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EV charging points in Oslo – 400 in 4 years 2008-2011

a city's strategy to support the use of electric vehicles and become the world's EV capital

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Abstract

Oslo has a history with electric vehicles. Since the 1990's, electric vehicles have been produced and sold in and around Oslo. However, until late 2000's, there were few public charging stations available. In 2008 the City Council in the City of Oslo decided to establish 400 on-street charging points, 100 charging points each year from 2008 to 2011. This task was appointed to the Traffic Agency, who at that time was the agency responsible for the city street parking regulations.

Although Oslo does not have a climate and topography ideal for EVs, the country has many strong incentives for buying an EV, but without a place to park and charge your EV if you live in the city, few people dare to buy an EV. By establishing 400 charging points within four years, accessibility to on-street charging in both residential and business areas has increased. Within those four years, the market for electric vehicles has also expanded rapidly and grew ever more popular. EVs are selling more than ever in Oslo, and Oslo probably is the capital with the highest concentration of EVs per inhabitant. The incentives and the establishment of on-street public charging points has made buying and driving an EV a more realistic alternative for people living in the city, and has helped the City of Oslo become the world's EV capital.

Infrastructure, charging, city traffic, incentive, subsidy

1 Introduction

Norway and its capital Oslo is not the obvious choice when it comes to driving an electric car. The city and surrounding areas full of small and big hills and during the winter months the temperatures are cold and the roads filled with snow. All these factors affect battery and range, and thus is not the optimal choice as a family car in Norway.

However, Oslo is the city where you will probably find the most electric vehicles per capita in the world.

1.1 History of EVs in Oslo

Since the early 1990's, electric vehicles has been present in Oslo, even produced in factories in Oslo and the surrounding areas. This was namely Pivco (later developed into Think) and since 1998, Kewet, after the company was bought from Denmark and the factory was moved to Norway. While only being appealing to a small group of drivers and EV enthusiasts, these companies were able to stay afloat until after 2000. At this point, although not highly popular as a mode of transport, EV's had already gained a lot of benefits and advantages:

- EVs can drive for free on toll roads
- There is no VAT (25%) on electric vehicles
- There is no "first-time registration fee" on new electric vehicles
- EVs are allowed to drive in lanes reserved for bus and taxi
- EVs park for free in public parking spaces (but need to abide by the maximum parking time)
- EVs in Norway have a strong user association (The Norwegian EV Users Association)

The reduced taxes meant that a Think or Kewet EV cost just about the same as a slightly used VW Golf.

However, space and safety in the cars were not at its best in this period. During the last few years before the millennium decade was over, there seemed to be a slowly moving shift in the market, and electric vehicles seemed to be working towards a new revival. Bigger car producers were looking toward the market of electric vehicle market and the Norwegian EV Users Association, were lobbying towards preparing Oslo for these new cars and the environmental benefits they may bring. At this point, already about 1500 EVs were registered in Norway, with numbers increasing with about 200 new each year.

In addition to all the benefits, one important fact to the high number of EVs in Norway is that EVs have *been available*. They were possible to buy if you really wanted one. However, only a few charging stations were available in Oslo, and a few owners were dependent on their charging cable hanging out of their apartment and down on the city street to be able to charge.

1.2 Establishing 400 charging points

In January 2008, The Oslo City Council decided to set focus on reducing CO2 emissions from the transport sector in Oslo. This included beginning a large-scale preparation for electric vehicles in the city. After some lobbying from the EV community towards politicians in the City Council, The Department of Transport and Environmental Affairs was asked by the City Council to establish 400 charging points for electric vehicles in the period 2008-2011. The planning and establishing of these charging points became the

responsibility of the Traffic Agency (now part of the Agency for Urban Environment).

When procuring and establishing the 400 charging points, our Agency decided to use the same charging system as the one which has been used by the EV community in Oslo since the late 1990's:

- To access the charging points, EV drivers use a key. The same key is used for most charging points in all of Norway.
- The key is included in the "Welcome as a new EV driver"-kit that comes with every new EV sold in Norway (provided by the EV Users Association).
- Parking and charging is free. There is no registration or membership required.
- Charging points have simple functions, but are designed to fit the city environment. They are 230V equipped with two sockets, two 16A automatic fuses and a LED light on top to indicate whether cars connected are charging or not (blue or green light).

