the largest potential to reduce GHG emissions in the period 2021–2030. To achieve these targets, the Government relies on technological development.

*Klimakur 2030* estimates that reductions in GHG emissions could be almost 6 million tons CO<sub>2</sub>-eq. in the period 2021–2030 if the Norwegian Government meets the targets for zero emission vehicles in the National Transport Plan 2018–2029. This is more than a quarter of the calculated emission gap for Norway in the non-ETS sector, given a target of 45 per cent reduction.

## **1.2 Market development and BEV market share in Norway and other European vehicle markets**

During the last few years, there has been a substantial growth in the sales of battery electric passenger cars in Norway. In 2017, the year of the last notification, 21 per cent of new passenger cars were battery electric. In 2018 and 2019, battery electric

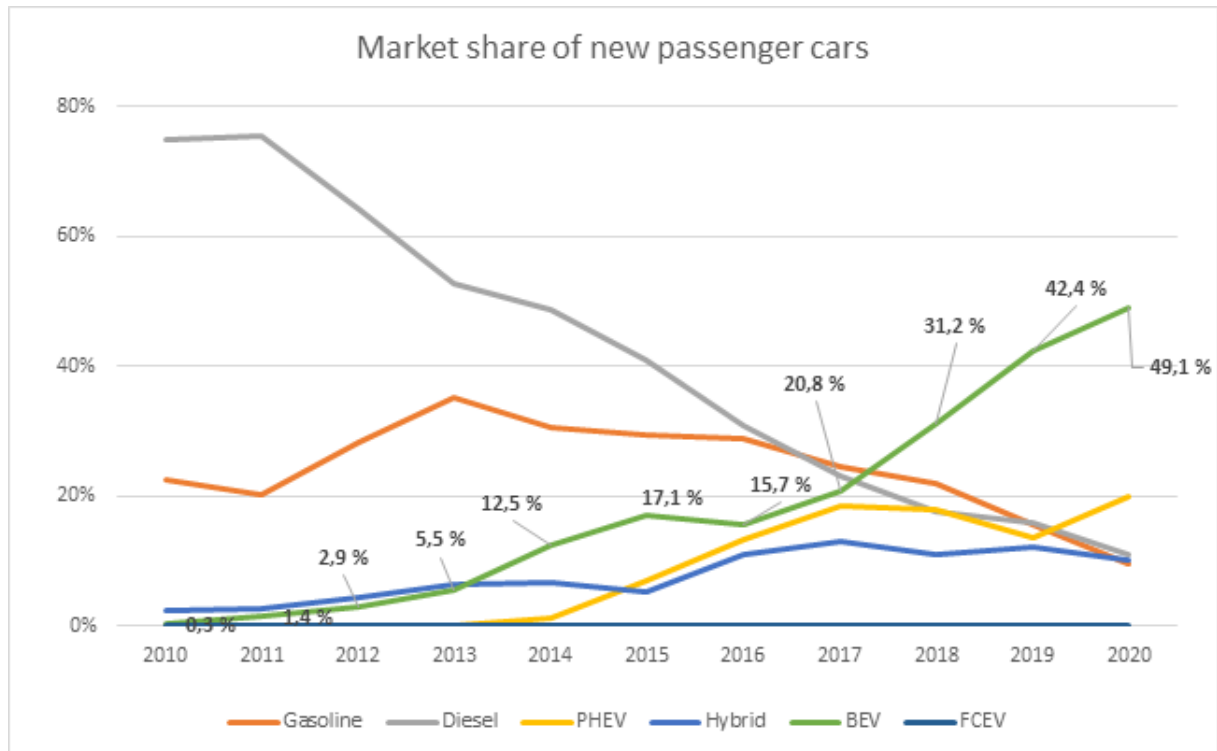
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<sup>2</sup> <https://www.regjeringen.no/en/aktuelt/a-national-transport-plan-for-better-and-safer-daily-travel/id2548623/>, <https://www.regjeringen.no/en/dokumenter/meld.-st.-33-20162017/id2546287/>

<sup>3</sup> *Klimakur 2030* is a report written by Norwegian public agencies, led by the Norwegian Environmental Agency. In the report, the authors have calculated the GHG reduction potential in Norway in the non-ETS sector in the years 2021–2030. The report also points to what measures can be implemented in order for Norway to reach the GHG reduction potential. The report was published on the 31<sup>st</sup> of January 2020. <https://www.miljodirektoratet.no/globalassets/publikasjoner/m1625/m1625.pdf>

passenger cars had a market share of 31 per cent and 42 per cent of the cars respectively. From January to May 2020, battery electric passenger cars had a market share of 49 per cent. In the same period, conventional petrol and diesel cars have been losing market shares. In 2017, about 48 per cent of new passenger cars were conventional petrol or diesel engine cars. This market share has decreased steadily, and from January to May 2020, 21 per cent of all new passenger cars have been conventional petrol and diesel cars.

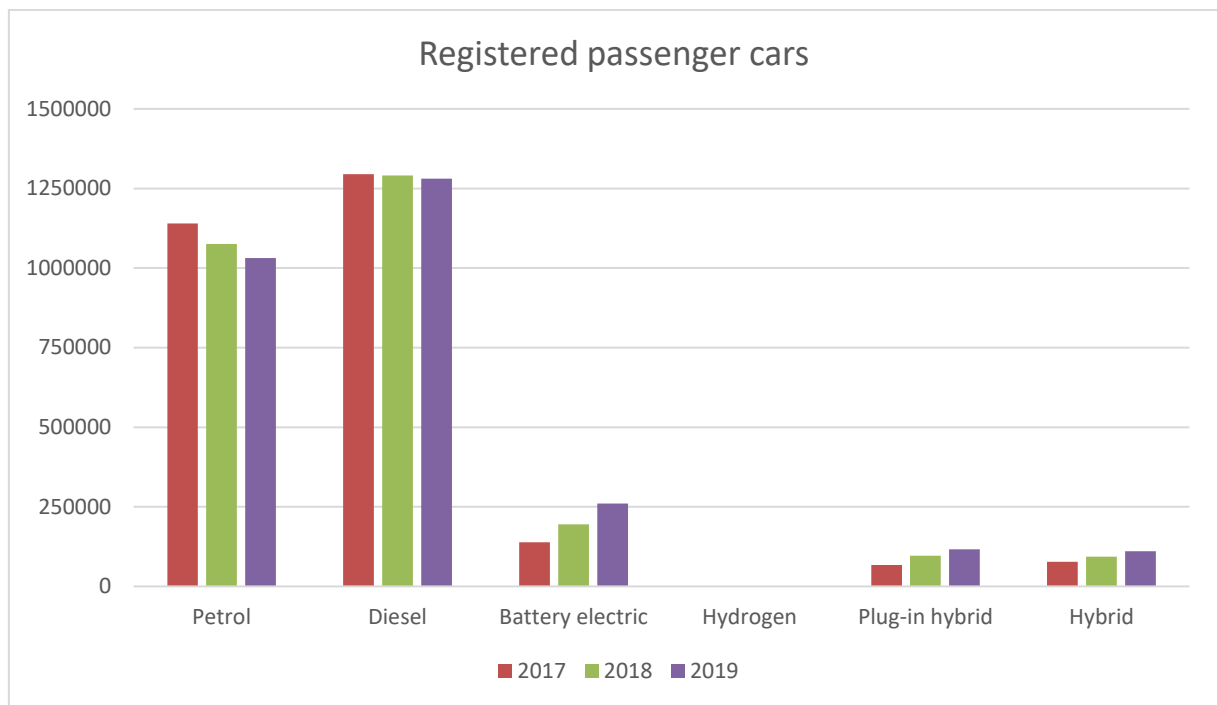
*Figure 1.1 Market share of new passenger cars*



Source: Opplysningsrådet for veitrafikken (OFV)

The sales of battery electric passenger cars have changed the Norwegian car fleet. From the statistics on registered passenger cars, we see that the number of registered petrol and diesel passenger cars have decreased by more than 122 000 cars from 31<sup>st</sup> of December 2017 to 31<sup>st</sup> of December 2019. At the same time, the number of passenger cars increased by about 80 000 cars in total. This development has been spurred by the growth in battery electric vehicles, plug in hybrids and regular hybrids. Actually, the number of BEVs increased as much as the number of petrol and diesel cars decreased in the period.

Figure 1.2 Total number of registered passenger cars in Norway 2017-2019

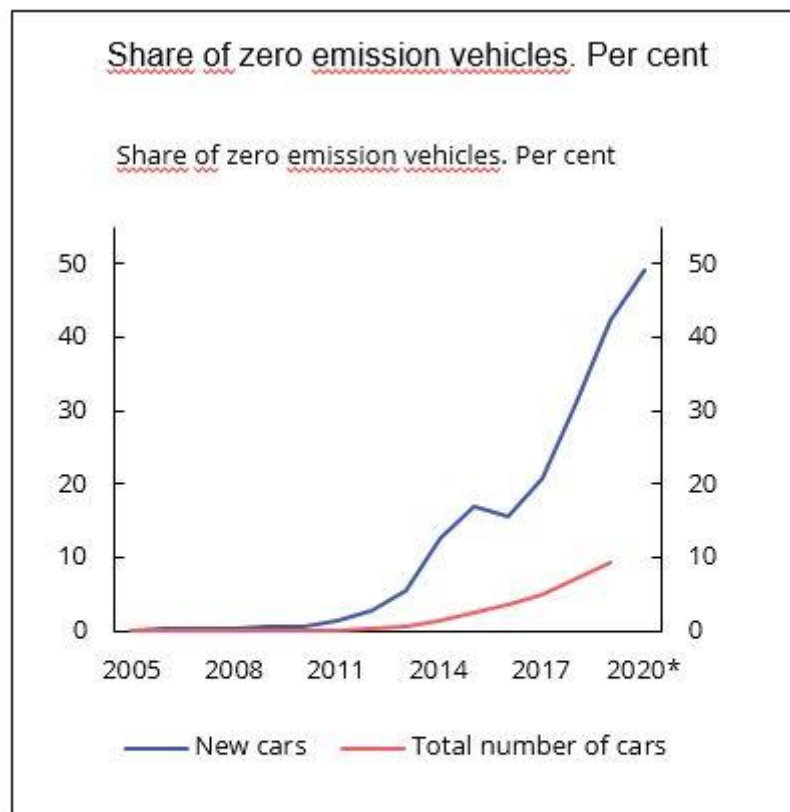


Source: Statistics Norway<sup>4</sup>

Though the share of new BEVs has increased significantly, the total number of electric vehicles is still small compared to the number of conventional fossil fuel vehicles in Norway. The development in the shares of new passenger cars and the total vehicle stock is compared in figure 1.3. The blue line represents the new car share, which reaches 49 per cent in 2020, and is much higher than the red line, which represents the share of the total stock of passenger cars, that reached 9.3 per cent at the start of 2020.

