



TACKLING

REKKEVIDDEANGST

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Summary

In order to reach net zero, decarbonisation will have to happen across all sectors, including transport. There are many benefits to switching to electric vehicles (EVs), including reduced air and noise pollution, as well as cutting emissions. Uptake of EVs has increased dramatically around the world over the last few years, but ownership still lags well behind traditional petrol or diesel vehicles, which rely upon polluting internal combustion engines (ICEs).

The country which has most successfully transitioned from ICEs to EVs so far is Norway¹. The proportion of cars that are EVs remains comparatively low at 12.1% (in 2020), but this is largely due to the high number of cars already in circulation and due to be retired shortly². Norway leads the world with its ambitious target of an ICE sales phaseout by 2025 after which no new ICE passenger cars, light commercial vehicles and buses can be sold³. This global lead is often attributed to a package of policies that provide economic incentives, and measures largely adopted in the 1990s and early 2000s to make it easier for EV drivers to switch to electric vehicles, such as exemption from some road tolls.

However, the uptake of electric vehicles only exploded in the last decade⁴, many years after the economic incentives were put into place and more in line with the global sales of electric vehicles. This suggests that the increase in EV ownership was largely due to the global market and production of EVs themselves rather than the specific tax incentives of the 1990s and early 2000s. However, from 2013 onwards Norway has nevertheless experienced a larger growth in EV sales than the rest of the world, which can be attributed to government policies around EVs.

¹ Nickel D, Electric Cars: Why little Norway leads the world in EV usage, Forbes, 2019

² 07849: Registered vehicles, by contents, unit variable, type of fuel and year, Statbank, query <https://www.ssb.no/en/statbank/sq/10064423>

³ Wappelhorst S, Hongyang C, Growing momentum: Global overview of government targets for phasing out sales of new internal combustion engine vehicles, the international council on clean transportation

⁴ 07849: Registered vehicles, by contents, unit variable, type of fuel and year, Statbank, query <https://www.ssb.no/en/statbank/sq/10063107>

Amongst the biggest barriers to EV uptake across the world are fears around the shorter range of EVs and the ability to charge EVs on longer journeys. This charge anxiety affects both rural areas (where there are fewer charge points due to lower population density) and urban areas (where households do not always have access to a parking space or garage where a home charger can be installed). Part of the reason for Norway's EV uptake therefore is the successful installation of widespread EV charging infrastructure under the centre-right Høyre government.

Background

Electric vehicle takeup has developed over five phases in Norway⁵. The first phase, from the 1970s to 1990, comprised the concept development of EVs. The second phase was the testing of the concept from 1990 to 1999. These both featured individual concept cars, which used an electric battery but were not widespread, and did not include any electric cars which were featured as part of the mainstream market. There were some measures designed to increase takeup - such as exemptions from certain road tolls for EVs - but this did not lead to substantial changes in EV ownership.

The third phase contained the majority of government incentives as well as the first mass market EV model. In 2001, Value-Added Tax on electric vehicles was reduced to zero, rather than the 25% that was levied on other vehicles⁶. Under a centre-right coalition in 2003, electric vehicles were able to use Oslo bus lanes in a trial to encourage their uptake. Later, free municipal parking was trialled for electric vehicles as well. However, EV take-up remained low, as EVs were largely untested on a commercial scale and there were few mass market models for consumers to purchase. EV ownership also remained an urban phenomenon, due to the lack of public charging infrastructure.

The following phases of EV development were much more market-driven. From 2009, the so-called 'market introduction phase' began, where multiple car manufacturers introduced commercial models of EVs to Norway for the first time. This coincided with the fifth 'market expansion phase', which saw a number of schemes from car manufacturers - rather than from government sources - trialled in order to increase uptake. Some, like the free of charge loaning of an ICE vehicle for 20 days within the first three years of ownership of a Nissan EV, were successful, while others like a battery leasing scheme by Renault were less popular, but all served to normalise EV ownership and encourage innovation in the EV market⁷. For the first time, multiple big car manufacturers launched EV models and the EV market share rose rapidly.

⁵ Institute of Transport Economics, Norwegian Centre for Transport Research, 2013 Electromobility in Norway - experiences and opportunities with Electric vehicles, *Figenbaum E Kolbenstvedt M*,

⁶ *Ibid*

⁷ *Ibid*

The centre-right Høyre was the governing party in Norway from 2013 until mid 2021. During this time, it implemented new initiatives to help encourage uptake of electric vehicles, mostly around charging infrastructure (e.g. mandates on the number of charging points per stretch of road and help in making charging easier with prepayment tags)⁸. These are minimal interventions compared to those introduced in earlier phases, but because they were implemented when consumer confidence was growing and the markets were making it easier to buy EVs, they were much more effective in promoting ownership.

