EVS27
Barcelona, Spain, November 17-20, 2013

Norwegian electric car user experiences

Petter Haugneland[1], Hans Håvard Kvisle
[1]*Norwegian Electric Vehicle Association, petter@elbil.no*

Abstract

Norway has the highest number of electric cars per capita in the world. In June 2013, Norway reached 13.000 electric cars in a country of 5 million inhabitants. The Norwegian Electric Vehicle Association (NEVA) is probably the world's biggest EV user organization with over 7,000 members. The experiences from the members of NEVA can give decision makers valuable input. In this paper, we will present and analyse the results from the 2012 and 2013 Norwegian electric car user survey. In the survey, we ask electric car owners about background details, such as how they drive and charge their car and their opinions on the EV market and Norwegian EV policy. In the 2013 survey, 1,858 EV users contributed with their experiences and opinions. The typical Norwegian EV user is a middle-aged family father with higher education and income, and he owns a Nissan LEAF as one of two cars. He drives his electric car on a daily basis instead of a traditional petrol or diesel car. He agrees on that his electric car saves him money and time and he is very satisfied as an EV owner. The broad package of incentives convinced him to buy his electric car. Although, it was the zero purchase tax and VAT that made the electric car competitive for him to consider in the first place. Low fuel cost, free toll roads and access to bus lanes are also important incentives. In order to get more people to buy an electric car, the EV user highlights longer range and predictable EV policy as the two most important requirements. One challenge to the electric car manufactures and one challenge to the world governments.

Keywords: EV (battery electric vehicle), Charging, Fast charge, Incentive, Infrastructure, Policy

1 Introduction

For 20 years, the Norwegian Electric Vehicle Association (NEVA) has been working for the successful introduction of electric vehicles. The association's main goal is to promote electric vehicles that run fully or partially on renewable energies.

NEVA represents the majority of the electric car owners in Norway. The association cooperates with national and local authorities, the electric car industry, charging industry and other national and international organizations. The association also promotes Norway as a best case for electric vehicles policy to Europe and the rest of the world.

In June 2013 there were over 13,000 electric cars registered in Norway [1] in a population of 5 million. This makes Norway the world leader on introducing electric cars. Norway's capital Oslo is the EV capital of the world, with the highest electric car density of any capital city.

The benefits for electric car owners in Norway include among others:

- No purchase taxes (extremely high for ordinary cars)
- Exemption from 25% VAT on purchase
- No charges on toll roads
- Free municipal parking
- Free access to bus lanes

In addition, per 30th June there are registered 1,200 charging stations with 4,159 charging points in Norway. Most of them are 16A Schuko outlets and 67 of them are CHAdeMO fast chargers. Within 2013, there will be at least 100 fast charging stations in a combination of CHAdeMO, Combo and AC 22 or 44 kW. Location and other information for all the public charging stations in

Norway are available in the open database NOBIL, which NEVA develops and maintains in cooperation with the state entity Transnova.
The benefits make the electric car competitive with traditional cars (defined as using fossil resources as fuel) in Norway. Because of high purchase taxes on traditional cars, the electric cars are only marginally more expensive than a comparable gasoline car. The price difference in Norway is for illustration maybe 1,000 €, not 10,000 € like many other countries. The competitive purchase price is a prerequisite for the EV success in Norway. In addition, electricity in Norway is cheap (0.11 Euro/kWh) [2] and gasoline expensive (1.9 Euro/litre) [3]. This makes the running cost for electric vehicles cheap compared to traditional cars. In addition, the electric car owners can park and charge at no cost at public parking spots, and drive free of charge through toll roads. Many electric car owners will also save time driving in the bus lanes during rush hours. The combination of these benefits compensate for the limited range and uncertain price on the second hand market for electric cars.
Another reason for the electric car success in Norway is the Norwegian electric car manufactures Think and Buddy. There were almost no electric cars available on the international market in the last decade. However, already in 2003 there were 991 electric cars in Norway and 1,193 in 2004. This gave Norway a head start on developing charging infrastructure and demand for EV policy from the electric car users. It also means that many of the Norwegian electric car owners have several years of experience driving and charging their electric car.
The Norwegian parliament guarantees the purchase incentives until 2018 or until we reach 50,000 zero emission cars on Norwegian roads. Therefore, there is no reason why the sales figures should not continue to grow as long as there are electric cars available. Average sale per month is now around 500 electric cars. The Norwegian Electric Vehicle Association has set a goal of 100,000 electric cars within 2020. This is necessary to get a sustainable market for electric cars and the charging infrastructure in Norway. In 2012, the electric cars accounted for 2.9 % of new cars sold in Norway. The total fleet of passenger cars in Norway was over 2.4 million in the beginning of 2013 [4]. Close to 10,000 of these were electric.

Because of the relatively high number of privately owned electric cars in Norway (76 %), the user experiences can give valuable input for the EV industry and policy makers, both in Norway and in other countries. The purchase of an electric car is the choice of the private owner and the car is to cover the household's daily transportation needs. Most electric cars in Norway are not a part of a fleet or used for testing purposes. The user perspective is paramount for the international electric vehicle market to succeed. Norway can share user experiences, as early adopters, from the daily use of electric cars by ordinary customers. Who are the users? How do they use their electric car in daily life? What are the pros and cons about electric cars from a user's perspective? What are their opinions on EV policy and the EV market? These are some of the questions we seek answers to in the Norwegian electric car user survey.

