

The Norwegian EV success continues

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Short Abstract Summary

Norway is leading the way for the transition to zero emission electric cars. In 2015, electric vehicles had a 22 % market share in Norway. This is due to a substantial package of incentives developed to promote zero emission cars. The Norwegian EV Association conducts a yearly survey among EV owners regarding why they bought their electric car, how they use it and what they think is the most important policy and measures to promote electric vehicles. These experiences are a unique test case for decision makers in governments and the industry globally. In this paper, we will present the results from the 2015 survey and compare it to previous surveys in 2014 and 2013.

1 Introduction

Every year since 2012, the Norwegian EV association has conducted a comprehensive survey among Norwegian EV owners. The number of respondents have grown with the booming EV market in Norway. In the 2015 survey¹, 7.780 respondents (33% response rate) spent an average of 17 minutes on the survey. In this paper, we will compare the previous surveys with data from the 2015 survey.

The Norwegian EV success is due to a substantial package of incentives developed to promote both hydrogen and zero emission electric cars. Since the early 1990's, the incentive package has been gradually introduced by a broad coalition of different political parties.

The zero emissions incentives include:

- No purchase/import taxes (1990)
- Exemption from 25% VAT on purchase (2001)
- Low annual road tax (1996)
- No charges on toll roads or ferries (1997 and 2009)
- Free municipal parking (1999)
- Access to bus lanes (2005)
- 50 % reduced company car tax (2000)
- Exemption from 25% VAT on leasing (2015)

The incentive package will be revised and adjusted parallel with the market development in coming years. The tax incentives will stay in place to 2018 and then be revised. From 2017 the local governments will decide the incentives such as access to buss lanes and free municipal parking. Free toll roads will be replaced with a new system with differentiated prices depending on CO2 and NOx emissions.

The overall signal from the majority of political parties is that it should always be economically beneficial to choose zero and low emission cars over high emission cars. This is obtained with the "polluter pays principle" in the car tax system. High taxes for high emission cars and lower taxes for low and zero emission cars. Introducing taxes on polluting cars can finance incentives for zero emission cars without any loss in revenues.

2 The Norwegian EV market

The growth of the electrical car market in Norway has been exponential. The Norwegian EV market has doubled from 2011 to 2014 (Figure 1). However, recent figures show that the marked share for battery electric vehicles (BEVs) is stabilizing around 20 %, while the market share for plug-in hybrids (PHEVs) is still growing.

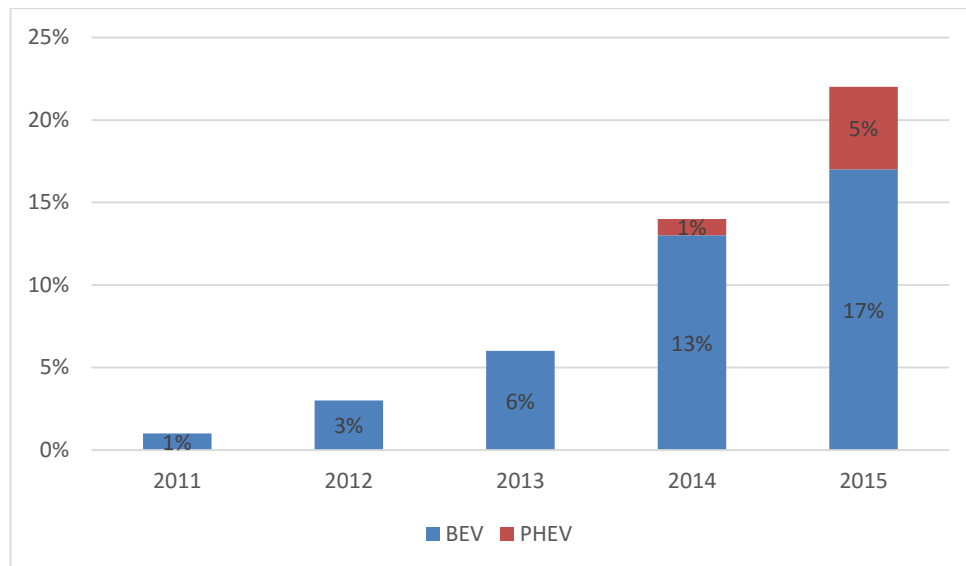


Figure 1: EV market share development in Norway.