<sup>4</sup> <https://www.ssb.no/transport-og-reiseliv/statistikker/bilreg>

*Figure 1.3 Shares of battery electric vehicles per year of new passenger cars and of the stock of passenger cars in Norway 2005-May 2020*



Share of zero emission vehicles of new passenger cars and total number of passenger cars, 2005-May 2020

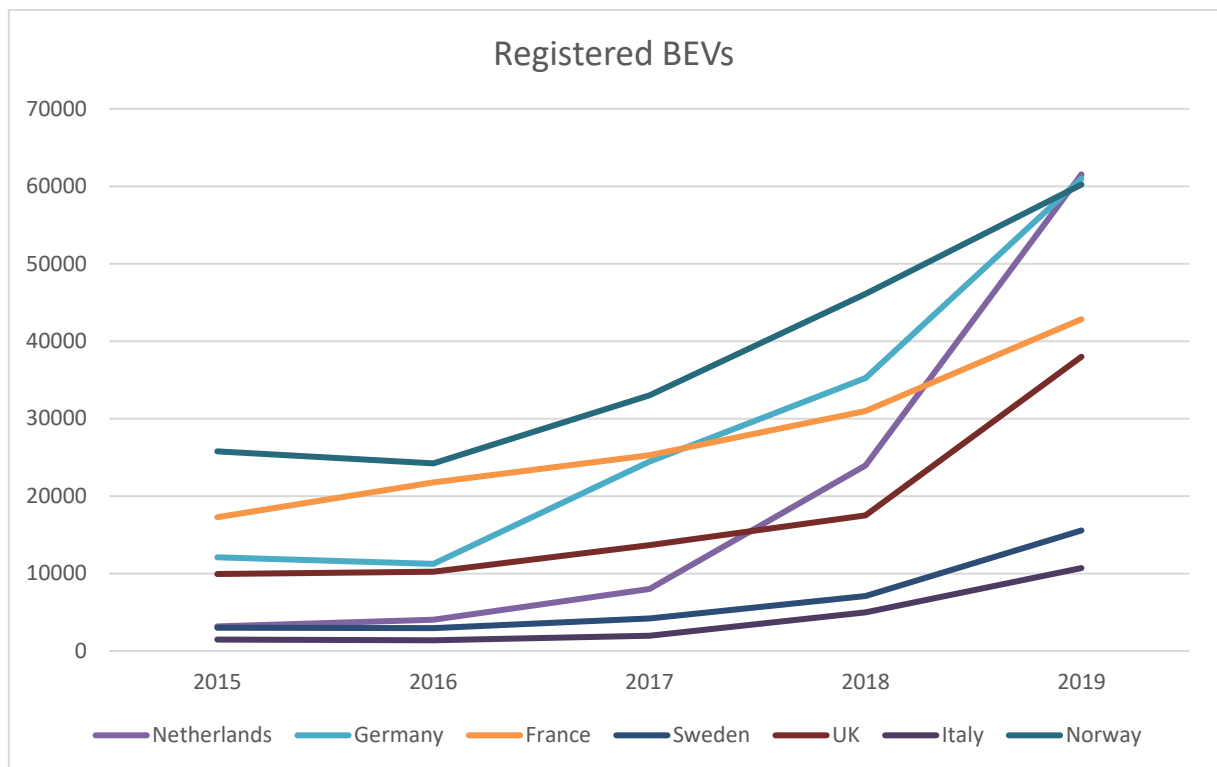
Source: Statistics Norway and OFV.

In 2019, the share of BEVs in the Norwegian passenger car fleet corresponded well with the share of passenger car kilometres driven by BEVs, which was 9.6 per cent of passenger car kilometers<sup>5</sup>. This was a substantial increase from 6.7 per cent in 2018 and 4.7 per cent in 2017.

Figure 1.4 shows the number of registered sales of new battery electric vehicles in selected European countries from 2015 to 2019. As seen from the figure, Norway has been the largest market for BEVs in Europe for many years. In fact, from 2000 to 2019, it was only in 2019 that Norway was not the largest BEV market in Europe in absolute terms. The Norwegian passenger car market represents roughly 1 per cent of the European passenger car market. Nevertheless, more than 16 per cent of all new BEVs sold in Europe last year, were sold in Norway.

<sup>5</sup> <https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/mindre-kjoring-med-personbiler>

Figure 1.4 Registered new battery electric vehicles in European countries from 2015 to 2019

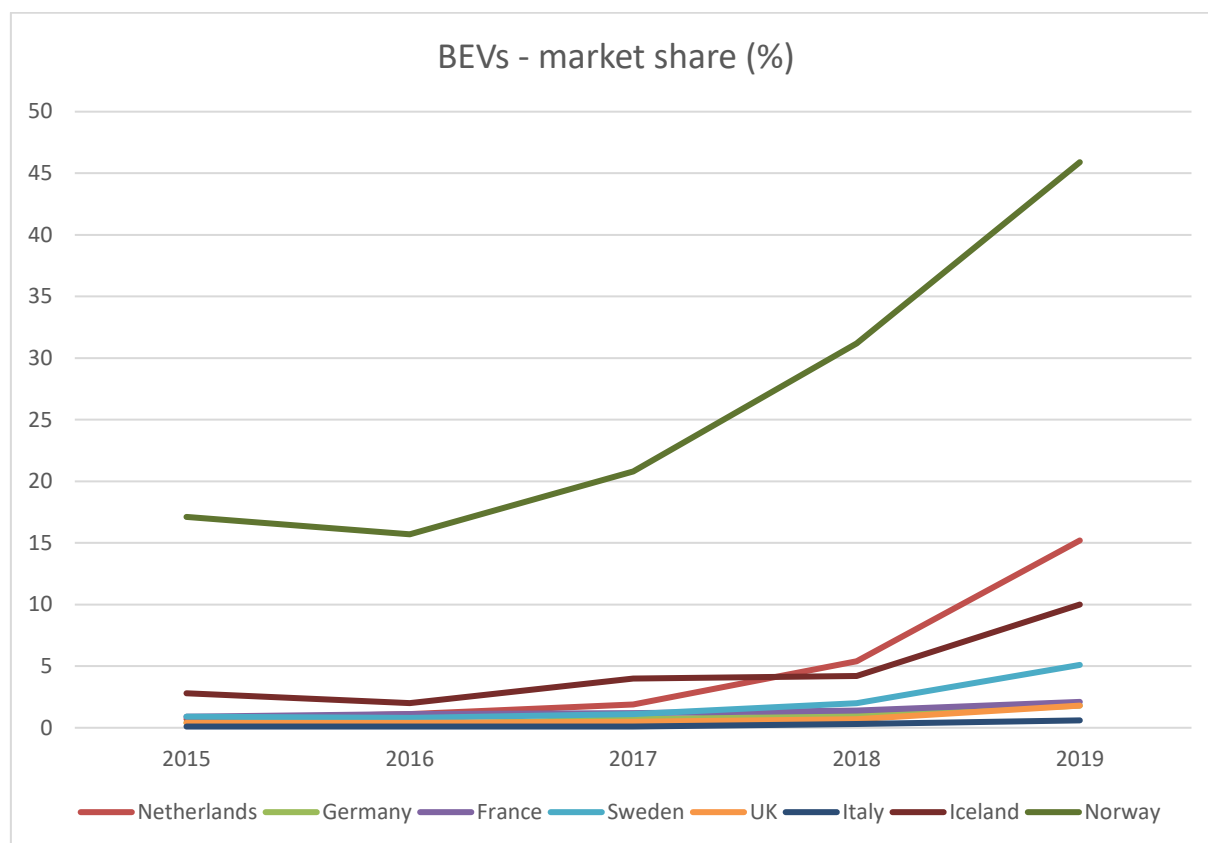


Source: European Alternative Fuels Observatory (EAFO)

Figure 1.5 shows the BEV market shares in the major BEV markets in Europe. Since 2017, the time of the last notification, the BEV share in Norway has more than doubled, from around 20 per cent to around 45 per cent.



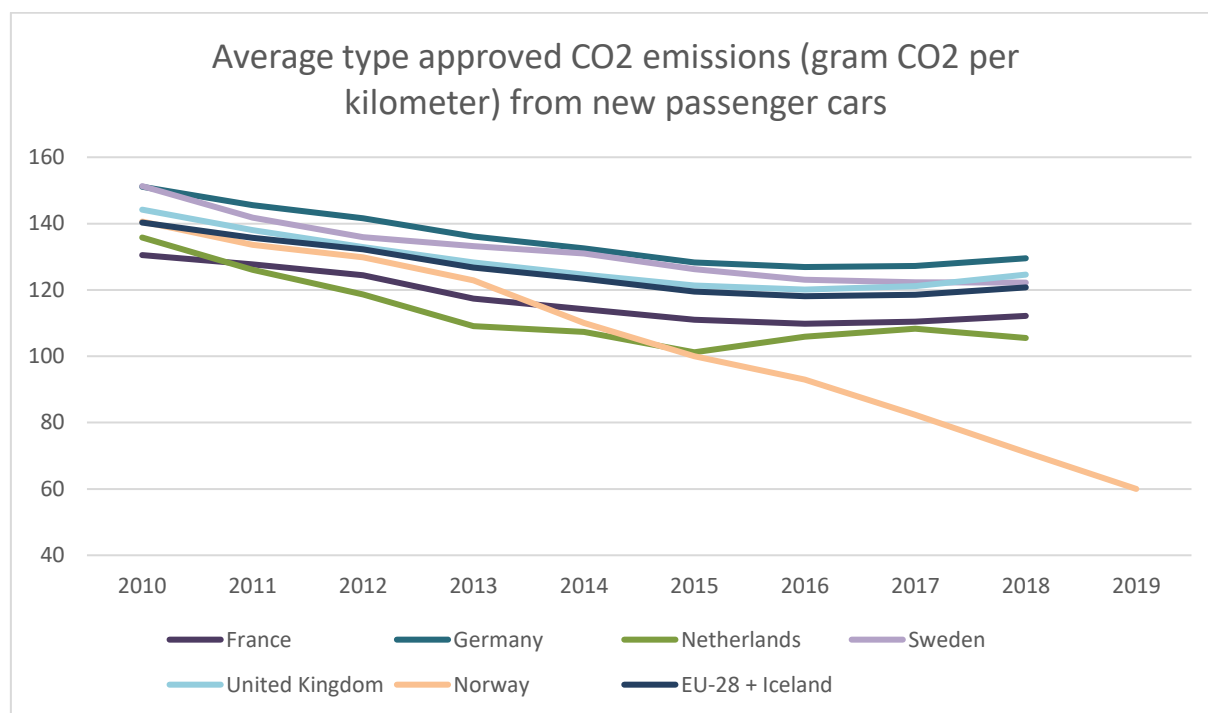
*Figure 1.5 Market share of battery electric vehicles in the new car sales in European countries from 2015 to 2019*



Source: EAFO

Average type approved CO<sub>2</sub> emissions, measured in gram CO<sub>2</sub> per kilometre, is an important measure of emissions from new vehicles. From figure 1.6, we see that emissions in Norway followed the European trend until 2013/2014. Since then, the average type approved CO<sub>2</sub> emissions from new passenger cars in the Norwegian market has followed quite a different path than any other European country. In 2019, the type approved CO<sub>2</sub> emissions from new registered passenger cars in Norway was about half of what it was in 2013 (60 gCO<sub>2</sub>/km in 2019 – 122.9 gCO<sub>2</sub>/km in 2013). The EU average declined from 126.7 gCO<sub>2</sub>/km in 2013 to 120.8 gCO<sub>2</sub>/km in 2018. The EU average in 2018 was about the same as the Norwegian average in 2013. The EU actually has an upward-sloping trend when it comes to average type-approved CO<sub>2</sub> emissions from new passenger cars, recording increases since 2016.

Figure 1.6 Average type approved CO<sub>2</sub> emissions from new passenger cars in European countries from 2010 to 2019.



Source: EEA <https://www.eea.europa.eu/publications/co2-emissions-from-cars-and-vans-2018> and numbers from OFV for Norwegian average type approved CO<sub>2</sub> emissions.

