

# Electric transport with wind in its sails

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Transport researcher Liv Øvstedal at SINTEF is working on a system in which electric cars themselves will be able to order charging by searching for charging stations and calculating their time to arrival. Credit: Thor Nielsen

Researchers are aiming to remove the electric car market's biggest problem – the fear of not reaching the next charging station.

Both in Norway and in Europe there is considerable interest in facilitating [electric mobility](#) and removing polluting goods and passenger transport from towns. There are critics out there, and European vehicle

sales give no cause for rejoicing, since only 0.2 per cent of private cars sold are electrically powered. However, Norway saw a doubling of sales last year, with a total of 4,009 cars, and the number of [electric cars](#) on Norwegian roads is now around 11,000.

Simpler charging is also on its way, and the cost-effectiveness of electric goods vehicles and electric buses is being tested on Norwegian roads.

## **Electric cars call for experienced drivers**

"One of the main challenges in getting more people to choose electric cars is the fear that their batteries will run flat and they won't find anywhere to charge them," says Liv Øvstedal at SINTEF. "Although a new generation of electric cars is now on its way, offering rapid charging and a greater range, we realise that the problem of charging and charging stations concerns people who are thinking of buying a new car.

"The cold, damp Norwegian climate represents an added burden for electric car owners. Motorists often need a year's experience of driving the cars to feel safe with them in all [seasons of the year](#)."

## **Communication platform in the car**

Transport researchers at SINTEF want to make it possible to calculate the range of a car more precisely than at present, and to provide the driver with full information at all times.

"We envisage a system where the car is equipped with a simple GPS unit on which the driver plots the route. The car should be able to order its own charging by looking up charging stations and calculating when it will reach them. If changes occur during a journey, the program should adjust. We are now working on getting all the pieces in place to make

this work," says Øvstedal.

A small technical pilot scheme has been planned in Trondheim, as well as a larger demonstration project next year involving 200 electric cars on the road between Oslo and Kongsberg.

"Many people in Europe have the same ideas as we do, but we have yet to see such a system in practice. We believe we can make a contribution at a European level by organising demonstrations and working towards a business model," says Liv Øvstedal.

## **Electric goods vehicles**

But what about all the goods transport in town centres, and the big diesel vehicles idling outside shops while they unload goods? Can these be replaced by electric vehicles?

According to Øvstedal, we are keen to point out that Norway has the greatest density of electric vehicles per head of population in the world, but when it comes to goods transport we are a long way behind. Small historical towns in Europe, with their narrow streets, have been using electric goods vehicles for a long time.

Last year, the Norwegian company BRING tested several electric vehicles for express goods delivery, and data from the Grønn Bydistribusjon (Green Urban Distribution) project were so encouraging that the company purchased an electric goods vehicle for permanent use.

The company is now involved in the EU project FREVUE, in which Oslo is one of eight participating European cities. The project will evaluate the operation of four electric vehicles – two large ones approaching 7 tonnes, and two smaller ones – within the area bounded by the city's outer ring road. They will be used for express door-to-door

delivery of packages, such as orders from IKEA.

## **Collecting and evaluating data**

In goods distribution work the focus is on solutions which are environmentally friendly, efficient and financially sustainable. "We must always have a clear picture of what we want to achieve," says Hanne Gabriel, a research scientist at SINTEF. According to her, the Oslo projects address several problems: The researchers shall investigate technical issues such as how well vehicles function when loaded.

Conditions related to charging and electricity supply are another issue: Can the vehicles function for a whole day without recharging? What "carrots" and incentives can be offered to purchase electric vehicles, and what about the logistics of their use?

"We want to check whether electric goods vehicles in the city can contribute to improved air quality, and whether we can facilitate the routing and transshipment of goods so as to avoid using large diesel vehicles in the city centre."

In other words we will test whether terminals on the outskirts of Oslo can be used as loading and unloading facilities where goods can be sorted and transhipped to electric vehicles for the last stage of their transport into the centre. The demonstration project will start next year.

## **Critical voices**

Even amid the choir of electric car enthusiasts there are also researchers asking difficult questions. Steffen Møller-Holst at SINTEF Energy Research believes that battery-powered vehicles will play a very important role in the emission-free transport of the future, but that this

will happen in combination with hybrids, rechargeable hybrids and hydrogen-powered vehicles.

"The different vehicle technologies will dominate in different transport segments, and all have advantages and disadvantages. We must therefore assess both the vehicle and its environmental soundness in a cradle-to-grave perspective," he says.

A joint American-Chinese research report (Shuguang, Ji et. al: Electric Vehicles in China: Emissions and Health Impacts) proves that vehicles powered by electricity from coal-fired power stations result in more soot emissions per passenger kilometre than cars powered by petrol and diesel. Compared with petrol and diesel powered vehicles, [electric vehicles](#) therefore turn out to be the worst polluters in large countries like China, India and the US.

Other critics highlight vehicle manufacture, where batteries also have a climate-related cost. Anders Hammer Strømman and his colleagues at NTNU have, for example, discovered that the building of an electric car causes about twice as much greenhouse gases to be emitted as during the construction of a petrol- or diesel-powered vehicle.

## **Expensive technology for electric buses**

Another thing which must be tested is whether electric buses will be a good investment for Norway in the future. The government-funded agency Transnova – the transport industry's equivalent of Enova – has initiated a project in which SINTEF researchers will make an assessment of the electric buses on the market and find out which are suitable for use in Norway.

"What's positive about introducing research and starting tests and demonstration projects is that knowledge and experience are shared and

can benefit many different parties. Based on research and experience, the technology can subsequently be developed and improved," says Hanne Gabriel.

## **"What do you know so far?"**

"We know that the technology is expensive, and that many operators are waiting until more experience is available. But this must be broken. As long as nobody dares to get involved, no new and more efficient technologies can be developed, either," says Liv Øvstedal. "Because although the initial investments are large, the operating costs are lower than with diesel-powered vehicles, and low operating costs mean that the venture will pay in the long run!"

Provided by SINTEF

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