1.1 About the survey

In 2012 and 2013, The Norwegian Electric Vehicle Association conducted an EV user survey among their members and other EV users and owners in Norway. To the 2013 survey, we sent an invitation to 5,600 electric car owners by email in the beginning of June 2013 and a reminder a week later. We also posted the invitation on the Norwegian EV portal elbil.no and on the online EV user forum elbilforum.no. In addition, we invited 4,000 EV owners to participate by mail. By June 20, a total of 1,858 persons had submitted the online survey form. For comparison, the 2012 survey had 459 respondents. The total number of EV owners in Norway was approx. 12,000 at the time. In other words, over 15 % of all the electric car owners in Norway participated in this survey. The average time used on the 2013 survey was 15 minutes.
Below is a map of Norway with the distribution of the 2013 respondent's postal code. As the total Norwegian electric car fleet, the owners are mostly located in and around the cities Oslo, Trondheim, Bergen and Stavanger (Fig 1). Owner statistics from the National Road Authorities show that 79 % of the electric cars are registered in the counties where these cities are situated.

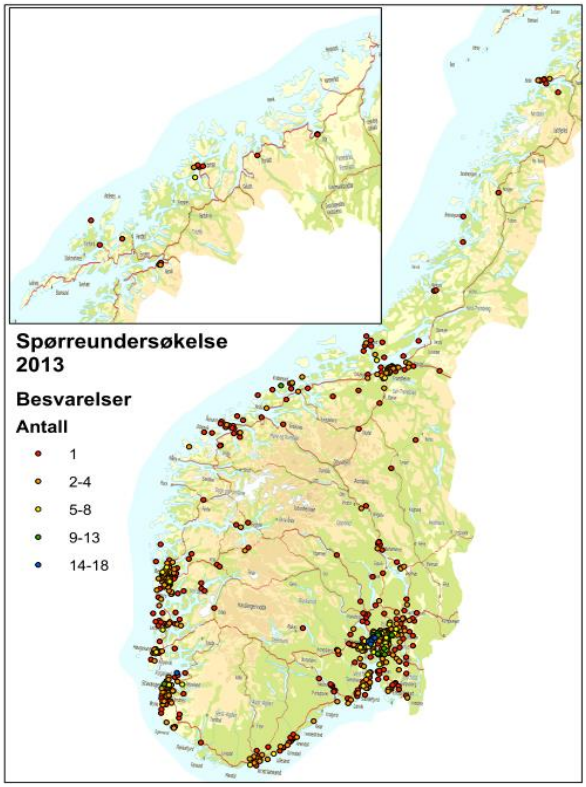

Fig 1. Distribution of 2013 survey respondents in Norway. Map: Kartverket.

2 Main results

2.1 The typical Norwegian electric car user

The typical Norwegian EV user is a middle-aged family father with higher education and income, and he owns a Nissan LEAF as one of two cars.

A great majority of the respondents (85 %) has two or more cars in their household (Fig 2). This is likely because of the shorter range of an electric car. They need a second car for longer journeys than current electric cars can provide. However, for everyday needs, the electric car is sufficient. Norwegians travel 42 km on average every day, mostly by car [5]. Households that already have two cars can easily switch one of them to electric. In Norway, more than 500,000 households currently have two or more cars.

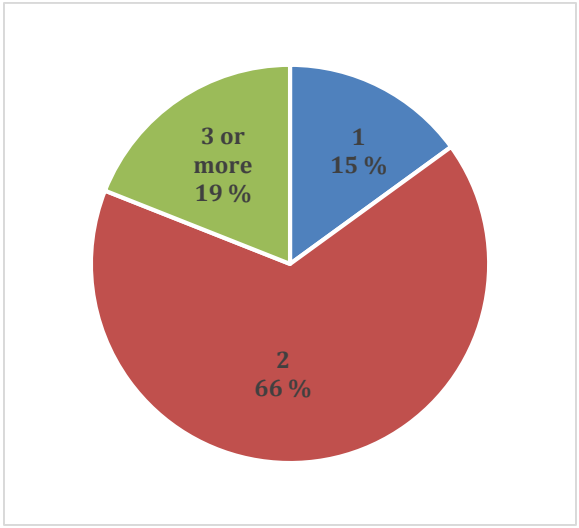

Fig 2. Number of cars in household.

Maybe more surprisingly, 15 % of the EV owners manage to do their daily transport with just their one electric car. For longer journeys, public transport or car rental/sharing is an option. In Norway, high taxation on traditional cars makes it expensive to own a car. You can rent a second car for many trips before the rental cost is exceeding the cost of owning your own traditional car. Some car dealers, like Nissan, even provide a free rental car for 20 days for their customers buying a Nissan LEAF.

Four persons in each household is most common (33 %) for electric car owners, and two or more persons in the household represent 94 % of the respondents. Only 6 % is a single person household.