The market for fuel cell vehicles (FCV) will still be limited in 2025. In the recent analysis in Klimakur 2030, the Norwegian Environmental Agency chooses to merely look at battery electric passenger cars, as the only realistic zero emission technology in the passenger car segment. BEVs will be more competitive than fuel cell electric passenger cars at least until 2030. Both the production cost of fuel cell vehicles, fuel cells and the hydrogen itself relies on large scale production. According to Statistics Norway, 146 FCVs were registered in the beginning of 2020. Only 29 new FCVs were registered in Norway in 2019<sup>6</sup>, a reduction from 51 in 2018<sup>7</sup>. There was an explosion in a hydrogen fuelling station outside of Oslo in the summer 2019. Since the explosion, there has only been a single registration of a new FCV.

### 1.3 Price and cost comparisons between comparable BEVs and ICEs

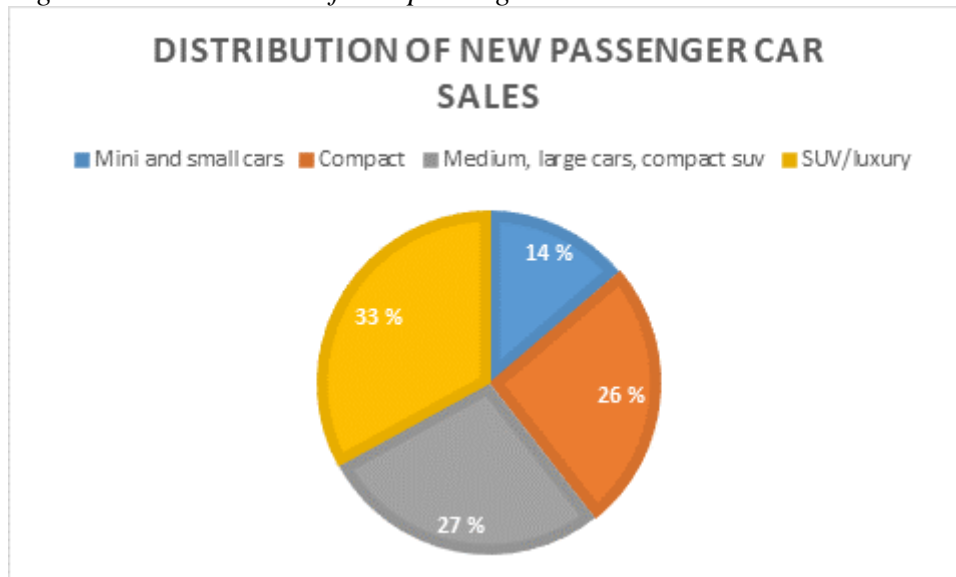
In the early phase of BEV introduction, many car models came in both battery electric and conventional fuel versions. Today, the car market is to a much larger degree dominated by unique battery electric models without specific conventional fuel counterparts. This makes the task of comparing cars on a model to model basis more difficult. Therefore, the comparison is presented on segment level. Figure 1.7 presents an overall distribution of new passenger cars by segment, showing that the most

<sup>6</sup> <https://ofv.no/bilsalget/bilsalget-i-2019>

<sup>7</sup> <https://ofv.no/bilsalget/bilsalget-i-2018>

popular segments are SUV/luxury cars, followed by the group medium, large cars, compact SUV and thereafter, compact cars and small/mini cars.

Figure 1.7 Distribution of new passenger car sales.



Source: OFV

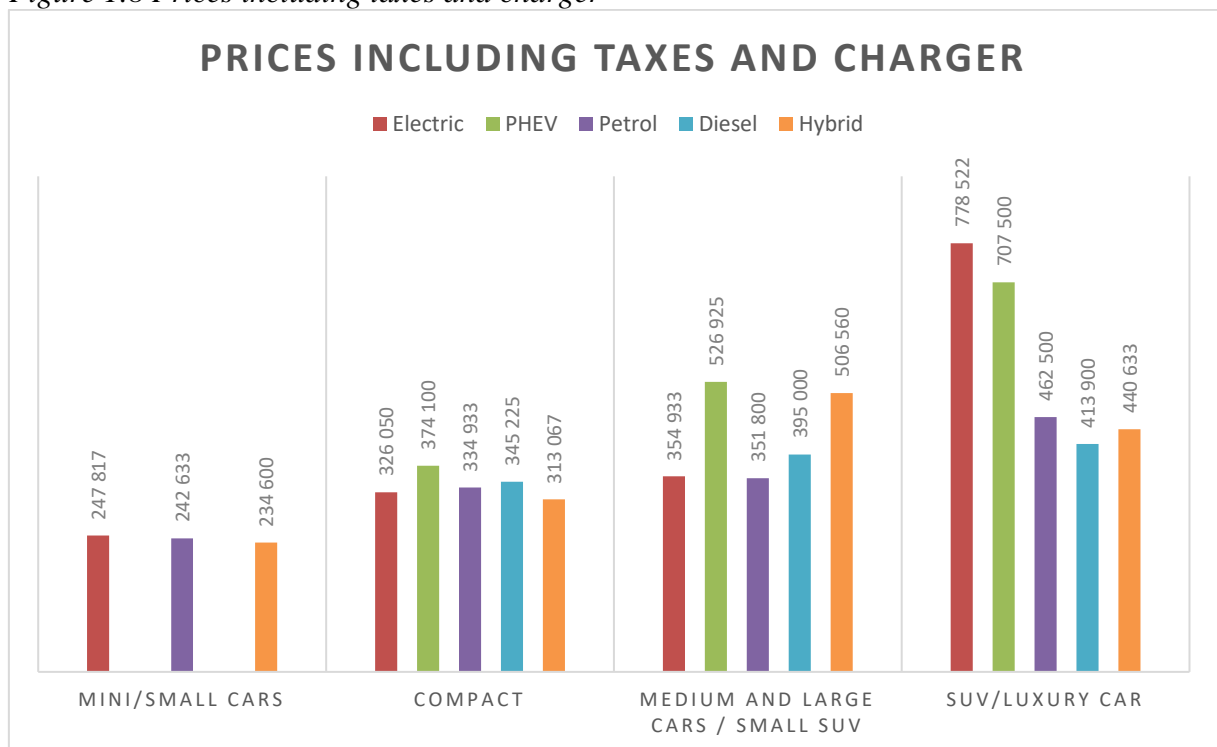
We have collected data for the new passenger car sales from January to May 2020. In total almost 48 000 new passenger cars were sold in those five months. The cars included in the analysis comprise about 75 per cent of total sales in this period. The most popular models for each segment differentiated on fuel type within those segments are chosen. There are actually 22 different segments recorded in the data from OFV, that are merged into four broader segments in the presented comparison. As a result for instance a segment called "medium, large cars, compact SUVs" and another "SUV/luxury". The data used in this analysis is provided in appendix A.

After choosing how to group the different segments, one has to decide what cars to include. The most popular models of the different fuel types in the different segments are presented. However, these models are also differentiated into different versions in the data we have. Therefore, like it was done in 2017, the numbers for the "cheapest" version in all the data are presented. The guiding price is merely the price that the importer pays. There are also some costs related to freight and other administrative costs. However, these costs should be fairly equal between the different cars.

In Klimakur 2030, one assumed a one-off investment in home charging infrastructure for BEVs which is priced at NOK 20 000. This was considered reasonable, as most BEV buyers have this expenditure connected to a BEV purchase. We have chosen to follow the example for Klimakur 2030 to better reflect the "real" purchase price of a BEV. In figure 1.8 below, these prices are compared between different types of vehicles.

Figure 1.8 summarizes the results.

Figure 1.8 Prices including taxes and charger<sup>8</sup>



Source: OFV

The purchasing price is relatively similar between all technologies in the two smaller segments. The PHEV models are typically more expensive, but that might be explained by the fact that the PHEVs are relatively heavy, with an average weight higher than the average weight for the BEV models.

The differences in prices between battery electric, petrol and diesel technologies in the segment comprising medium and large cars and small SUVs are small. However, plug-in hybrids stand out. The explanation seems to be that these cars are relatively large and more costly to produce. Three out of four of the best-selling PHEV models are heavier than the best-selling BEV models in the segment. The average weight of the PHEV models is nearly 200 kg higher than for the BEVs. In comparison, the BEVs are on average about 300 kilos heavier than the petrol and diesel passenger car models.

The results of the price comparison in the SUV/luxury car segment differ somewhat from the other segments. In this segment, BEVs have substantially higher prices than conventional fuel cars, and even higher prices than PHEVs. However, an important explanation is that among the most popular models in the segment labelled "SUVs/luxury cars", only BEVs classified as luxury cars are present (among the most popular models). Three out of six of the BEV models in the segment are luxury cars. These are the Porsche Taycan (321 sales), Tesla Model X (176 sales) and Tesla Model

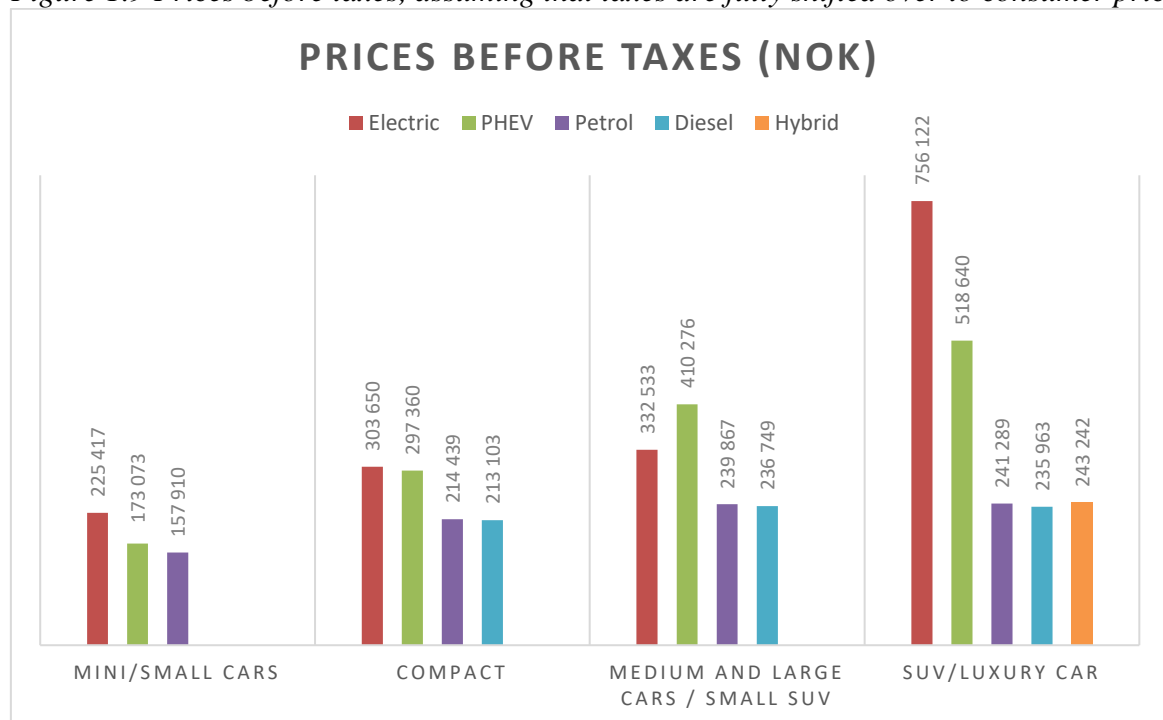
<sup>8</sup> The sale of diesel cars and PHEVs in the segment mini/small cars is marginal.