Range anxiety vs Charge anxiety

Range anxiety and Charge anxiety are both listed as barriers towards EV ownership. They are separate but interlinked issues with regards to EVs.

Range anxiety

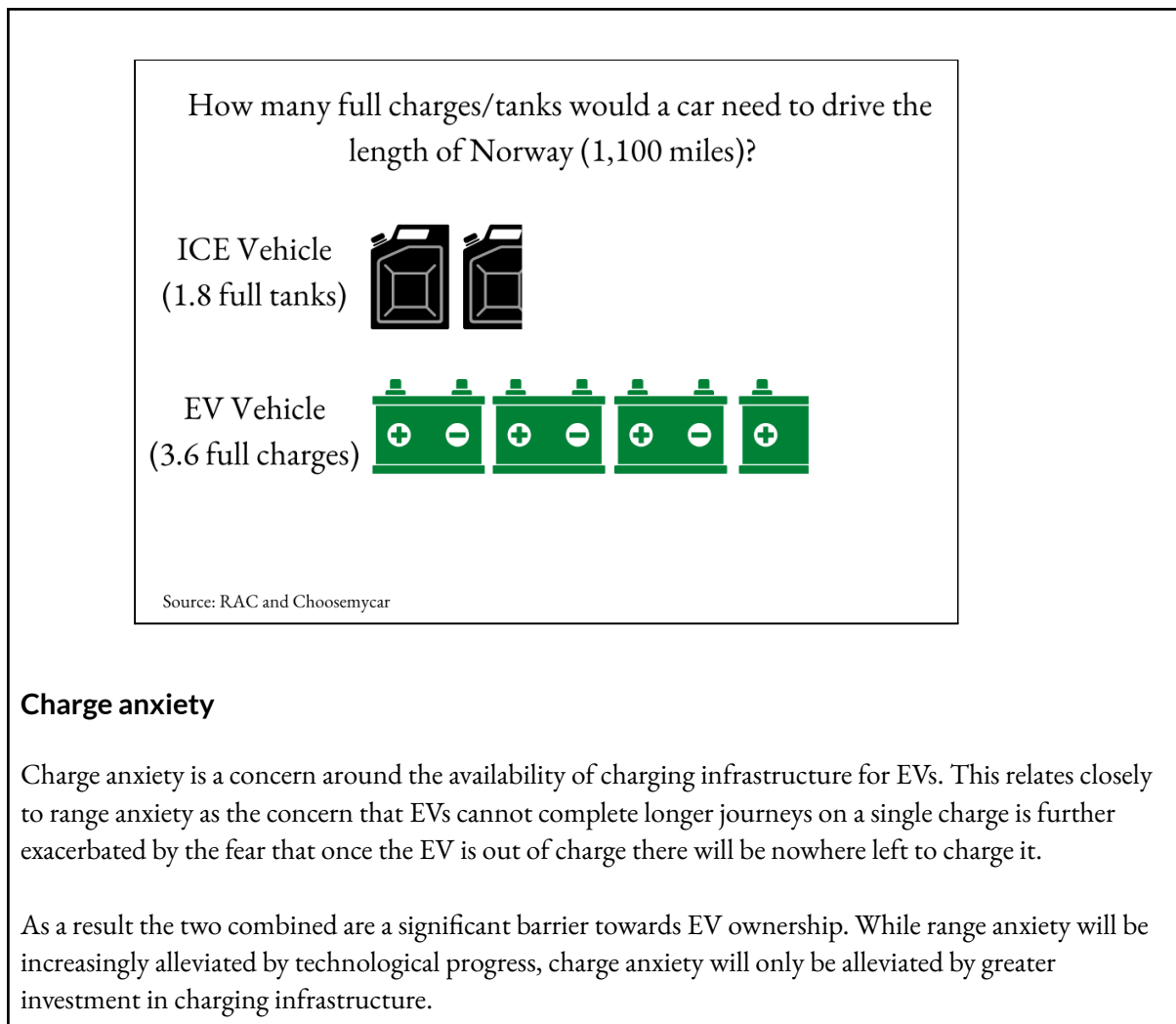
Range anxiety was such a key issue with electric vehicles that the Norwegian equivalent 'Rekkeviddeangst' placed second on Norway's word of the year list in 2013⁹. Range anxiety is a concern about fuel storage and thus the potential mileage of an electric vehicle. It is best alleviated by technological progress increasing the mileage of newer models of EVs. Some models of EVs can now drive 300 miles on one full charge¹⁰ which, while still less than the nearly 600 miles some petrol cars can manage¹¹, is still sufficient for even very long journeys.