While the Norwegian EV market share is stabilizing on 20 % most other countries hold around 1 % market share². This implies that the Norwegian EV market is approximately 5 years ahead most other countries. This makes the Norwegian market an interesting and beneficial case for other countries. The Norwegian EV owners are more than willing to contribute with their customer experiences and opinions on the EV policy.

By the end of 2015 there was close to 75.000 BEV and about 12.000 PHEV registered in Norway. Nissan LEAF is the bestselling EV model with over 22.000 Norwegian registered cars in February 2016, followed by Volkswagen e-Golf with about 12.000 registered vehicles and Tesla Model S with about 10.000 registered vehicles in February 2016.

3 The typical Norwegian EV owner

The typical Norwegian EV owner buys his or hers electric car as an addition to their petrol or diesel car. Nevertheless 23% of the respondents claim that they manage well with just an electric car in their household. For the rest, the electric car quickly becomes car number one that are used for most travel needs (Figure 2). In average, the EV replaces 82 % of the use of a petrol or diesel car.

The second ICE car is only used occasionally for longer trips. But we also see that there is a substantial share that uses their EV for longer journeys, 26% of the respondents in 2015 compared to 34% in 2014 survey and 12% in the 2013 survey.

The 2015 survey shows that a majority of 66 % is part of a household that contains 3 people or more. The largest age group is 40-49 years (35%) and 30-39 years (28%). Only 6 % of the respondents are 30 years or younger. 75 % of the respondents have higher education at university or college level. 78 % of the respondents were male.

The electric car covers most daily driving tasks

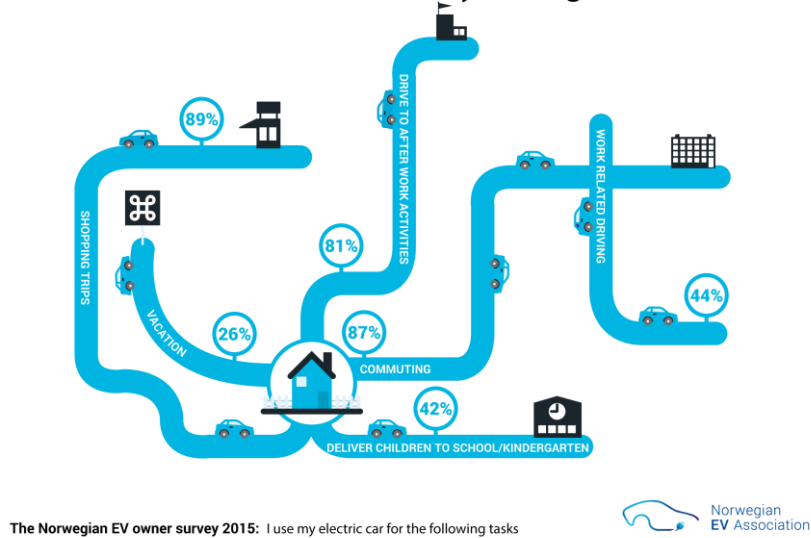
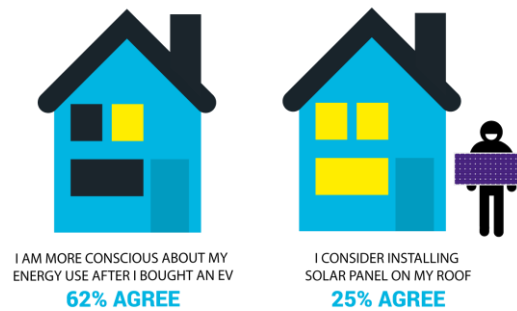


Figure 2: The electric car covers most daily tasks.

The EV survey showed that a high percentage of the EV owners bought their electric car solely for economic reasons, but became more conscious about his or her energy use and the environment after buying an electric car. 62 % of the respondents agree that they are more conscious about their energy use after they bought their EV and 25 % agree that they consider installing a solar panel on their house (Figure 3).

The EV owners are more conscious about their energy use and want to contribute more for the environment



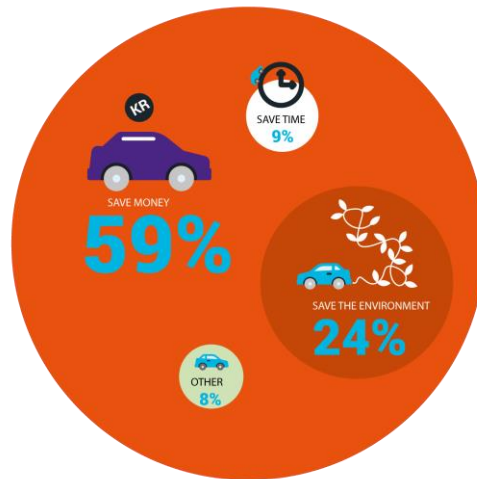
The Norwegian EV owner survey 2015: How much do you agree or disagree?