S (69 sales). These cars push the average price among the BEV models in the segment significantly upwards. For instance, the price difference between the Porsche Taycan and the most popular BEV model in the segment, the Audi e-Tron (5165 sales), is NOK 340 000. The guiding price for an Audi e-Tron is NOK 617 480. If the luxury EV models are left out, the average of the remaining models are NOK 627 000. This gives a pattern with more resemblance to the other segments, even though the segment still stands out with significantly higher prices for BEVs than conventional fuel models. The results from 2017 showed the same pattern with larger BEVs being far more expensive than larger conventional cars.

The data collected for the sales from January to May 2020 is quite similar to the last notification from 2017. The price for all segments have increased from 2016/2017 to 2020, which is to be expected given inflation. Perhaps the most substantial change is the number of EV models available and the segments they belong to. Until May 2020, 32 different EV models have been registered as new passenger cars. At the end of 2017, 16 different EV models were registered as new passenger cars. In the last notification in 2017, there were only two BEV models classified as medium cars or larger. Today, nine BEV models are classified as medium cars or larger.

One can also compare prices *before* taxes.

*Figure 1.9 Prices before taxes, assuming that taxes are fully shifted over to consumer prices.*



Source: OFV

Before taxes, the EV models in all the segments are substantially more expensive than the petrol and diesel models in the same segment.

## 1.4 Technological changes and expected development

The global electric car fleet exceeded 5.1 million in 2018, up by 2 million since 2017. This almost doubled the amount of new registrations in 2017<sup>9</sup>.

A continued reduction in battery costs, dedicated production lines for BEVs and production for a broader consumer market is expected. A combination of reduced costs and increased energy efficiency in batteries will initially increase the range of these cars, and subsequently reduce the cost for a given range. This means that BEVs should become competitive in the not too distant future, with less tax incentives than what is currently the case in Norway. A plethora of reports point to EVs becoming competitive, without tax subsidies, before 2030 (see for instance Klimakur 2030, Miljødirektoratet 2020; BNEF 2019<sup>10</sup>; and TØI 2020).

However, BEVs are still more expensive than conventional vehicles, and will potentially have other disadvantages for consumers. Such disadvantages may be long charging time and lack of charging infrastructure in some areas. Some consumer groups have extra demanding vehicle use, while others have little to gain from buying an electric vehicle. Thus, there is still a need for significant incentives for BEVs.

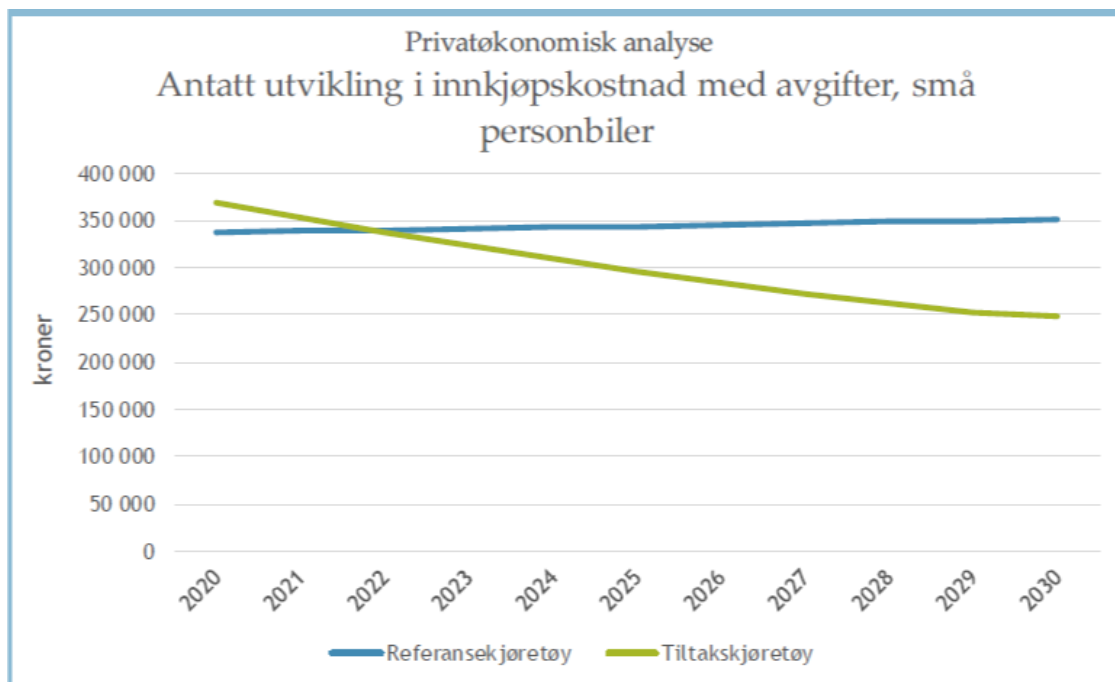
Klimakur 2030 shows expected development in investment for small and large passenger cars, with and without taxes. Klimakur 2030 finds that with current benefits and incentives, small BEVs will be monetarily profitable to buy compared to a conventional vehicle, around 2022. The same scenario for larger BEVs is around 2025. The results from Klimakur 2030 are illustrated in figure 1.10-1.14 below.

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<sup>9</sup> <https://www.iea.org/reports/global-ev-outlook-2019#key-findings>

<sup>10</sup> <https://about.bnef.com/blog/battery-pack-prices-fall-as-market-ramps-up-with-market-average-at-156-kwh-in-2019/> See also: <https://about.bnef.com/blog/electric-cars-reach-price-parity-2025/> for the same argument in 2017.

Figure 1.10. Expected development in purchaser price after taxes for small passenger cars.



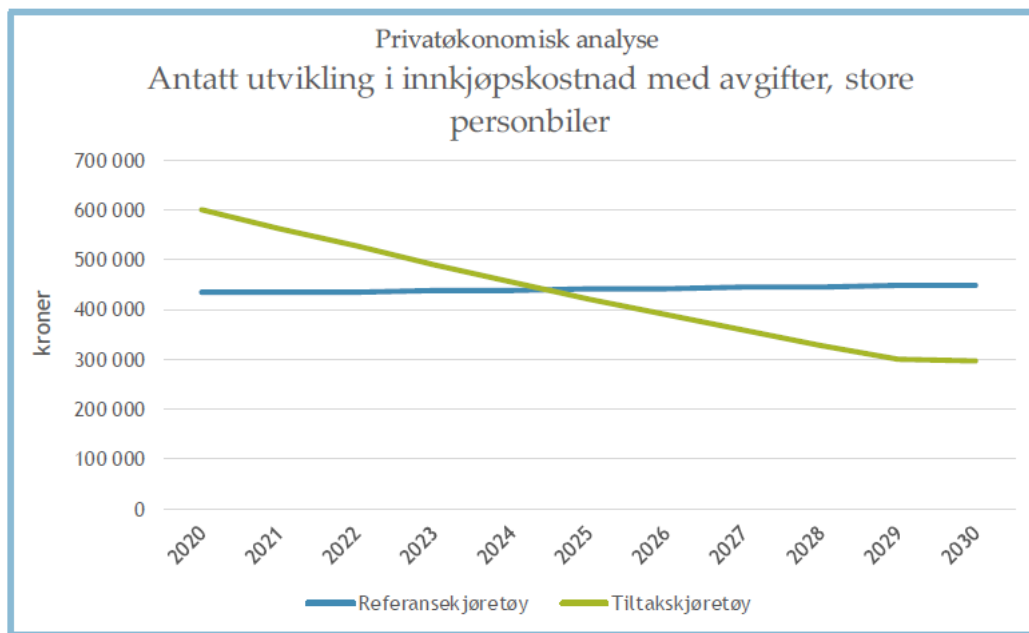
Figur 12. Utvikling i innkjøpspris inkludert avgifter for små personbiler (2019-kroner).

Figure 1.11 Expected development in purchaser price before taxes for small passenger cars.



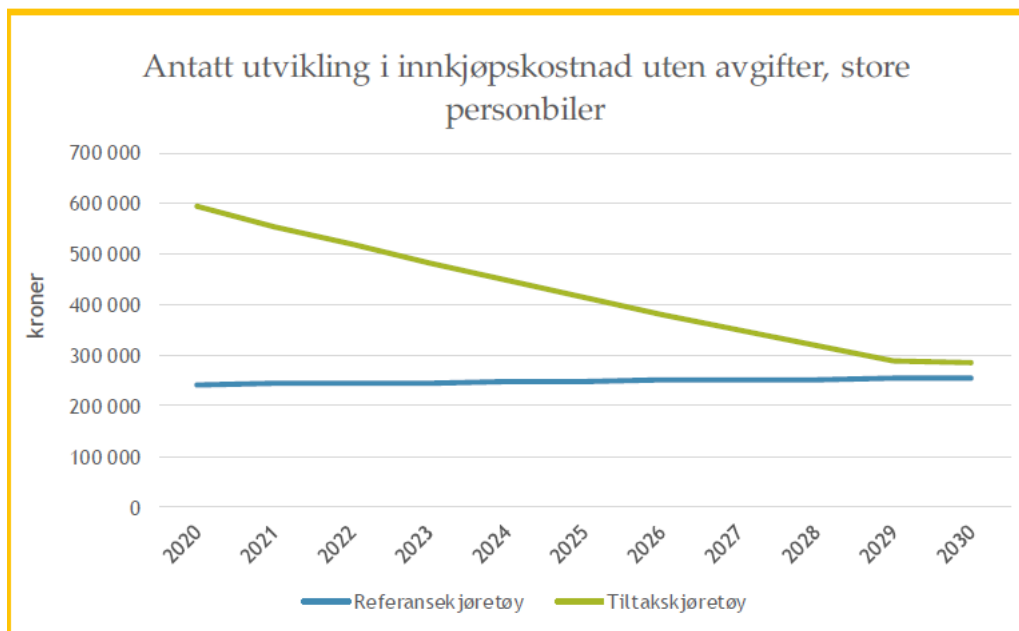
Figur 14. Utvikling i innkjøpskostnad uten avgifter for små personbiler (2019-kroner).

Figure 1.12 Expected development in purchaser price after taxes for large passenger cars.



Figur 13. Utvikling i innkjøpspris inkludert avgifter for store personbiler (2019-kroner).

Figure 1.13 Expected development in purchaser price before taxes for large passenger cars.



Figur 15. Utvikling i innkjøpskostnad uten avgifter for store personbiler (2019-kroner).