75 % of the survey participants are male and the majority is between 36 and 45 years old. They have significantly higher income than average in Norway, and a majority has education at university level (77 %). Since most electric car models for the moment only are available as new, it is logical that the average age and income is higher for EV owners. Today EVs are mostly available just for those that want to buy a brand new car. Most young people for instance cannot afford to buy a new car. Since there is relatively few second hand electric cars available, it is a more limited option for people with lower than average income.

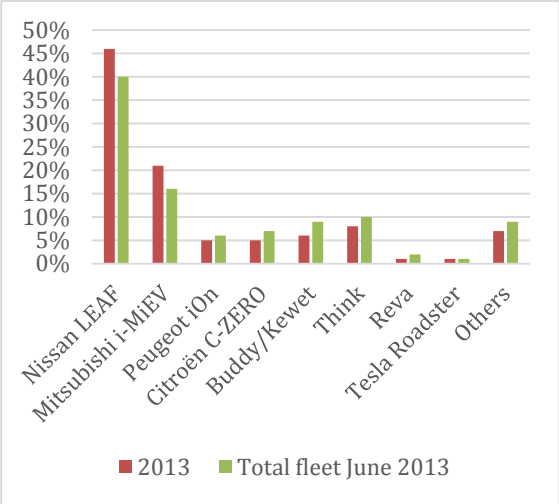

Fig 3. The electric car model for 2013 survey respondents compared to total fleet June 2013.

Nearly half of the respondents to the 2013 survey own a Nissan LEAF, the bestselling EV in Norway (Fig 3) and among the top five at the general model ranking. In April 2013, the LEAF was even the second bestselling car model in total after Volkswagen Golf.

The distribution of the rest of the electric car models is in a good way representing the existing electric car fleet in Norway. After Nissan LEAF, the triplets Mitsubishi i-MiEV, Peugeot iOn and Citroën C-ZERO are the most popular electric cars in Norway. There are also still a substantial share of the Norwegian electric cars Think and Buddy.

Still, owners of the new generation of electric cars are slightly overrepresented in this survey if you compare it to the total electric car fleet in Norway.

We have to mention that 5 % of the respondents have more than one electric car. Most probably, a result of their long ownership of EVs, they keep their old electric car when they buy a new one. A movement to avoid owning traditional cars and the whole family can have an electric car for their daily transport.

2.2 Use of electric cars in daily life

To reduce emissions as much as possible we must find methods that will get electric cars to replace the use of traditional cars and not public transport or walking and bicycling. The users in Norway states that their electric car in most cases replaces use of a traditional car (87 %). For the reminding, the electric car replaces walking, bicycling (1 %) and use of public transport (10%). This result shows that almost nine out of ten electric cars replace traditional cars (Fig 4.).

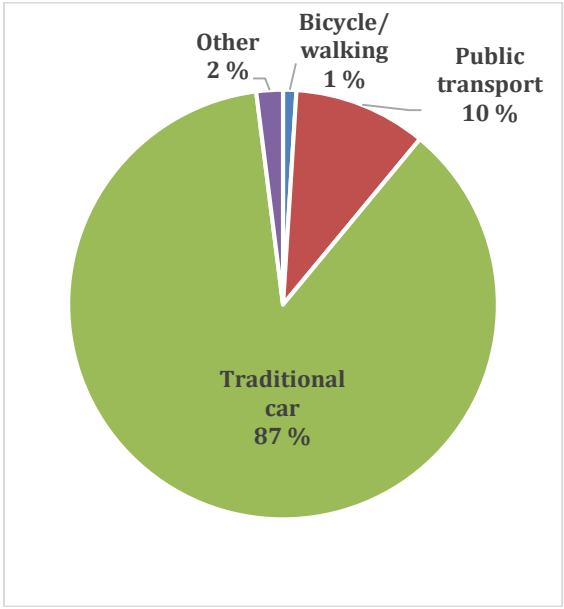

Fig 4. Use of transport before EV.

An earlier study from 2009 suggests that the electric car replaces public transport for commuting by a larger extent then our results at about 18 % [6].

A similar question is how much the electric car replaces a traditional car (Fig 5). 90 % answer completely or to a high degree. If you combine these two questions, it is a clear indication for concluding that the electric car replaces the use of a traditional car for the most extent. Hence, the electric car is not an addition to a traditional car, nor replaces use of public transport or walking and cycling. When that said, it is still important to find measures to make public transport competitive compared to personal transport.

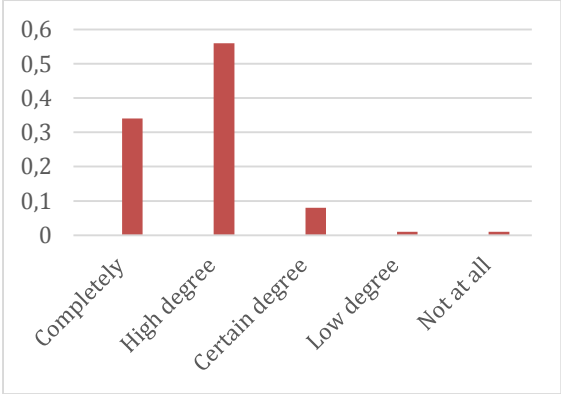

Fig 5. EV replacement of traditional car.