By law, parking for electric cars is free in public parking spaces. As our procured charging station is simple to use, we also decided it was not necessary to implement a costly and complicated system for paying for electricity when charging. We therefore decided to let charging be free as well. In 2010, the total bill for electricity for our charging stations was around NOK 330 000 ($ 56 000). For the 270 charging stations we had at the end of 2010, this was an average of 50 cent per charging point per day. Our experience was thus that the expenses of installing payment equipment exceeded the possible revenue. However, other cities may need the extra income that comes from charging for electricity. Other cities may also find it useful to survey and manage the use of the charging stations in a more advanced way for statistical benefits. This is a consideration and costs that need to be advised before procuring and establishing charging points.

When it comes to placement of the charging stations, we asked the EV community to help us and give us suggestions for possible locations. Many drivers suggested public spaces, near sports arenas, concert halls, theatres, downtown shopping areas, and in residential streets where residents only had access to street parking. In additions to this, our Agency strolled and drove through the city, looking for streets where EVs were parked, and where there was no charging available. When surveying streets like this, we also looked for places to connect the power needed for the charging stations to as to minimize the need for more field trips. In addition, we have also established charging points at a Park & Ride location, although most EV drivers prefer to drive their car all the way downtown, because of the easy access to parking and charging stations. We have however implemented slightly different regulations in the varying charging locations. Locations in high demand with few spaces available and those situated near shopping areas usually have a maximum parking time of 3 hours. This is to improve circulation on the parking spaces and charging points. Charging points in mainly residential areas have a more liberal maximum parking time, between 16 to 24 hours, to make sure the cars are able to charge to 100% overnight.

Although EVs up to this day have not been able to drive far, traveling between the Scandinavian countries is not uncommon, and many Norwegians like to drive and spend their holidays in Sweden and Denmark. A simple and user friendly system has therefore been important for us. The lack of a standard when it comes to how to open

or close, or make available a charging point, may make this tourism a future challenge. Even more so if the country or city has multiple charging station providers, each with their own key, RFID chip, pre-registered customer plan etc. Our use of the key in our charging station will probably need to be revised within few years. However, for the time being, we are satisfied with choosing the simple, easy and affordable system for making charging available for the public.

In addition to building 400 charging points on public streets, we were asked to join the Energy Efficiency Agency in creating a subsidy for private companies, apartment complexes, stores and shopping centers who wish to establish charging points for EVs. Our Agency administers applications for this subsidy. Subsidies range up to 10 000 NOK ($ 1800) per charging point established. This is meant to cover the private parking spaces where our agency does not have jurisdiction to establish charging points on our own.

1.3 Summary

As of today, the Agency for Urban Environment has established 400 charging points for electric vehicles in Oslo. Most of these are being used every day, both day and night. The high number of EV's being sold in Oslo, may also be partly due to the charging points being established shortly before the mass produced vehicles started being sold. Our single largest charging location feature 50 charging points, but most other locations feature 2-4 charging points with on-street parking. This made potential customers able to see that there actually were places to charge your car, even if they lived in a city street with no private residential parking. Apart from the more popular term "range-anxiety" at least there was less "parking-anxiety" as parking spaces with charging points started showing up all around the city center.

Due to the success of our charging points, and the high number of EV's being sold in Norway, we have been asked to build another 100 charging points in Oslo in 2012. The map for the current and future charging points is available on our website: http://www.bymiljoetaten.oslo.kommune.no/parkering/parkeringsplasser/elbilparkering/

Since 2010, we have also been part of the "Electric Vehicles in Urban Europe" project, together with 9 other cities in Europe, sharing our knowledge and exchanging better-practice solutions to improve conditions for electric vehicles in Europe.

As of December 2011, there are a total of 5448 electric vehicles in Norway, whereas 1373 registered within the City of Oslo and 1749 in the neighbor county [1]. Divided on the 600.000 inhabitants of Oslo or the 4.8 million in Norway, Oslo and Norway probably has the highest number of EVs per capita in the world.

To sum it up, these are the most important factors that have led to the high numbers of EVs in Norway; some can also be transferred to other countries and cities:

- Available electric cars since early 2000
- Electric car producers in Norway has led to even better conditions and incentives for EVs
- Incentives are marketed towards consumers
- Enthusiastic EV community for early-adopters
- EVs are bought and driven by private persons, who are motivated customers

- Visible cars and EV drivers help gain attention towards EVs as being functional cars
- Charging points are established before mass-produced EVs were for sale
- Good network of normal charging points nation-wide through national government scheme in 2009-2010
- Fast chargers are being established nation-wide through national government fast-charging scheme 2010-2012
- High taxes on ICE cars make EVs have a competitive price

Until we are proven wrong, we dare call Oslo the EV capital of the world.

Acknowledgments

The Norwegian EV Users Association
The URBACT EVUE project

References

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