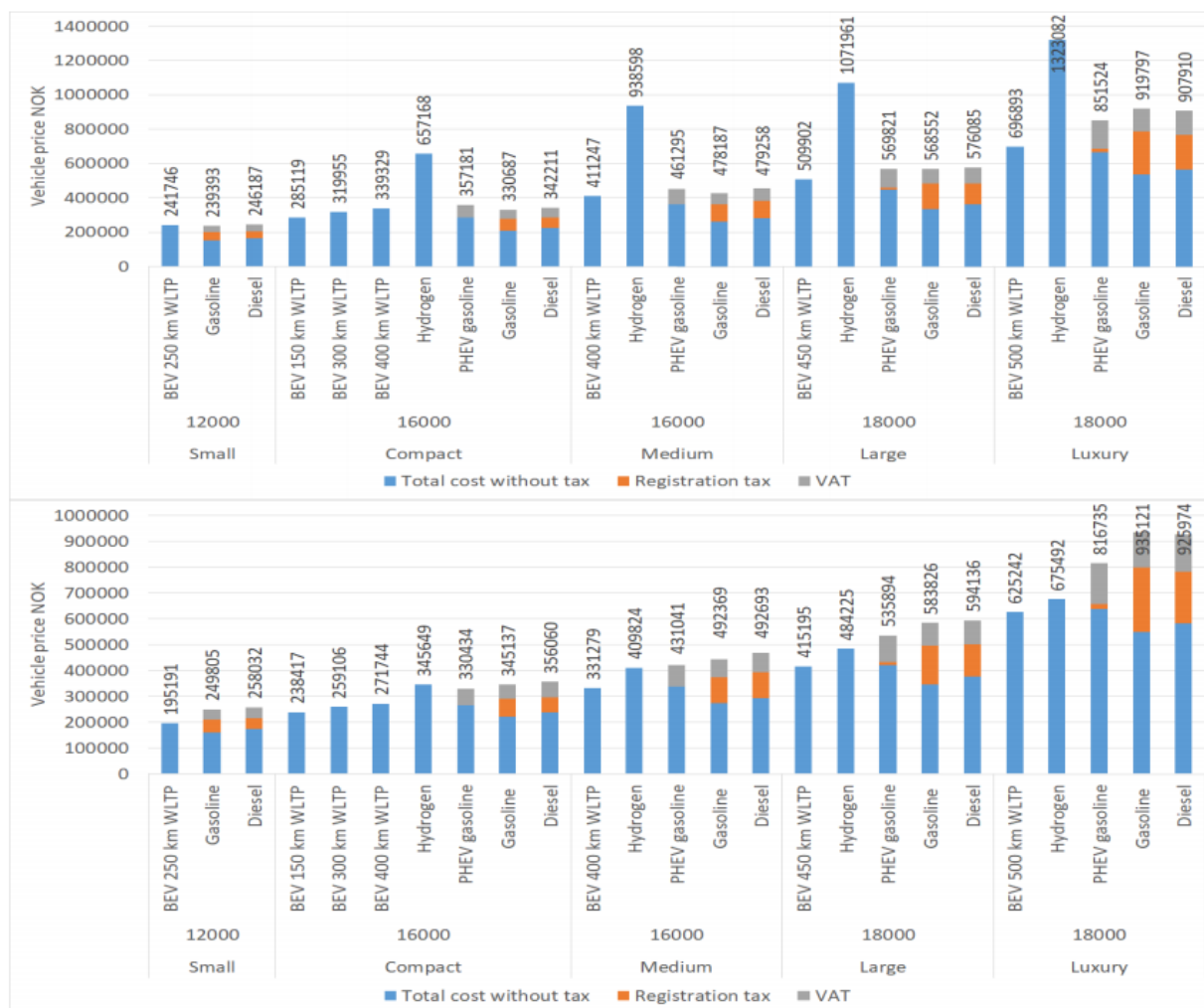
In the report “360 graders analyse av potensialet for nullutslippskjøretøy”, Transportøkonomisk institutt (TØI) has used the model TCO to estimate purchase price and taxes for zero emission vehicles and conventional fuel vehicles in 2019 and 2025 in different segments. The results are presented in the charts below. TØI finds that in 2019, small and compact cars have approximately similar prices as conventional fuel cars, due to the purchase taxes that is included in the prices of the latter. In the larger segments, the prices of zero emission vehicles are a little lower. Without the tax



advantages, zero emission vehicles are a substantially more costly than conventional vehicles. The production cost for hydrogen cars are far higher than for other vehicle technologies.

TØI estimates that the production cost of zero emission vehicles will still be higher in 2025, but they will have the lowest prices in all segments if the tax advantages remains unchanged during the time period.

Figure 1.14 Estimated purchase prices and taxes for passenger cars in 2019 (upper) and 2025 (lower) for passenger cars of different sizes and different engine technology,



Figur 10.1: Estimerte kjøpspriser og avgifter på biler i 2019 (øverst) og 2025 (nederst) for personbiler av ulike størrelse og med ulike drivsystemer. BEV=Elbil, PHEV=Ladbar hybridbil, Gasoline=Bensin. NOK. Kilde: Egne beregninger med TØI-TCO.

The prices are different in the reports from TØI and from the Norwegian Environmental Agency. One reason is that the latter includes the purchase of a charger, which is about NOK 20 000. However, the most important reason is that the different reports compare different vehicles. The purchasing price is therefore merely instructive. It is, for instance, not straightforward to decide which model of a

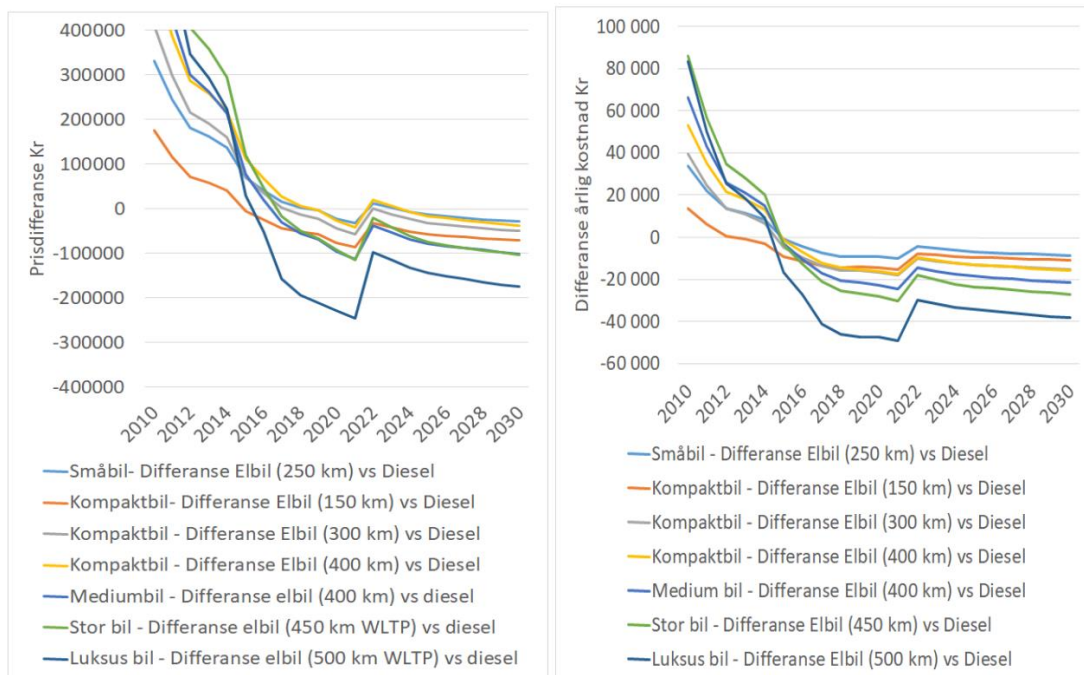
conventional car that is equivalent to a certain BEV. The choice of the specific model will affect the comparison.

The graphs and analyses above show the purchase price of different types of vehicles, and do not take into account any difference in cost between BEV and conventional cars over the lifetime of the car. A BEV owner will have lower expenditures related to fuel costs and maintenance (regular motor services for example) over the lifetime of the car.

In addition to comparisons of purchaser prices, TØI presents calculations of total cost of ownerships over the lifetime of the vehicle, based on their cost model TØI-TCO. A comparison is given in figure 1.15 below, where the left panel shows the development in purchaser price differences, and the right panel shows total annual cost differences. The downward sloping curves illustrate that a gradual decrease in price and annual cost of BEVs relative to ICEs is expected. TØI presents several different scenarios with different set of changes in tax advantages, but figure 1.16 shows a scenario where the VAT exemption is removed and replaced by the general VAT rate at 25 per cent in 2022. In the years before 2022, the calculations are shown with the current tax benefits in place. The figure show that the total annual cost are lower for BEVs, but that removing the VAT exemption significantly increases the total annual cost of BEVs and reduces the advantage compared to conventional diesel vehicles.

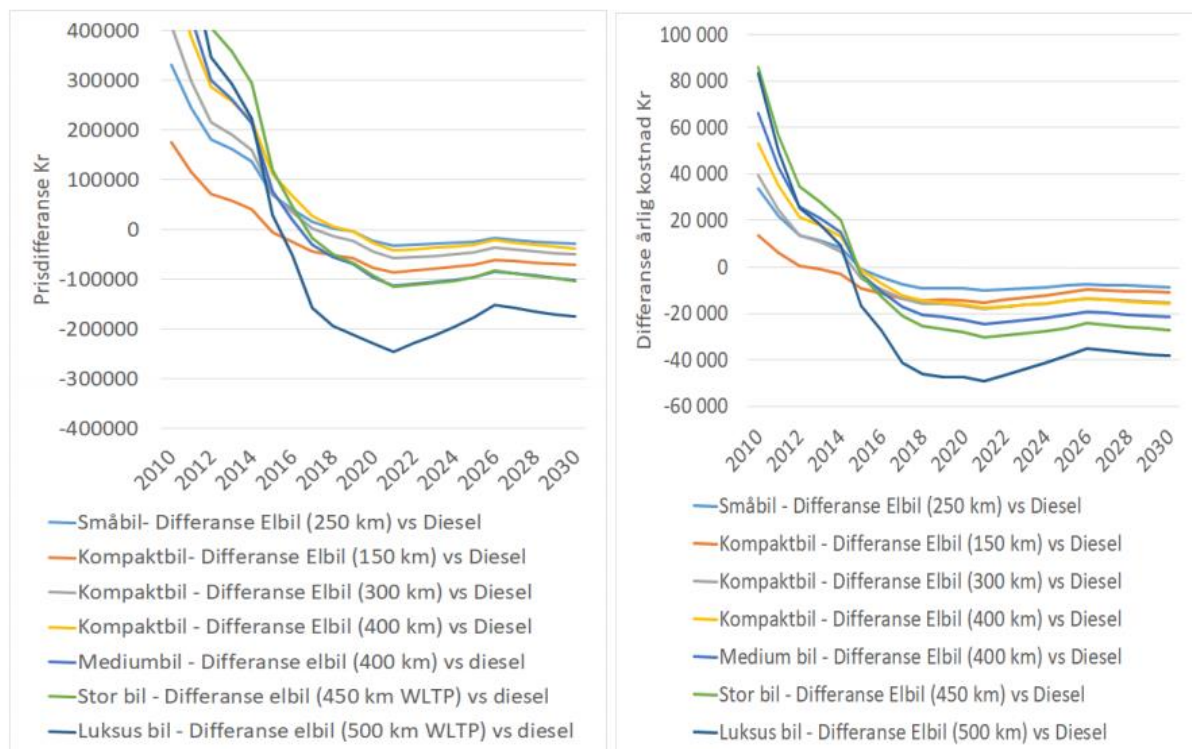
However, there is still a positive total cost advantage for BEVs over the lifetime of the car. A more gradual withdrawal of the VAT exemption is shown in figure 1.16. Compared to figure 1.15, this option does not alter the total change over the period, but the increase in the price and total annual cost of BEVs is smoothed over time. However, uncertainty about the cost and price development, as well as behavioural responses to tax changes, suggests that there are advantages related to choosing a gradual approach.

Figure 1.15 Differences between price (left) and annual cost (right) between diesel vehicles and BEVs with introduction of general VAT rate on BEVs in 2022.



Figur 13.23: Effekt av full MVA sats på elbiler med 25 prosent fra 2022. Kjøpspris (venstre). Årlig kostnad (høyre). Kilde: Egne beregninger med TØI-TCO.

Figure 1.16 Differences between price (left) and annual cost (right) between diesel vehicles and BEVs with introduction of gradual increase in VAT rate from 2022 to 2026.