Norwegian EV Association

Figure 3: The EV owners are more conscious about their energy use and want to contribute more for the environment by installing solar panels.

More than half of the EV owners state that the economic benefits are the most important when owning an EV, if they have to choose only one option. Almost 1 in 4 respondents claimed that the main reason for buying an electric car was due to the environmental benefits. Others bought it to save time driving in the bus lanes during rush hours (Figure 4). Other reasons were interest in new technology, among others.

To save money is the most important reason to choose an electric car



The Norwegian EV owner survey 2015: I chose an electric car to ... (MOST IMPORTANT REASON)



Figure 4: To save money is the most important reason to choose an EV.

The Norwegian EV market first and foremost expanded in the areas in and around the capital of Oslo. But the EV sales are now expanding more evenly across the country. For example the EV market share is now higher in counties like Hordaland than in Oslo, with a record market share of 34 % in 2015 (Figure 5).

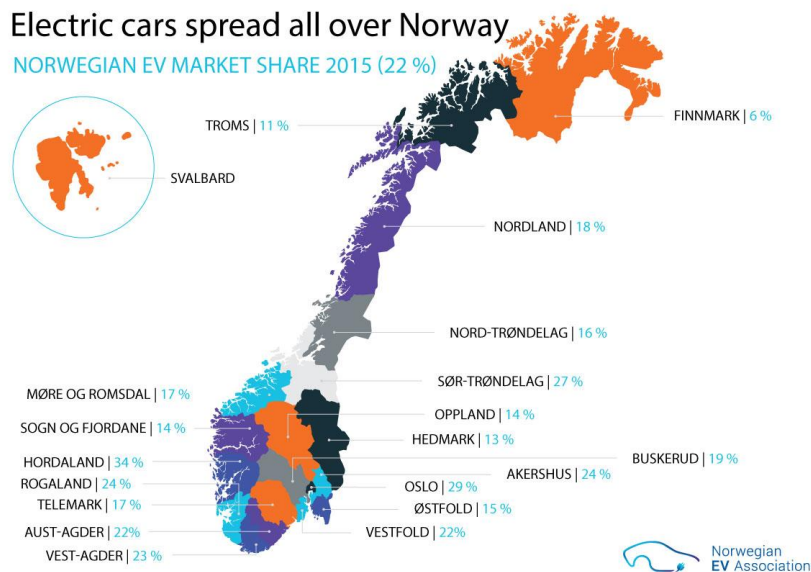


Figure 5: Electric cars spread all over Norway

A study by Institute for Transport Economics³ shows that electric cars are not just city cars with low annual driving range. They estimate the annual driving range for electric cars to 14.500-16.500 km, compared to 15.500 km for a 1-4 year old diesel and petrol cars and 13.000 km average for all passenger cars in Norway.

4 Charging infrastructure

The first group of EV owners have short commutes and access to charging at home. They do not acquire public charging stations on a daily basis. About 96 % of the EV owners have access to charging in their own

house (83%) or in their apartment building (13 %) (Figure 6). The biggest obstacle is for those who live in shared apartment buildings and therefore is not able to establish a home charger on their own. Oslo and some other cities have a grant system to support charging stations in shared apartment buildings to lower this barrier.

Most electric car owners charge at home and starts with full battery every morning

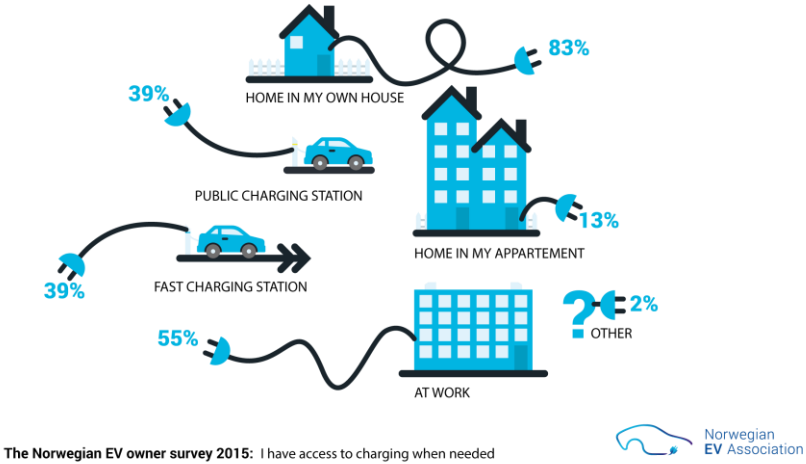


Figure 6: Most electric car owners charge at home and starts every day with a full battery.