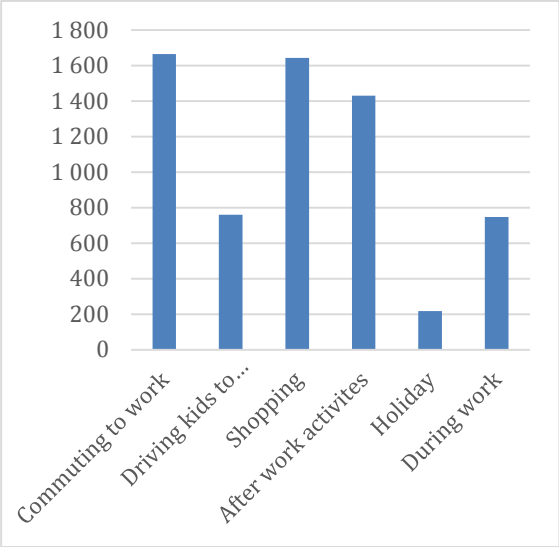

Fig 6. Use of electric car.

As you see from fig. 6, people use mostly the electric car for commuting to work (1,666 of the 1859 respondents), shopping (1,644) and driving to after work activities (1,431). Other use is delivery of children to school or kindergarten (760) or in business purposes (748). Only to a small extent, do people use the electric car for holiday travel (217 of the 1,859 respondents).

A traditional car is in average driven approximately 15,000 kilometer annually. We could expect that an electric car will have a shorter annual distance because of the shorter range. 45 % of the respondents anticipate driving below 12.000 kilometer. Another 23 % between 12,000 and 16,000 kilometer and the remaining 30 % anticipate driving over 16,000 kilometer annually. In average, the annual driving range for the respondents is 13,800 kilometer. This shows people annually drive electric cars more or less the same distances as traditional cars. Even if you do not have the longer trips, it is more convenient and cheaper to use it for all the shorter, frequent trips on a daily basis.

We also asked the respondents to state how much they agree or disagree with a set of statements based on their experience with the electric car. 67 % agree to the statement "The charging time is fast enough". 51% agree to the statement "The range satisfies my needs", while 60 % also agreed that they need more charging stations. 53 % agreed to need fast charging.

A large majority of 94 % agreed to the statement: "My electric car has low cost in use" and 64 % agreed that they save time with their electric car (Fig 7).

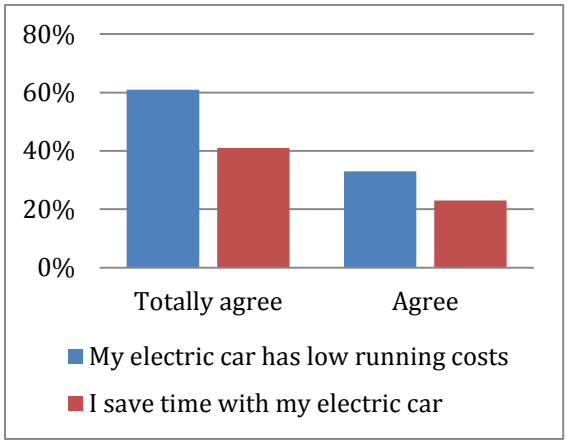

Fig 7. Respondents who agree to statements about low costs and saving time with electric cars.

This shows that the big advantage of low running costs for electric cars is not just a theoretic advantage to traditional cars, but also something the users experience in practice. It might also be related to the above annual driving range. The low running costs will make it easier to use the electric car more often. During rush hours you will save time driving in the bus lane. Parking reserved for electric vehicles can also be time saving if you more easily find an available parking spot.

The relative low running costs for electric cars are especially apparent in Norway. We have cheap electricity from hydropower and expensive gasoline because of high taxes. In addition, the electric car owners can park and charge at no cost at over 3,500 public charging points, park for free at all municipality owned parking lots, and drive free of charge through all toll roads in Norway.

2.3 Motivation for choosing an electric car

There is no single main reason why people choose to buy an electric car. It depends on where you live and what transportation needs you have in your daily life. We asked for the most important reason of the three broad categories save money, save time or save the environment (Fig 8).

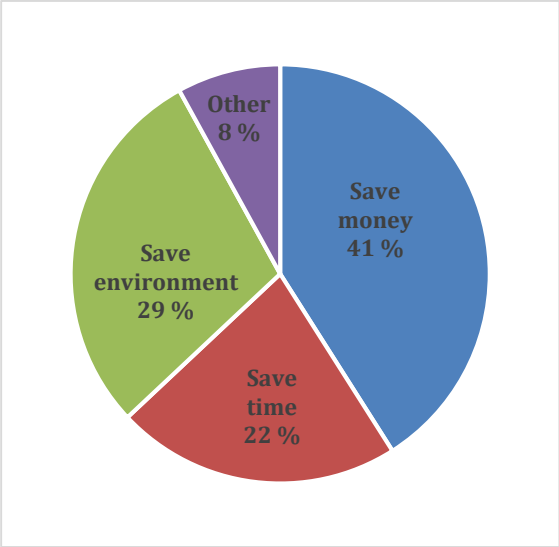

Fig 8. Why did you choose an EV?