Figur 13.25: Effekt av MVA innføring med 5 prosent per år fra 2022 til 25 prosent fra 2026. Kjøpspris (venstre). Årlig kostnad (høyre). Kilde: Egne beregninger med TØI-TCO.

## **1.5 Comparison of the situation in 2017 and 2020**

The sales of electric vehicles in Norway is still high compared to other countries, as it was in 2017. Although the sales of battery electric vehicles has increased considerably since the last notification, from about 21 per cent in 2017 to about 49 per cent from January to May 2020, we are still far from reaching the target of zero emission vehicles constituting 100 per cent of new passenger car sales in 2025.

Since 2017, Norway has strengthened the ambitious climate policies, and kept the ambitious targets for the introduction of zero emission vehicles. In 2020, as in 2017, the target for passenger cars is that 100 percent of new private cars and light vans will be zero emission vehicles in 2025. Improvements in technological maturity so that zero emission vehicles will be competitive to conventional vehicles, is a precondition for the targets.

In February this year, Norway became the first and so far the only western country to report a strengthened climate target within the UN deadline. Norway significantly strengthened the reduction target from 40 percent to 50 - 55 percent (from 1990 to 2030).

As expected in the last notification, the cost of producing BEVs has been decreasing since the last notification. The production costs, and hence the sales prices, excluding taxes, are higher for BEVs than for comparable gasoline and diesel cars. Furthermore, there are still disadvantages for BEV buyers, including limitations in range and charging capacity. This can represent significant disadvantages of owning a BEV, leading to a reduced demand. There is still a need for economic incentives to promote the purchase of EVs.

The VAT exemption for electric vehicles is an important economic measure that gives incentives in favour of zero emission vehicles at the time of purchase. With the VAT-exemption in place together with other measures, we have seen an increase in the BEV share. After a halt in the increase in the years 2015–2017, the increase picked up in the following years. In 2017, the future development in the share of BEVs was uncertain, and the increase the last years has been above the expectations in 2017, but in line with what the Government was aiming towards.

The pace we have observed the last years is approximately in line with what is necessary to reach the target for introduction of zero emission vehicles in 2025. The future is uncertain, but the past development gives reason to expect that with the measures in place, the increase in the BEV share will continue. Furthermore, the updated information about policy, market, cost and prices are in line with the assumptions in the notification in 2017. This supports the conclusion from 2017, that the scheme is necessary and proportionate.

The topics of special concern, whether the zero VAT rate leads to lower prices and to increased demand, are addressed in the two following parts of the midterm review.

## 2 VAT ZERO RATE AND CONSUMER PRICES FOR BEVS

During the package meeting September 26 2019, ESA clarified their expectancies regarding an analysis of the assumption that the VAT zero rate leads to lower consumer prices. In the plan for the midterm review from December 2019, we stated the following:

*“We will examine and seek to verify that the VAT zero rate results in lower price for the consumer. We intend to analyse pass-through by collecting prices for different EV-models in Norway as well as one or more comparable countries, such as Sweden. We will need to identify the price net of taxes and transform it into a comparable currency. This method will reveal whether the cars are sold at different prices in different countries, and thereby try to estimate the level of pass through of the zero VAT-rate in Norway. In the analysis we will describe factors that can affect price level for EVs in the countries, present assumptions that have been applied in the analysis and discuss the importance of these factors and assumptions with regard to the robustness of the results.”*

Since December, we have developed an empirical model designed to reveal the causal relationship between the price of Norwegian BEVs, and the VAT zero rate. The following paragraphs will give a brief summary and discussion of existing literature on tax incidence, before we present our model, results and key assumptions. For an in-depth description of our analysis, we refer to appendix B.

### 2.1 Predictions from existing literature

Economic theory states that for markets with perfect competition, or markets characterised by oligopolistic price competition with homogenous products, the rate of which an ad valorem tax is passed through to the consumers by an increase in market prices depends on the elasticities of demand and supply. A perfectly elastic supply curve (constant marginal costs) implies that the tax is fully passed through to consumers, while a perfectly elastic demand curve implies that the tax has no effect on prices. The assumptions for these kinds of markets, however, do not hold for the market for motor vehicles. Motor vehicles are sold in markets with imperfect competition, where products are differentiated both vertically and horizontally by having different characteristics and through marketing/branding. Furthermore, the market is characterised by vertical integration, where some producers sell directly to consumers via fully integrated dealerships, some may sell through non-integrated, but exclusive, dealerships, while others will sell their vehicles through “independent” dealerships. Producers might also choose a combination of the above. In markets with imperfect competition, the level of pass through depends on the exact characteristics of each market.

There has been a number of publications giving an overview of how ad valorem taxes affect prices and welfare in markets with imperfect competition, under different market conditions. The theoretical predictions vary greatly, however, the most common result seems to be that ad valorem taxes are undershifted; meaning consumer prices increase

less than the amount of tax per unit. The theoretical results are backed by several empirical studies. Empirical findings vary, depending on product, country and empirical strategy, confirming the heterogeneity of the theoretical predictions.

The heterogeneous nature of tax incidence makes it difficult to use earlier theoretical and empirical studies to draw conclusion regarding the Norwegian VAT zero rate on BEVs without a comprehensive analysis of market conditions, industry integration and the relationship between dealerships and producers. We have not been able to find any papers or reports including such an analysis, and we consider performing such an analysis to be beyond the scope of this midterm review.

In the plan for the midterm review, and the preceding meetings, the issue has been whether the VAT zero rate on Norwegian BEVs has been passed on to consumers in the form of reduced prices. Pass through is a central part of the tax incidence literature, but theoretical predictions and empirical estimates usually hinges on the fact that VAT rate reductions is introduced in mature markets. The VAT zero rate on BEVs was introduced in 2001, long before there existed a substantial commercial market for BEVs. While this may seem trivial, it has some important implications. Phenomena such as price stickiness and tacit collusion help explain why reduced rates are not passed on to consumers, but these phenomena will only occur if there is a price before the reduced rate is introduced. One must therefore use great care when drawing conclusions about the Norwegian VAT zero rate on BEVs based on empirical estimates for other goods or markets.

## **2.2 Empirical model and analysis**

Given the special circumstances of the VAT zero rate, instead of determining the level of pass through, we wish to study what would happen to BEV prices if we introduced VAT on BEVs in Norway. Our proposition is that if prices are unaffected by the introduction of VAT (equivalent to the tax exemption not being passed through), there must exist an ad valorem mark up on BEVs in Norway that is contingent on the VAT zero rate. We collect price data for 51 BEVs and 23 conventional vehicles in Norway and Sweden and employ a model similar to the difference in difference model used in causal empirics.

By comparing the price difference between battery electric and conventional vehicles in each country, we eliminate any factors that affect prices of either conventional or battery electric vehicles in both countries, and any factors that affect prices of both battery electric and conventional cars in one of the countries. Since we also adjust for differences in taxation, any positive difference in price differences should be caused by the existence of a mark-up caused by reduced sales taxes on BEVs . If the difference in price differences is equal to zero, we may conclude that there is no mark up on BEV prices, and that the VAT zero rate leads to lower consumer prices for BEVs in Norway.

When calculating the average difference in differences for our sample, under the assumption that VAT and one-off registration taxes in the Norwegian and Swedish market is fully passed through, we find the difference to be negative. This result indicate that prices of BEVs in Norway are lower than the reduced VAT rate should imply. Our analysis is sensitive to the level of pass through of taxes in Sweden and on conventional cars in Norway. If we allow for overshifting of these taxes, meaning a 25 percent VAT rate leads to price increases larger than 25 percent, the difference in price differences becomes zero.

The negative sign on the average difference in price differences may be caused by the fact that the underlying assumptions of our model does not hold. A key assumption is that BEVs are sold with constant marginal costs. Based on our knowledge of the car industry, we believe this to be likely on the production level, and on the dealership level. Even if there are economies of scale present, we argue that the relative size of the Norwegian and Swedish market, combined with the geographical proximity of the two countries, makes any economies of scale negligible for the purpose of this analysis. The negative sign could also be caused by a country and vehicle specific factor that is omitted from our model. For this to be the case, the factor would have to be substantial. We are not able to identify what this factor could be, and while it is impossible to completely rule out the existence of such a factor, we deem it unlikely that the results are skewed by an omitted factor.

Our empirical analysis may have some limitations, but when combining it with the vast theoretical and empirical literature on tax incidence, we find it very unlikely that prices on electric vehicles would be unaffected by the introduction of a VAT, and hence that the VAT exemption is passed on to the consumer. We therefore conclude that the VAT zero rate benefits consumers through reduced prices.

### **3 VAT ZERO RATE AND DEMAND FOR BEVS**

In the plan for the midterm review, it is stated that we attempt to verify that the VAT zero rate increases demand for BEV. There is a large number of studies and surveys on electric cars, car taxation and similar topics. The most relevant studies are briefly presented below. In the plan for the midterm review, a report commissioned by the Ministry of Climate and Environment from TØI, is specifically mentioned. Much information from this report, “360 graders analyse av potensialet for nullutslippskjøretøy” is included earlier in the first part of this midterm review. In addition, the report is included in the list below. The studies and surveys presented are divided in three subgroups, as specified in more detail below.

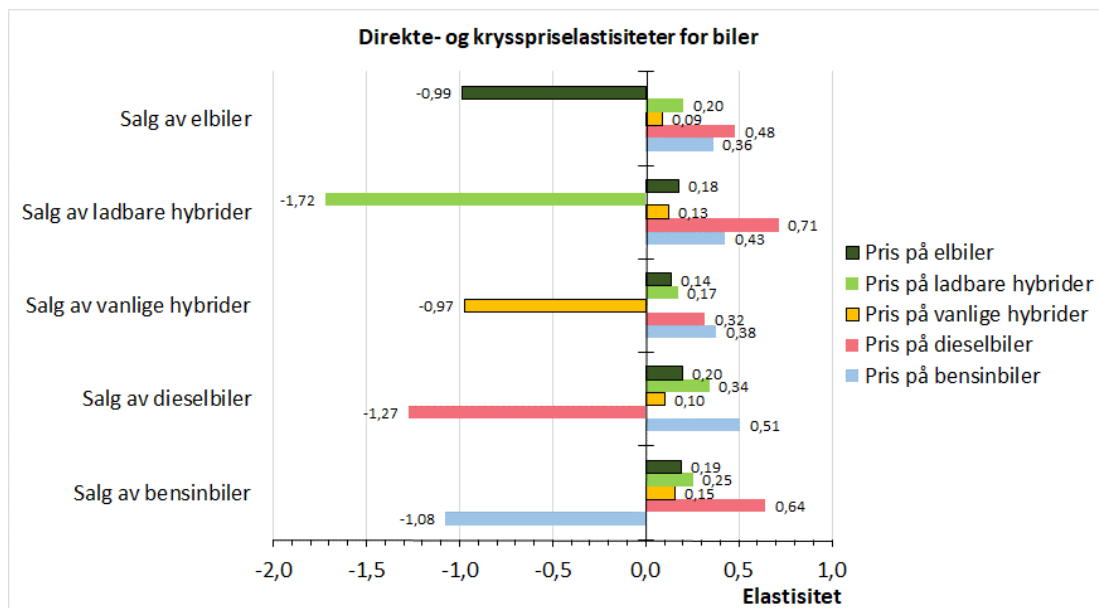
#### **3.1 Studies with empirical estimates of tax changes**

The VAT exemption is part of a comprehensive set of measures and, have been in place since 2001. Therefore, the effect of the exemption on the demand for BEVs is difficult to estimate. Results from studies that use different models have tried to simulate the effect of the changes in the car taxation on the car sales in Norway, are summarized below.