⁸ Case study report: the Norwegian EV initiative, European Commission, Kristensen F.S, Thomassen. M.L, Jakobsen. H.L, February 2018

⁹Loveday E, ""Range Anxiety" in 2nd Place on Norway's "Words of the Year" List". [InsideEVs](#).

¹⁰ Electric vehicle range - how far can I drive in an EV, RAC

¹¹ In which cars can you drive furthest on one tank of fuel, choose my car.



Charge anxiety

Charge anxiety is a concern around the availability of charging infrastructure for EVs. This relates closely to range anxiety as the concern that EVs cannot complete longer journeys on a single charge is further exacerbated by the fear that once the EV is out of charge there will be nowhere left to charge it.

As a result the two combined are a significant barrier towards EV ownership. While range anxiety will be increasingly alleviated by technological progress, charge anxiety will only be alleviated by greater investment in charging infrastructure.

EV expansion

As demonstrated by the graph below, the number of electric vehicles in Norway has risen dramatically since Høyre took office in 2013. Some have pointed to the tax exemptions for electric vehicles, which make electric vehicles relatively cheap in comparison to traditional cars. This may explain some of the uptake, but as the VAT exemption had existed for twelve years by the time the electric vehicle uptake sped up, it is difficult to attribute the rise in EV sales solely to the tax exemptions.

Number of EVs in Norway

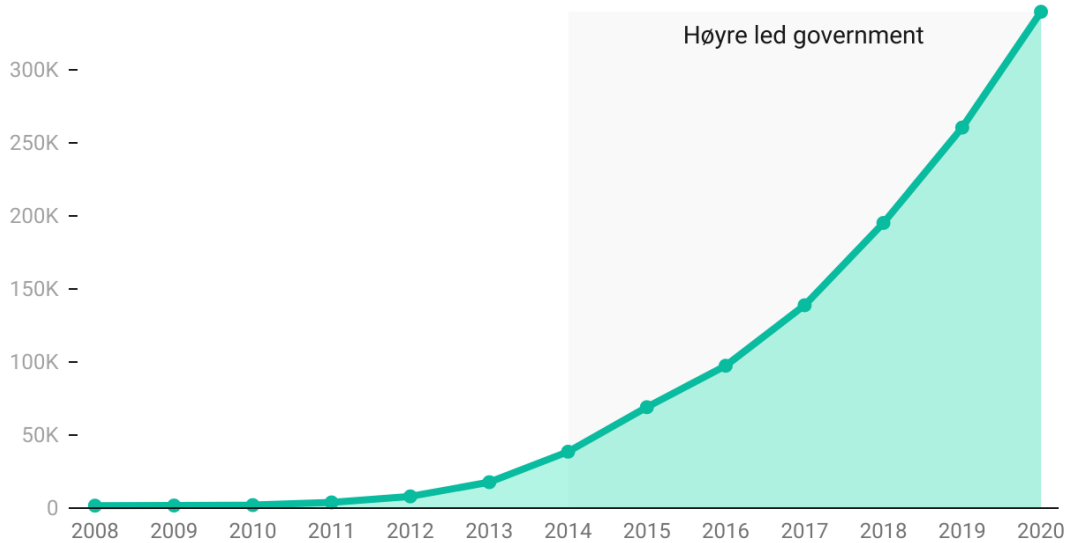


Chart: Fin McCarron for CEN • Source: Statbank • Created with Datawrapper

In fact, one of

the turning points for the explosion in EV ownership was paradoxically the announcement in May 2015 that the VAT exemption incentive for electric vehicles would be reduced from 2018. This led to an explosion of people purchasing EVs in order to take advantage of the tax benefits while they still could. This approach particularly appealed to more affluent consumers who could afford to bring forward their plans to upgrade their cars, which make up the majority of emissions (as opposed to lower income households, who are less likely to have multiple cars and to drive longer distances).

However, the reticence to purchase an EV can be attributed to fears around the ability to drive an EV longer distances, particularly outside of the few urban hubs where takeup is high. This is despite the Norwegian Government providing a number of economic incentives which drove the cost down below that of a new ICE vehicle - the average retail price for an EV in Norway is €44,500 compared to €53,000 for ICE cars¹².

Charging infrastructure

One of the key reasons the uptake of electric vehicles was much higher under the Høyre-led Government is better charging infrastructure¹³. Public EV charger density in Norway increased from 0.6 chargers per 1000 inhabitants in 2009 to 2.8 per 1000 inhabitants ten years later. The density of fast charge points in 2019 was, at 0.7 per 1000 inhabitants, higher than the density of chargers overall in 2009. This has served to effectively

¹² EVs cost 52% more than ICE equivalents, find Jato, Automotive Management online, 2021

¹³ Schulz F, Rode J, Public charging infrastructure and electric vehicles in Norway, Energy Policy, Volume 160, 2022,

combat ‘range anxiety’, especially in rural areas, which are home to around 17% of the Norwegian population¹⁴ - this is often cited as a reason for lower EV take up.