Saving money was the most important reason for 41 % of the respondents. 29 % choose an electric car for environmental reasons and 22 % for saving time (for example by driving in the bus lane during rush hours). 8 % had other reasons, for example as many mentioned the excellent driving performance for electric cars.

We also asked what their actual experience was after they bought and started to use the EV. 46 % experienced less costs as the main advantage of the electric car. This tells us that most users experience the electric car as less expensive than a traditional car. Better environmental conscience after acquiring an EV, was stated as the main advantage for 28 % of the respondents. Practical and timesaving advantages was still most important for 22 % of the respondents. The two above questions shows us that there are small variations from what the users expect and what they get from their electric car. We will assume that this coherence relates to the relatively long history of electric cars in Norway, and information efforts such as Norwegian Electric Vehicle Association is conducting. In Norway, we have developed a market where both the sellers and buyers of EVs have sources (for example the Norwegian EV portal elbil.no) for reliable and thorough information. Especially have NEVA worked with giving the new EV users the right picture of the real driving range in the harsh Norwegian climate.

2.4 Very satisfied EV users

When asked how satisfied they are as EV users, an impressive 91 % answer that they are very satisfied (Fig 9). The reminding 9 % are reasonably satisfied. Only 7 respondents of the total 1858 were less satisfied or unsatisfied.

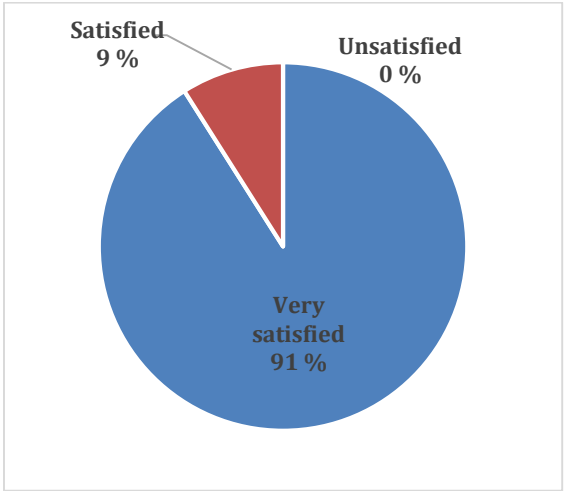

Fig 9. How satisfied are you as an EV user?

The satisfaction rate, which is close to 100 %, is impressive, but might be lower among all EV owners in Norway. It is probably the most satisfied and enthusiastic users who tend to contribute to the survey. In addition, people have a tendency to justify their own choice once there is no turning back. If you have spent a lot of money on an electric car, it might be unpleasant to admit that it was a wrong decision.

Still, these results give us a good reason to believe that once you have experienced driving an electric car; in general, you are most likely to be very satisfied with your choice. Nevertheless, it is important that people who consider an electric car gets correct information about practical range and other special features for EVs. If not, you risk getting disappointed customers who will not recommend electric cars to neighbors, friends, colleagues and relatives.

There are many examples of the so-called neighbor effect that satisfied electric car owners inspire their surroundings to consider an electric car. They show that it is possible to use an electric car in their daily life. This effect is probably the most important and most effective information measure to replace traditional cars with electric ones. We can stimulate this social effect by giving the users tools to be EV ambassadors and opinion leaders. As an example the Norwegian Electric Vehicle Association, actively encourage their members to spread the word and share information material. For example, the leaflet “Facts about electric cars” gives you the most important facts about what an electric car is, and what it is not.

For many it may come as a surprise that the sale of electric cars in Norway is not larger considering the high satisfaction rate among existing users. There might be a big potential in further developing and exploiting the neighbor effect. For the 2014 survey, we will include questions to quantify the neighbor effect and find the best methods to stimulate social sharing further.

To further explore the satisfaction rate, we asked if the next car also will be electric (Fig 10). 64 % answered yes, an increase from 59 % in the 2012 survey. Only 5 % answered no in both the 2012 and 2013 survey.

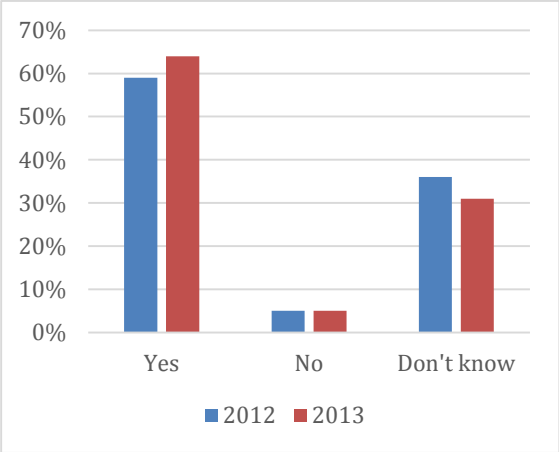

Fig 10. Will your next car be an EV, too?