### 3.1.1 The demand for new automobiles in Norway – a BIG model analysis, TØI-report 1665/2018

In this report, TØI analyses how different tax changes affect the composition of car sales, CO<sub>2</sub> emissions and revenues. To simulate responses to different tax changes they use the model BIG, a disaggregated discrete choice model of passenger car purchases. The model uses information about virtually all 1.8 million new automobile transactions in Norway during 2002–2016, to derive direct and cross demand price elasticities for gasoline, diesel, ordinary hybrid, plug-in hybrid and battery electric passenger cars. The direct and cross demand elasticities are shown in figure 3.1.

*Figure 3.1 Price elasticities of demand for five vehicle types in 2016, derived with respect to the retail prices of cars.*



Source: TØI

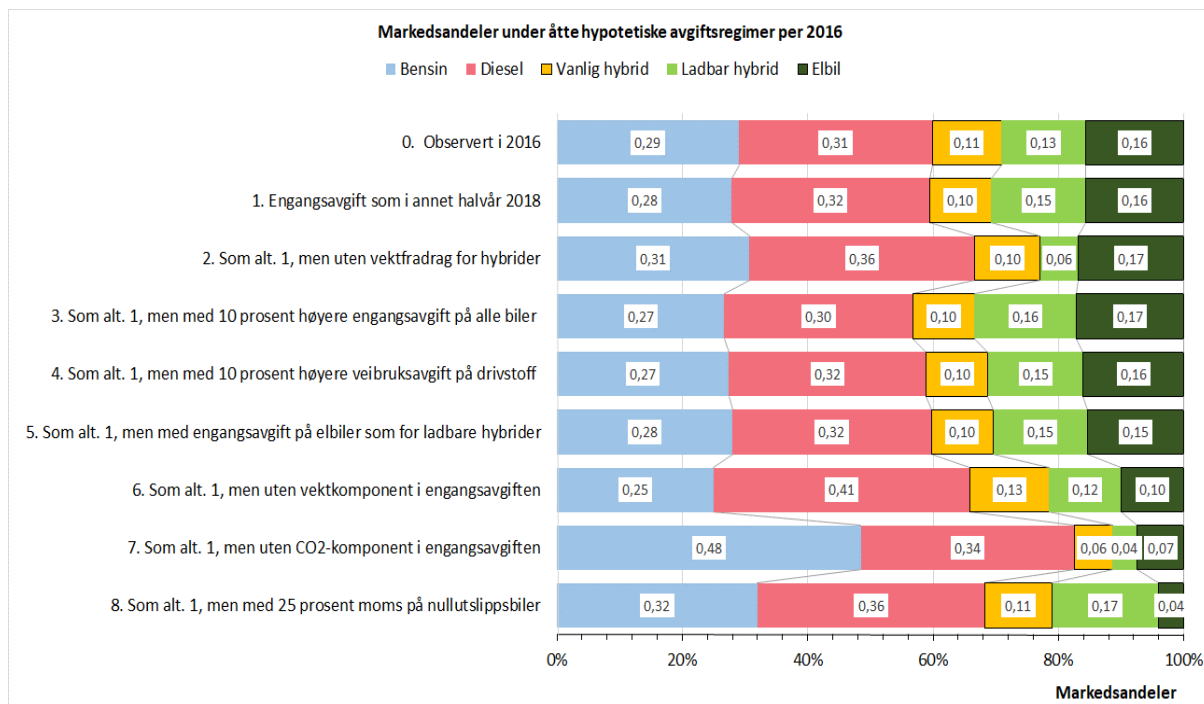
The direct demand elasticity for battery electric vehicles is 0.99, i.e. a one per cent increase in the price of BEVs is expected to give a close to one per cent reduction in the sale of BEVs.

In their report, TØI analyses some specific tax changes as shown in figure 3.2, including:

- Introduction of general VAT rate of 25 per cent for BEVs. The results would have reduced the share of new passenger car purchases in 2016 from 16 to 4 per cent. The result implies that a large price increase could have significant negative impact on the sale.
- Introduction of a registration tax for BEVs similar to that of PHEVs would only result in a small reduction in the sales of BEVs. One important reason for this result is that this tax change only would result in only a few BEVs (the heavy ones) getting a positive registration tax, leaving the majority unaffected by the change.



Figure 3.2. Observed market shares in 2016 and calculated market shares under eight different tax regimes.



Source: TØI

To summarize, this study shows that car buyers respond to tax changes, but the magnitude of the response depends on which changes are made. Large tax changes, like removing the VAT exemption or the CO<sub>2</sub> component in the registration tax, can possibly imply large adjustments and changes in the composition of the new passenger car purchases. Less dramatic changes, like 10 per cent higher registration tax for all cars, can result in relatively limited changes in the composition.

### 3.1.2 'Greening the vehicle fleet: Norway's CO<sub>2</sub>-Differentiated registration tax'. Yan S. and G. S. Eskeland. 2018

The study analyses the CO<sub>2</sub>-differentiation of the vehicle registration tax. They find that a 1 000 NOK tax increment reduces vehicle sales by 1.06–1.58 %. The study presents an elasticity of average CO<sub>2</sub>-intensity to average car price of -0.53, with a pass through of the tax to car prices of 88 %. They conclude that tax significantly shifts consumers toward lower-emission vehicles. Simulations done in the study, suggest that high-emission vehicle segments lose market shares and become less CO<sub>2</sub>-intensive, while low-emission segments gain market shares.

The topic of the study is the registration tax, not VAT-advantages and it uses data for the period from 2006–2011, that is before the numbers of EVs increased substantially. Nonetheless, the study finds significant shifts in choice of cars due to tax incentives.

### 3.1.3 'Evaluation of changes in the registration tax for new passenger cars', (‘Evaluering av endringer i kjøpsavgiften for nye biler’). Vista Analyse. 2012<sup>11</sup>

The study evaluates the introduction in 2007 of environmental differentiation of the registration tax. From 2006 to 2011 the average CO<sub>2</sub>-emissions from new passenger cars fell with 24 per cent. Vista Analyse finds that the tax changes can explain between 50 and 60 per cent of the observed emission reduction in the period. The findings that the CO<sub>2</sub>-component in the registration tax have had significant influence on the CO<sub>2</sub>-emissions from new cars, also strengthens the hypothesis that tax advantages at the time of purchase like the VAT-exemption, impacts the composition of car sales.

### 3.1.4 Simulated effects of changes in the VAT zero rate based on earlier estimates

In the plan for the midterm review, it is stated that if possible, estimated elasticities will be used to calculate probable effects of the VAT zero rate. The elasticities that most easily lends itself to an exercise like that, is the estimate from TØI shown in figure 3.1 above. If the direct demand price elasticity for BEVs of roughly -1 per cent is used as basis for estimation, introduction of low tax for BEV, for example 10 per cent of the price, will give a moderate, but significant, reduction in the demand, with a magnitude around 10 per cent. With a BEV share of 50 per cent so far in 2020, a change like this would implicate a reduction of five percentage points. As mentioned earlier, the result TØI calculates for reduction in the BEV share if general VAT rate is introduced, indicates that bigger changes can imply large adjustments.

Even though there is considerable uncertainty about the range the estimated elasticity is valid, as well as changing market conditions due to the rapid change in the vehicle market, the estimate may serve as an indication of the magnitude of the change in the composition of new cars, it is reasonable to expect with a moderate introduction of tax on BEVs.

## 3.2 Survey results

Surveys can give insight of how buyers value different measures and perceive the importance of advantages. Results from different surveys are presented below.

### 3.2.1 'Charging infrastructure experiences in Norway - the worlds most advanced EV market'. Lorentzen et al. 2017

The paper has a focus on charging infrastructure and experiences, but also discusses more general aspects of the Norwegian EV policies. They argue that the Norwegian experience shows that there is a substantial number of potential early users who will buy BEVs even without a comprehensive fast charging network. They contrast this by comparing with Denmark, where the charging infrastructure network is quite well-developed, but the BEV sale is sluggish. The assessment is that this implies that other incentives are more important than a charging network on its own. However, the paper

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<sup>11</sup> Report by Vista Analyse: <https://vista-analyse.no/no/publikasjoner/evaluering-av-endringer-i-kjopsavgiften-for-nye-biler-fra-2006-2011/>

does comment that as we are moving to a mass market adoption of BEVs, there is an obvious need for a large scale fast charging network as new user groups are preparing to move into the world of BEVs and as a growing number of BEV owners do not rely on conventional cars as backup.

Regarding the need for public support for fast charging, the paper argues that the business model related to fast charging, is starting to come apparent with as little as around 115 000 BEVs, or around 3 per cent of the light car fleet being BEVs. The paper draws the conclusion that this shows that there is a limited need for public support after a relatively short introduction phase. They highlight that a future challenge will be charging possibilities at home for the population living in apartment buildings.

The paper also presents some results of an EV owner survey from 2017, showing that the Norwegian BEV users values the tax breaks at time of purchase and other economic incentives, the highest.

### 3.2.2 'Elbilbarometeret 2019' A Nordic survey by Opinion in collaboration with the Norwegian EV Association, and 'Elbilisten 2019' A survey by the Norwegian EV Association

*Elbilbarometeret* is a Nordic survey by Opinion in collaboration with the Norwegian EV Association. The survey has 4 778 respondents, approximately 1 000 respondents from each of the Nordic countries, a bit less from Iceland. The purpose of the survey is to examine the demand for and attitudes towards EVs, in the Nordic countries. The 2019-survey is carried out in 2018 and 2019.

According to the survey, 65 per cent have the opinion that tax relief is important for Norwegians to be buying an EV next time they replace their car. In Norway, it is perceived that the most important barrier to buying an EV is lack of range. This is the same as in Iceland, but in Denmark, Sweden and Finland the price is the most important barrier.

*Elbilisten* is an annual survey by the Norwegian EV Association since 2013. In 2019, the survey was sent to 70 000 EV owners (both member and non members of the association) and received 16 125 answers. The purpose of the survey is to examine Norwegian EV owners car use, attitudes and experiences with EV and charging.

According to the survey, the VAT exemption is the most important EV advantage. When asked to choose the three most important EV advantages for themselves, the VAT exemption is chosen by the highest share, 69 per cent. Following second and third are the exemption from the registration tax (58 per cent) and free or low toll roads (50 per cent). When asked if they would buy an EV today without the VAT exemption, 28 per cent answered 'yes', 47 per cent 'no' and 24 per cent answered 'not relevant/unsure'. When asked what they would buy without exemption for the VAT and registration tax, 41 per cent answered 'EV', 34 per cent answered 'new or used petrol or diesel car', 6 per cent would not buy a car and 19 per cent answered 'do not know'.

The surveys show that the VAT advantage is considered as an important, maybe even the most important, measure to increase the purchase of EVs. The answers from

existing EV owners in Norway, indicate that a significant share of the EVs would not have been purchased without the VAT exemption.

### 3.2.3 'Battery electric vehicle user experiences in Norway's maturing market'. TØI-report 1719/2019

We also refer to results from an online survey from June 2018 of BEV owners and owners of conventional cars. The results are compared with a similar survey from 2016.