The 2015 survey showed that only 7 % of the EV owners used public slow charging stations on a daily basis and only 17 % used them weekly. When asked the same question about fast charging, less than 1 % of the EV owners claimed they used it on a daily basis and 8 % weekly. When asked how often they would need fast charging, 3 % said they needed fast charging daily and 15 % weekly. This probably means that they would use their electric car more often instead of other alternatives if there was a better fast charging network.

Norway’s EV market have now past the innovators group and moved in to the group of early adopters and early majority (Figure 7). It is therefor crucial to build charging infrastructure for those who have longer daily driving distances and do not have access to charging in their own private house.

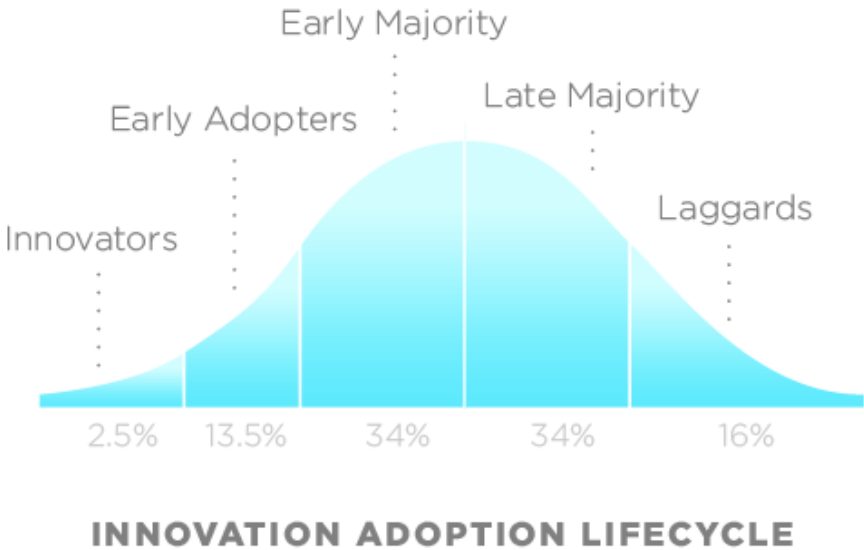


Figure 7: Innovation Adoption Lifecycle.

For longer distance trips, a well-organized charging network has to be in place. Even if EV owners are charging at home and manage without fast charging on a daily basis, they think it is important to have the option to fast charge when needed. They are also willing to pay a higher price for the service of fast charging. On average, three times more than they pay for electricity at home. The Norwegian Government have launched a program to finance the establishment of at least two multi standard fast charging stations every 50 km on all main roads in Norway by 2017.

A new EU directive⁴ recommend that there should be one public available charging point for every 10 electric cars by 2020. Assuming an increasing market share from 22% in 2015 to 30% in 2020, the Norwegian EV population may by 2020 reach 250.000. This shows that there should be around 25.000 public charging points available by 2020. In 2015 there were only approximately 1.350 charging points complying with EU standards. Environmental effect

The introduction of electric cars will in most cases replace use of a fossil car, not bus or bicycling. The environmental effect will be high, especially in Norway with close to 100 % renewable hydropower. 86 % of the EV owners state that they would have used a petrol or diesel car for daily travels if they had not bought an EV (Figure 8).

Electric cars replaces petrol an diesel cars, not bus and bicycle

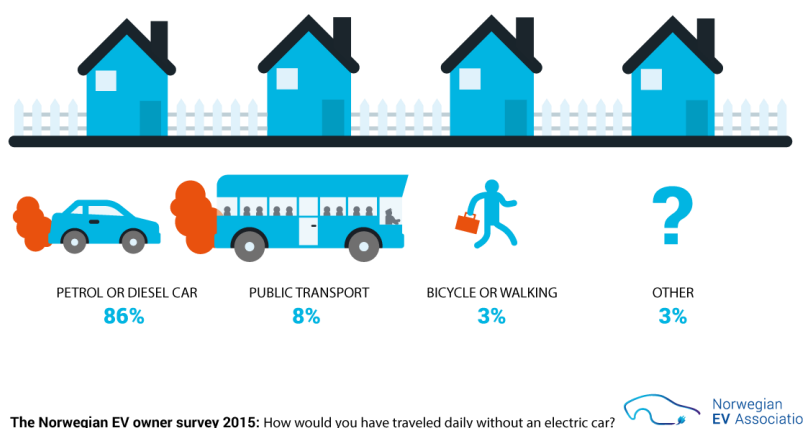


Figure 8: Electric cars replaces petrol and diesel cars, not bus and bicycle.