For the 31 % who didn't know and the 5 % who answered no in the 2013 survey, we asked if they could specify why they are uncertain or don't want to buy an EV the next time. The main relevant reason seems to be related to the limited range, either battery capacity or lack of charging network (29 %). Like this statement from one respondent: "Limited range makes it necessary with another solution for longer trips". Another is: "It depends on how the charging networks between the larger cities develop to make the electric car more usable". The second most important reason are uncertain EV policy (26%). We need to assure the users that the incentives will remain in the near future. If we remove the incentives too soon, many of the uncertain responders will not buy an EV the next time. Like this statement: "It depends on the political development. It is not an option to buy another electric car if the incentives disappear". The reminding uncertain or negative respondents have other user specific issues as it depends on where they live and work in the future.

45 % of the respondents in the categories "no" and "don't know" had reasons not necessary directed to issues related to the electric car, but a slightly flawed understanding of the question. For example, that they first would change their traditional car because their electric was quite new, or they had not yet experience enough to give a definite answer. For the next survey, we need to make the question more precise.

Anyway, this question shows us that many users want electric cars with longer range and a national charging network for longer trips. They want to use their electric car for all transport needs, not only for the daily shorter trips. They also value predictable EV policy when they consider buying a new electric car.

2.5 Charging the electric car

Charging during the night at home is the cheapest and easiest method of filling the batteries in an electric car. You plug in when you park the car in the evening and then the batteries are full in the morning. In cold winter conditions like in Norway, many electric car models can even, when plugged in, be preheated in the morning to prevent using the battery capacity to heating instead of longer range. In the 2013 survey, 1,579 (85 %) of the respondents can charge in their own garage or parking lot (Fig 11). In addition, 178 (10 %) have access to charging in the shared apartment building where they live. This means that 95 % of the respondents can charge their electric car at home during the night.

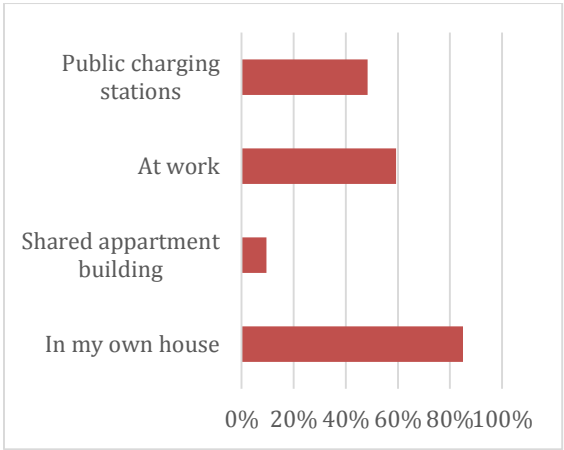

Fig 11. Access to charging

In addition 1,102 (59 %) have access to charging where they work and 898 (48 %) at public charging stations in the area they normally use the electric car. Charging at work or at public charging stations can be important for users with longer

commutes or for those who do not have possibilities to charge at home. Public charging is also a supplement for longer trips and during winter when the range is shorter than normal.
If we extrapolate these results to all the 13,000 electric car owners in Norway as of June 2013 we get the following charging station numbers:

- Home: 11,050 charging points
- Work: 7,670 charging points
- Apartment buildings: 1,300 charging points

In addition, there are over 3,500 registered public charging points in The Norwegian Charging Station Database (NOBIL). Of these, only 67 are fast charging points with at least 43 kW effect. This means that in Norway today there are approximately 23,520 charging points for electric cars, or about 1.8 charging point per car as of June 2013. The last two years, the establishment of new public charging points has not been following the increased sale of electric cars in Norway. We have to underscore that for a big majority of the charging points at home, it is used ordinary Schuko household outlets (85 %), not dedicated charging point equipment (9 %). The remaining do not have charging possibilities at home.
When we ask where the users miss charging possibilities, a majority 1,167 (63 %) of the respondents wants more charging stations between cities. 747 (40%) respondents wants more public charging stations in the city streets and 624 (34%) in shopping centers. 342 (18 %) asked for charging opportunities at work and only 89 (5 %) at home. This shows that for the moment, the level of charging stations for daily usage is more or less sufficient but it needs to keep up with the increased sales of new electric cars. When it comes to the extraordinary trips, the charging network is yet not sufficient according to the users. They would like to use their electric car also for longer trips between the cities.
We also asked the users how often they charge their electric car at public charging stations the last month (May 2013). 11 % of the respondents used public charging and parking on a daily basis the last month, 28 % on a weekly basis and 35 % less frequent. 26 % of the respondents did not use public charging and parking at all the last month.

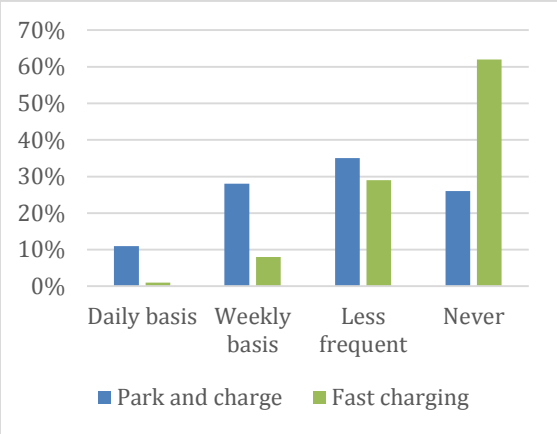

Fig 12. How often did you use public charging stations last month?