Young men with high education, in work and in bigger households with above average income drive a BEV more often than the average car driver. However, from 2016 to 2018, the difference between the BEV driver and the average driver has diminished. BEV owners have in average 35 per cent longer travel distance to work than owners of conventional cars. The survey finds that in the opinion of owners of conventional cars, the following are the largest drawbacks with BEVs: Limited range, car size and practical characteristics like trunk size and lack of possibility for towbar – properties that are important when it comes to longer journeys and flexible car use. For BEV owners, driving economy is the most important reason for the car choice for 56 per cent, while only 8 per cent of the conventional car owners say the same. For the latter, reliability and practical properties are the most important. The share who want to buy a BEV as their next car is increasing. To summarize, the survey shows that a growing number of consumers is considering BEVs a viable alternative. However, for the owners of other cars than BEVs, properties of the car is important, and in their opinion, there still is important disadvantages with BEVs compared to conventional cars.

## 3.3 Various studies evaluating aggregate performance of Norwegian measures

### 3.3.1 '360 graders analyse av potensialet for nullutslippskjøretøy', TØI-rapport 1744/2019

The report investigates goals, incentives and results with regard to EVs in Finland, Sweden, Denmark, Germany, France and China. All these countries have incentives in place, which can have a value of up to EUR 60 000, but typically less. Many of the incentives take form of favourable taxation rules for the private use of electric company cars. None of the countries comes close to Norway when it comes to market shares for EVs. A conclusion of the report is that countries with the most incentives have the highest EV shares. Further, a finding which is reported is the importance of the long-term nature of the Norwegian EV incentives, and the relative predictability. This has been very important for there to be a functioning second hand market, which is imperative when taking a decision of buying a car. It seems that Norwegian EV owners have trusted that there will be a second hand market for EVs. The dynamic might have had the opposite effect in many countries, which may also explain to some degree why the *privately* owned EVs have a marginal share of the total EVs owned. Lastly, in the report one points toward the relative simplicity of the Norwegian EV incentives, as compared to the other countries.

It also seems that many other countries have set ambitious targets for the sales of new EVs, mirroring the Norwegian goal, albeit not as ambitious.

### 3.3.2 Briefing No 6/2019 Summary of ‘Fiscal instruments favouring electric over conventional cars are greener’ by The European Topic Centre on Air Pollution and Climate Change Mitigation. European Environment Agency. 2019<sup>12</sup>

One of the conclusions from this study, is the following: Countries such as Norway and the Netherlands, that have promoted electric vehicles more than any of the other countries in the study, managed to achieve significant reductions in emissions, both in terms of CO<sub>2</sub> and air pollutants. Many electric vehicles were introduced into these countries’ fleets, because policies specifically target these technologies. The leading country in terms of emission savings, is Norway. One likely reason for this relatively high performance is strong incentives for promoting purchase and ownership of PHEVs and BEVs.

### 3.3.3 ‘Dagens and morgendagens bilavgifter’. TØI-rapport 1708/2019

The report presents and evaluates the existing system for car taxation and proposes improvements. In the assessment of the VAT, it states that the VAT exemption for BEVs plays a significant role for the choice of the car purchasers, and thereby is an important measure in the climate policy in the transportation sector. In the concluding remarks of the evaluation of the VAT, it is stated that the exemption for zero emission vehicles is decisive for the competitiveness and market share of these cars.

The report also presents projections of passenger cars transportation until 2030. To see the effects of the purchase taxes, it is important to look quite far ahead. In this part of the report, the necessary strength of the EV-incentives to reach the zero emission targets, is discussed. It is considered an open question whether the existing BEV incentives will be sufficient to achieve the zero emission targets for new passenger cars in 2025 and 2030. Different aspects are discussed and it is stated: *“All in all it is little doubt that the tax exemptions for zero emission vehicles in a decisive way has affected the choices of the car purchasers. The climate effect of this is limited in the short run, but significant when looking 10 to 20 years ahead.”*<sup>13</sup>

### 3.3.4 ‘Incentives for Electric Vehicles in Norway’. Ecofys and Adelphi. 2018

The article presents and discusses different aspects of the Incentives for electric vehicles in Norway. It states that the most important incentives for Norway are financial. Norway’s approach is outstanding insofar as the total cost of ownership (TCO)<sup>14</sup> is lower for PHEVs in comparison to internal combustion engine vehicles.

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<sup>12</sup> <https://www.eea.europa.eu/publications/fiscal-instruments-favouring-electric-over>

<sup>13</sup> «Alt i alt er det likevel liten tvil om at avgiftsfritakene for nullutslippsbiler på en avgjørende måte har påvirket bilkjøpernes valg. Klimaeffekten av dette er beskjeden på kort sikt, men betydelig når en ser 10 til 20 år fremover.»

<sup>14</sup> A TCO consists of a car’s purchase price, its maintenance and fuel costs, and the infrastructure costs over the lifespan of the vehicle. Sometimes, insurance and financing costs are also included in this calculation.

The article discusses the effectiveness of the EV incentives by assessing results of different studies. They comment that isolating the contribution of particular policy instruments to the uptake of EVs, is a methodological challenge but has been attempted by researchers. They refer to a calculation of partial effects on BEV stock if individual incentives were removed by Fearnley, Pfaffenbichler, Figenbaum, & Jellinek from 2015 that shows that bus lane access and VAT as well as purchase tax exemptions, have the most important effect on BEV adoption, while annual benefits such as road tax rebates have a smaller impact on the adoption of BEVs in Norway.

They also refer to other studies, for example by Højklint & Hofvander Hansen from 2017, that based on consumer surveys have shown somewhat mixed results. It varies whether the reduction in operational cost (road tolls, annual taxes) or the upfront investment (VAT and registration tax) are more important to consumers.

The report also considers the Norwegian electricity mix that have a high share of renewables, and hence concludes that the GHG reduction potential of EVs in Norway is high. Furthermore, they also argues that potential adverse effects (congestion etc.) as well as the high cost and the cost efficiency of the policies should be taken into account.

### 3.3.5 'E-vehicle policies and incentives - assessment and recommendations'. TØI-report 1421/2015

In this study, TØI uses a model named SERAPIS to analyse effect and cost of different incentives. The analysis is performed as early as 2015, but is interesting because the study gives some indications of the relative importance of different measures. The results indicate that VAT in combination with purchase tax is an effective measure, but also costly. The study states that incentives that directly reduce the purchase price of an EV are particularly effective in growing the BEV market.

### 3.3.6 NOU 2019:11 Enklere merverdiavgift med én sats

NOU 2019:11 analyses the potential for improving and simplifying the VAT system. The report recommends that the VAT system should have as sole purpose to generate revenue. As part of this recommendation, it is suggested to remove all low rates and exemptions, including the exemption for BEVs. However, the report considers VAT exemption, together with the other tax and user benefits, as an important reason for the growth in the BEV share in Norway. While mainly evaluating the VAT system from an efficient tax point of view, the report also points to that the VAT exemption is costly and has some other disadvantages as uneven distributional effects, that the price determines the support level and in general complicates the VAT system.

### 3.3.7 Klimakur 2030. The Norwegian Environment Agency

According to the emission projections from the Norwegian national budget 2020, about a third of non-quota greenhouse gas emissions in the period 2021-2030 will come from road transport. Of these, 45 per cent come from passenger cars, 36 per cent from heavy vehicles (trucks and buses) and 17 per cent from vans. The remaining 2 per cent are

from motorcycles and mopeds.

According to Klimakur 2030, electrification will be the most important measure to reduce emissions for passenger cars, vans and heavy transport. For the existing car park, we can reduce activity and use of biofuels to reduce emissions.

Klimakur 2030 argues that the Norwegian NTP targets are technically possible to achieve, if provided with sufficient charging infrastructure and strengthening of the instruments that facilitate phase-in of electrical vehicle. However, it can be demanding to reach 100 percent of a segment from a given year. In this report, the NTP targets have been interpreted as "almost 100 percent of new car sales by 2025".

If the existing benefits are continued, the electric car is expected to be very competitive for all types of passenger cars as well as light goods vehicles, as production costs fall further. It can be very demanding in any case to achieve the phase-in that is the basis for the measure, which means that all new passenger cars purchased from January 1, 2026 are electric cars. There can be a large spread in the additional costs between the operators, among other things due to cost differences between large and small electric cars, variation in mileage, access to charging infrastructure and financing costs. There is also reason to assume that some have strong preferences for choosing vehicles with diesel or petrol engines rather than electric motors.

This means that very strong measures are needed to get the "late" consumers to choose an electric car. It is therefore reason to believe that it will be considerably easier to reach a goal of, say, 95 or 98 percent of new car sales than a 100 percent goal. It is worth noting that even with an electric car share of new car sales of 100 percent, will be possible to buy gasoline and diesel cars for many years in the future in the second hand market, for those who have a strong preference for these or a pattern of use that they consider incompatible with an electric car.

### 3.3.8 Global EV Outlook 2019. International Energy Agency

IEA states that the global electric car fleet exceeded 5.1 million in 2018, up 2 million from the previous year. According to IEA China remains the world's largest electric car market, followed by Europe and the United States. Norway was the global leader in terms of electric car market share in 2018.

The report finds that policies continue to have a major influence on the development of electric mobility. Leading countries use a variety of measures such as fuel economy standards coupled with incentives for zero- and low-emissions vehicles. EV uptake typically starts with the establishment of a set of targets, followed by the adoption of vehicle and charging standards. An EV deployment plan often includes procurement programmes to stimulate demand for electric vehicles and to enable an initial roll-out of

publicly accessible charging infrastructure. Fiscal incentives is especially important as long as EVs purchase prices are higher than for ICE vehicles.

### **3.4 Summary of findings**

In our attempt to verify that the VAT rate increases demand, we have searched different studies. Our findings can be summarized as follows:

- Studies that try to simulate/estimate effect on EV sales of tax changes generally find that the tax incentives like the VAT exemption does affect behaviour significantly.
- Surveys reveal that the VAT exemption and tax incentives at time of purchase, are perceived to have high importance for the buyers of BEVs and influence the car choices.
- Other studies etc. related to EV policy and the system of car taxation generally, consider the VAT exemption as an important measure, both for the increase in the EV one has had in Norway, as well as to achieve future increases.

In sum, the available evidence, evaluations and considerations paint a fairly consistent picture of the zero VAT rate as a measure that reduces the price and increases the demand for BEVs.

## **4 CONCLUDING REMARKS**

The first part of the midterm review, contains updated information about the Norwegian policy, market development, cost and price information. Overall, the development since the last notification has been positive. The BEV share has been increasing, as expected when continuing the VAT exemption and the other measures in the EV policy. The number of car models with qualities has increased, and the cost of producing BEVs has decreased. Even though there are positive development in many areas, there are still many similarities between the situation three years ago and the situation today. BEVs would still be more expensive to buy without tax incentives. When comparing the development in Norway with other countries with less comprehensive packages of measures, their BEV-share is much lower. The VAT exemption is not the only measure in Norway, but it has an effect in decreasing the price and increase demand.

In the second part, the pass through of the VAT exemption is considered and an analysis of pass through is presented. Price information from Norway and Sweden is used in a model to compare the results, finding that the VAT exemption do lead to lower prices for BEVs.

In the third part, different studies and analysis are summarized and the importance they attribute to the VAT exemption is discussed. The studies gives much support to the notion that the zero VAT rate is a measure that increases demand for BEVs.



To sum up, Norway has continued and strengthened the ambitious policy to reduce climate emissions. Since 2017, development in technology and the market has been positive, and there has been a substantial rise in the share of battery electric vehicles. This review concludes that the exemption do lead to lower prices for the purchasers and also finds support for the notion that it increases demand for BEVs. The positive development the past years with substantial increased share of BEVs together with the assessments in the midterm review, gives support to the conclusions in the notification from 2017.