While there are government targets for EV charger numbers and various subsidy schemes, the diffusion of charging stations in Norway has predominantly been due to private companies installing electric vehicle charging stations, with only around one fifth of charging stations being operated by public authorities¹⁵. For EV manufacturers like Tesla, it makes business sense to install charging stations: a proliferation of charging points will encourage people to buy electric vehicles. Companies also provided EV chargers in order to profit from the sale of electricity to EVs.

Because the most profitable charge points for companies are in densely populated areas where the potential for EV usage is highest, rural areas have traditionally been less well served by charging points. This has been reflected in assessments of EV users, which found that the average EV user is most likely to live in a densely populated area and least likely to live in a rural area¹⁶.

There had been some previous government support for charging infrastructure before the Høyre-led Government. A support scheme which funded 100% of the installation cost of home charging points was implemented in 2009/2010. However, the technology was still in development and many of the charge points were taken out of service following high maintenance costs. They were also less suitable for long term charging.

By the time the Høyre-led coalition came to office, international standards had been adopted for charge points and the technology had developed. In 2015, the state enterprise Enova introduced a support scheme which aimed to cover the main roads in Norway with fast charging stations at every 50 km. This necessarily covered more rural areas than before. Additionally, to further ease range anxiety the Government mandated that all charging stations must have at least four chargers.

In order to make this competitive, the Government split up the road into smaller segments and opened them up to competitive funding from operators. This means that they were able to drive down the costs of installation and reduce the level of government expenditure¹⁷.

¹⁴ Rural population (% of total population) Norway, Worldbank

¹⁵ Schulz F, Rode J, Public charging infrastructure and electric vehicles in Norway, Energy Policy, Volume 160, 2022, p3

¹⁶ Elisabeth Fevang, Erik Figenbaum, Lasse Fridstrøm, Askill H. Halse, Karen E. Hauge, Bjørn G. Johansen, Oddbjørn Raaum, Who goes electric? The anatomy of electric car ownership in Norway, Transportation Research Part D: Transport and Environment, Volume 92, 2021,

¹⁷ Lorentzen, E., Haugneland, P., Bu, C. and Hauge, E., 2017. *Charging infrastructure experiences in Norway - the worlds most advanced EV market*. EVS30 Symposium Stuttgart, Germany.

The promotion of charging stations has led to greater uptake of EV usage and the market has responded. Operators are building a large number of fast charging stations without any need for government support, as it has been proven that EV charging stations now make good business sense. This is particularly the case in urban areas and along major highways. Additionally, from 2015 the Norwegian Electric Vehicle Association provided a universal charging tag to its members, which can be registered with most charging operators to simplify use and payment for EVs, making fast charging much easier. In fact, someone in Norway purchasing a new EV with a range of 300-500km today will experience nearly all of the benefits of having a car run on fossil fuels, based on the coverage of the charging network and the speed of charging, without the negatives of increased pollution and carbon emissions¹⁸.

Lessons to be learned from Norway's electric vehicle uptake

Create the conditions for markets to set the pace - With the implementation of widespread charging infrastructure, EV ownership shot up with many of the charging stations being installed by private companies. After some initial policies encouraging EV use, the level of EVs has very largely been driven by market conditions.

Adapt policies as situations change - In 2018, for the first time the Norwegian Government announced financial compensation for scrapping fossil fueled vans in exchange for electric vans¹⁹. This is a policy of its time and would not have made sense earlier, as the technology for electric vans was not yet good enough to encourage widespread adoption. By adapting policies as situations change, such as waiting until there was a universal standard for chargers to implement fast charging mandates, Norway has been able to target ever deeper decarbonisation and increase ambition.

The most important market are the sceptics, not the pioneers - The biggest motivation in Norway for the purchase of an electric vehicle is not the environmental benefits but the cost. Additionally, the biggest barrier to owning an EV has been range anxiety²⁰. People deeply concerned about the environment would have likely bought EVs at any price, but in order to achieve widespread adoption of EVs Norway needed to reduce their cost and provide widespread charging infrastructure.

¹⁸Case study report: the Norwegian EV initiative, European Commission, Kristensen F.S, Thomassen. M.L, Jakobsen. H.L, February 2018

¹⁹Norway EV policy, Ebil

²⁰Aasness, M.A., Odeck, J. The increase of electric vehicle usage in Norway—incentives and adverse effects. *Eur. Transp. Res. Rev.* 7, 34 (2015). <https://doi.org/10.1007/s12544-015-0182-4> p34

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