When it comes to fast charging, only 1 % of the respondents used a fast charging station on a daily basis last month. 8 % fast charged their electric car on a weekly basis and 29 % less frequent. 62 % did not fast charge at all the last month. One explanation to the relative low usage of fast charging is of course the few fast charging points in Norway today compared to the number of electric cars with fast charging capabilities (67 fast charging points and about 7,800 electric cars with CHAdeMO charging solution as of June 2013).
It is interesting to see the frequent usage of the most popular locations like the three ABB fast chargers in Oslo and Bergen that in one year exceeded 10,000 charging sessions. This means an average of 9 charging sessions a day on each of the 3 fast chargers. Until summer 2013, these fast chargers have been free of charge. We are looking forward to see how the frequency of use will develop when payment is introduced.
It seems that the fast chargers are important to prevent range anxiety and extend the range of the electric car for extraordinary trips. Even if fast chargers are not frequently used, they still have an important function. Not just for the existing EV users, but maybe even more for potential new users who consider buying an electric car. The high investments for establishing fast chargers, lack of knowledge on willingness to pay and how patterns of use will develop, makes it difficult to foresee a sustainable business model in this early phase.

2.6 Payment for fast charging

Until now, the cost of fast charging has not been a reason for the low frequency of use among many of the EV owners, as nearly all of the fast chargers have been open and free of charge in a test period.

The operators are now starting to phase in payment solutions to their charging stations.

In the survey, we asked for the top 3 most important reasons for getting the EV owners to use fast charging facilities. 944 of the respondents state they will use fast charging for having the possibility to drive the EV for longer trips in weekends, holidays etc. Convenient locations where they can spend the time do shopping, restaurant visits etc. is important for 551 of the respondents. As a safety net when it by accident is need for a quick refill of electricity, is important for 555 of the respondents. Real time status information, easy payment solutions, universal charging card and acceptable cost is important for around 500 respondents each. It seems that people perceive fast charging as an attractive option to extend the use of the electric car beyond daily basis. This match the answer about where the users are missing charging possibilities: between cities.

Finally, we asked how much the respondents are willing to pay for a fast charging session. Since we have little experience with payment models in Norway, this was an open question without alternative price ranges. We did not want to make any suggestion for what we might think a correct price range would be. As a result, the answered payment willingness for a 15 minutes fast charging session varied a lot. The main impression from the 1,254 answers is that the majority is willing to pay for fast charging, even if the maximum amount vary from 0 to 500 NOK (0 to 60 Euro). The majority seems to think a maximum price of between 2.5 and 6 Euros per 15 minutes fast charge is acceptable. About 10 % of the respondents can accept a price of up to 12.5 Euros. A substantial part of the respondents also indicates that they are willing to pay the double of what charging per kWh at home costs. At 2 NOK (0.25 Euro) per kWh, this means a cost of approx. 40 NOK (5 Euros) to fill the battery of a Nissan LEAF from 0 – 80 % capacity.

Slower fast charging for cold batteries (around half the effect) in 4-5 months in Norway complicates for the users the normal procedure by taking payment per minute using the fast charger, not the amount electricity (kWh) charged. In a cold winter day, you risk not to get more than 5-6 kWh during 15 minutes. The results show that the willingness to pay for fast charging is lower than most fast charging operators have in their price models. It seems important that in any circumstances, the price per km fast charging should not exceed the cost per km for diesel and petrol cars.

2.7 Norwegian EV policy

The governmental incentives for buying and driving electric cars have contributed to the Norwegian success.

We asked the users what they think are the three most important incentive for electric cars. There is no single incentive that excel as the most important among all the electric car owners. It depends on where you live and how you use your electric car.

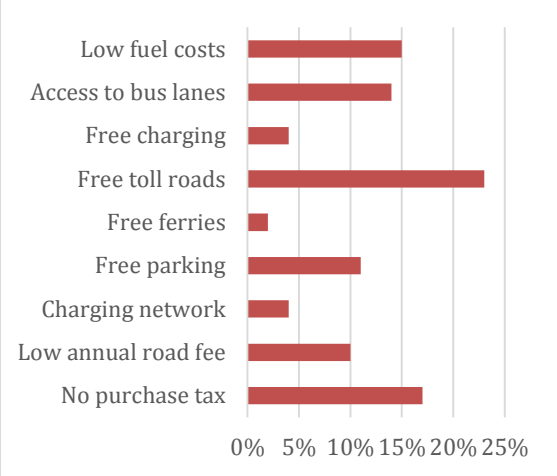

Fig 13. What are the three most important EV incentives?

23 % of the respondents think that no charge on toll roads are most important. Probably not important for those who do not drive on toll roads. Oslo has a toll road around the city, and this area's share of the sales of electric cars in Norway has been quite stabile around 50 %. The two last years the share of electric cars sold in this area has been slowly decreasing. 17 % of the respondents highlight the purchase tax exemptions as the most important. This means that the electric car is competitive to traditional cars at purchase. A basic incentive that gets people to consider buying an electric car at all, and probably the main reason to why Norway is ahead the rest of Europe on sales per capita. Because of high purchase taxes on traditional cars, the electric cars are only marginally more expensive than a comparable gasoline car.