About 28 % of the respondents say that their EV covers all of their driving. 93 % says that they drive a diesel or petrol car less, much less or not at all after they bought their EV.

These results indicate that the electric car is a very good alternative for diesel and petrol cars in most cases. Not just for shorter trips in the city instead of public transport or bicycle.

For all new cars, the average NEDC CO₂ emissions have decreased from above EU average to well below the latest years (Figure 9). Most of this decrease is because of the large market share of electric vehicles. In 2015 the average CO₂ emissions from new cars was 100 gr CO₂/km, a new record low. The Norwegian target is 85 gr CO₂/km by 2020.

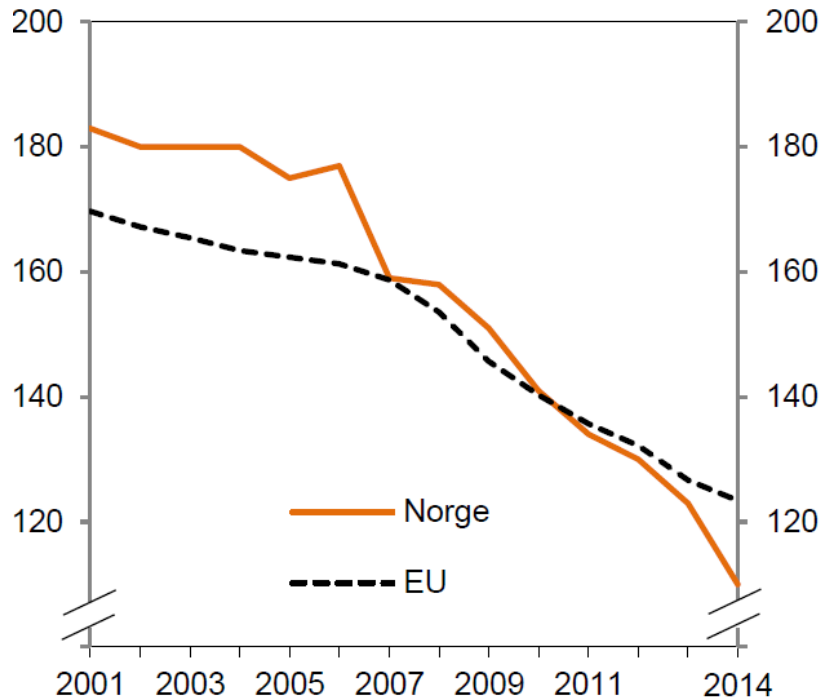


Figure 9: Average CO₂ emissions per km from new passenger cars in Norway and EU.

5 Norwegian EV policy

The main reason for the Norwegian EV success is the zero tax incentive for zero emission cars. The EV owners rank the tax incentives for zero emission cars highest (Figure 10).

The economic EV benefits are the most important to convince more people to choose an electric car

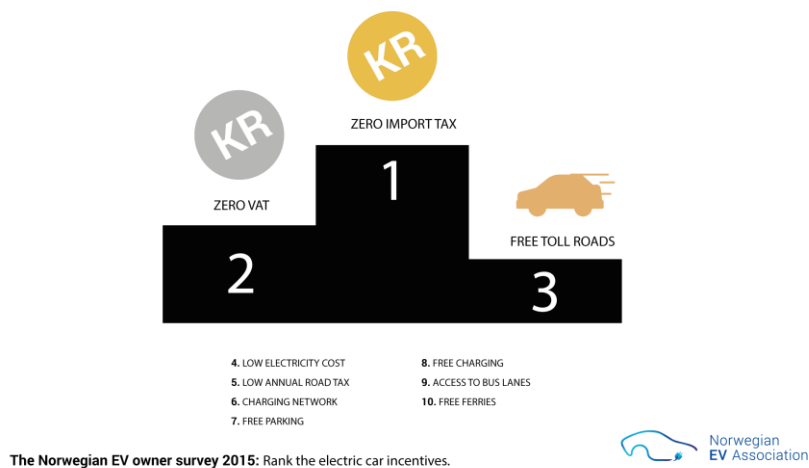


Figure 10: The economic EV benefits are the most important.