Low fuel cost is also an important incentive for the electric car owners (15 %). The access to bus lanes is important for those who live in areas where these are available (14 %), mainly around the large cities, and especially for commuters west of Oslo. Free municipal parking (11 %), lower annual fees

than traditional cars (10 %), free public charging (4 %) and available network of public charging stations (4 %) was the other options for the 2013 survey. These results differ little from the 2012 survey with the exception of the importance of available public charging stations (11 %). At this moment, investments in a large, public charging station network does not look as crucial as financial incentives for purchase and use. However, this will again depend on where we want the electric cars to be used, in the cities between home, work and shopping, ore extend the use to travel between cities. Overall, the Norwegian electric car success is due to the package of incentives, not one single benefit in particular.

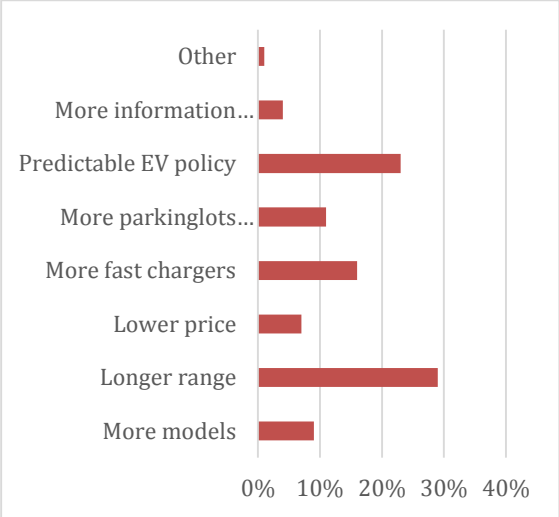

Fig 14. What's necessary to get more people to buy EVs?

We also asked the EV users what they think is necessary to get more people to buy electric vehicles regardless of their own specific needs (Fig 14). The most important measure in the user's opinion is to give the electric car longer range (29 %). This can be done by improving battery technology or bigger battery packages like the Tesla Model S. Another way to extend the range is to establish more charging stations. More fast chargers (16 %) and more parking spots with charging (11 %) is also important to make the electric car attractive for the mass market according to the Norwegian EV users. More models to choose from is important for 9% of the respondents and lower price is important for just 7 %. This illustrates that the purchase price is already competitive because of the exemption from purchase taxes and 25 % VAT. Norwegians can buy relative cheap electric cars today, maybe a precondition for other countries that want to follow the Norwegian success. Last, but not least, a predictable long term EV policy is for 23 % of the respondents necessary to get more people to buy electric cars.

3 Conclusions

Because of a broad package of incentives to buy and use electric cars, Norway is leading the way to electrify the road transport. There are over 13,000 electric cars driving in Norway in June 2013, and each month 500 new electric cars hits the roads. The long tradition of electric cars in Norway and the high number of electric cars per capita makes it an interesting case for other countries and the EV business. The Norwegian Electric Vehicle Association conducts an annual survey among their members and other Norwegian electric car owners. In the 2013 survey, 1,858 EV users contributed with their experiences and opinions.

The typical Norwegian EV user is a middle-aged family father with higher education and income, and he owns a Nissan LEAF as one of two cars. He uses his electric car on a daily basis instead of a traditional petrol or diesel car. He uses the electric car for commuting, after work activities, and not for longer holiday trips. He agrees on that his electric car saves him money and time and he is very satisfied as an EV owner. His next car will also be electric. The typical EV owner has a charging outlet at home and probably also at work. He uses public charging stations less frequent. Fast charging is important to extend the range of the electric car on extraordinary trips and as a security if the battery runs empty by accident. He is willing to pay between 2.5 and 6 Euros for a 15 minutes fast charging session. The location of fast chargers should be between cities and convenient locations where he drives on a regular basis. The broad package of incentives convinced him to buy his electric car. Although, it was the zero purchase tax and VAT that made the electric car competitive for him to consider in the first place. Low fuel cost, free toll roads and access to bus lanes are also important incentives. In order to get more people to buy an electric car, the EV user highlights longer range and predictable EV policy as the two most important requirements. One challenge to the electric car manufactures and one challenge to the world governments.

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Authors

Mr. Petter Haugneland is the Communication Manager and Editor of elbil.no at Norwegian Electric Vehicle Association. His association cooperates with Norwegian policy makers, the electric car industry and other organizations for the successful introduction of electric vehicles. Mr. Haugneland has a master's degree in political science from the University of Oslo and ten years of experience as a communication advisor at the Center for International Climate and Environmental Research in Oslo (CICERO).

Mr. Hans Håvard Kvisle is Project Manager in Norwegian Electric Vehicle Association. Among different projects, leading the development and maintenance of the charging station database NOBIL. Editor of elbil.no 2010-13, now contributor. President of NEVA 2010-12, now Board Member. Managing Director of the development company Ladestasjoner AS. Mr. Kvisle has background from EV-business (manufacturing, engineering and sales) and communication technology.