The incentive is financed by high tax on high emission cars. Other countries can copy this policy by introducing the polluter pays principle to their car tax system. With the right level of tax on CO₂ emissions for fossil cars, the zero tax incentive for zero emission cars can be introduced without any loss in public revenues.

The Norwegian case shows that the customers are willing to embrace zero emission technology today, even with the limited range of a typical electric car. The EV owners give their electric car an average 9 out of 10 points (Figure 11).

The average EV owner gives the electric car 9 out of 10 «smilies»

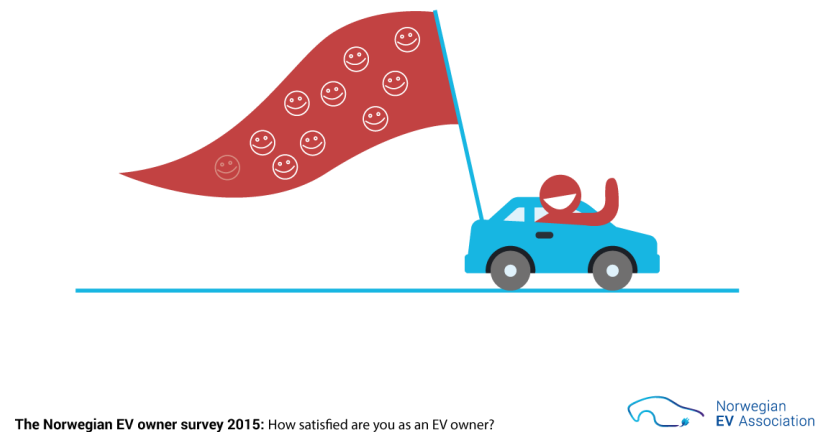


Figure 11: The EV owners are very satisfied with their electric car.

However, they are not willing to pay much more than a similar fossil car. Therefore the government must introduce a time-limited package of incentives to promote zero emission cars.

In Norway, the EV market is highly competitive and prices have gone down significantly without any changes in government incentives. This shows that the incentives to help market introduction have been very successful and that in a few years the incentives can start to be gradually phased out. However, it is still too early to remove the incentives. Even if we have a 22 % market share for EVs in Norway, the share of total passenger cars is under 3 % of the 2,6 million passenger cars in Norway. It takes time to change the transport sector and we have to start now.

There is a huge potential customer group for EVs, they just do not know it yet. If we can stimulate people to try out the new zero emissions technology, they will love it and never want to go back to old fashion cars. In Norway, there are over 600.000 households with two or more cars. They can easily switch one of them to an electric car for daily driving. Even if it is nice to have a car that you can drive all over the country and back whenever you want, you do not do that very often. A typical electric car with a practical range of 75-150 km is covering most people's daily driving needs.

6 Lessons learned

There is no master plan that caused the Norwegian EV success. The Norwegian authorities started to introduce incentives from the early 1990 to support domestic EV production like the Think. Later the EV policy became one of the most successful measures to reduce CO₂ emissions from the road transport. In 2015, the average CO₂ emissions from new cars was a record low 100 gr/km, mostly because of the high share of electric cars.

Even if the Norwegian experience shows that EV owners love their electric car and use it on a daily basis, the technology has not come far enough to be competitive without a comprehensive package of incentives to promote zero emission vehicles. The consumers are conservative and still need economic and other incentives to choose electric when they buy a new car.

A new Bloomberg analysis⁶ suggest that electric vehicles will be competitive by 2025. Before that, more countries need to introduce incentives to stimulate the global EV market.

The tax incentives makes the purchase price of electric cars competitive in the Norwegian market. Other incentives, as free toll roads, free parking and access to bus lines are compensating for the lower range and

uncertain second hand value of electric cars. The incentives package is the ground floor of the successful EV market in Norway, but other requirements are also necessary to start the ball rolling.

The primary success factor is to make EVs available, i.e. cost-competitive, known to the customers, and attractive to sell for the car dealerships. Then, as soon as the ball starts rolling, the neighbour effect has made it possible to sell EVs through word of mouth. For every satisfied EV owner there will be three more.

To fuel EV penetration even further, charging infrastructure is essential in the second phase, for potential customers that have longer commutes or do not have access to charging at home. Then you already have a potential customer group for a sustainable EV charging market with less need for subsidies.

References

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Authors

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