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DR ANTJE KLITKOU DISCUSSES THE BATTERY ELECTRIC VEHICLES MARKET IN THE NORDIC COUNTRIES, AND THE NEED FOR A NEXT GENERATION RELIABLE AND EASILY ACCESSIBLE RECHARGING INFRASTRUCTURE

# The electrification of Nordic road transport

The electrification of the road transport network in the Nordic countries is one of the main pathways for a transition from road transport dominated by fossil fuels to a sector that is more sustainable. In recent years, battery electrical vehicles (BEV) have achieved a market niche status in the Nordic countries, especially in Norway, and the TOP-NEST project was created to analyse electrical mobility in these countries.

## Renewable electricity

BEVs produce the lowest carbon emissions of all power trains as long as the electricity is produced by renewable energy sources. This means that access to such electricity sources is an important precondition for achieving a sustainability gain by deploying BEVs. In 2011, the share of renewable sources in electricity generation varied from 98% for Norway, to 59% for Sweden, 39% for Denmark and 28% for Finland (Eurostat). These shares explain some of the differences regarding the market penetration of BEVs, measured in registered BEVs in 2013: about 1,300 in Denmark, 140 in Finland, 12,000 in Norway, and 670 in Sweden. Another explanation is differences in policy support.

## Public support

A combination of environmental, transportation, research and financial politics has proven to be important for market niche formation: sustainability goals for transport-related carbon emissions, the introduction of demonstration programmes, the implementation of regulations favouring BEVs, the support of charging infrastructure by public agencies, and the introduction of long-term tax incentives for BEVs, have been instrumental for niche formation.

The Norwegian Electric Vehicle Association reported in 2013 that the three most important incentives are free toll roads and exemption of high purchase taxes and low fuel costs due to free use of the public charging points, but also important are issues such as access to bus lanes, free parking on municipal parking lots and low annual road fees.

## Market

In Norway, the market for BEVs has changed over the last decade. The early market was dominated by small city vehicles, such as 'Think' and 'Buddy', driven by EV enthusiasts. These were developed by actors in the Nordic region outside the traditional automotive industry, but went bankrupt. Nevertheless, Think had an important role as one of the first in an emerging market for electric vehicles in Norway.

Since 2010, sales of electrical passenger cars in Norway have doubled annually. Today, the main manufacturers in the Nordic BEV market are global actors, such as Nissan, Tesla, Mitsubishi, Volkswagen and Citroen. Indeed, the major car manufacturers are either selling BEVs or are working on prototypes for BEVs that will soon be commercialised.

Nevertheless, Nordic car producers remain actively involved in BEVs, with Saab, a Swedish car producer, having now been purchased by a

consortium of Chinese and Japanese companies who plan to resurrect Saab as an electric car manufacturer targeting the Chinese market.

In addition, Danish start-up ECOmove has developed a prototype of a lightweight BEV. The low weight of this BEV increases the range of the car and makes it more affordable to drive. ECOmove wants to establish a partnership with more experienced players in manufacturing and supply chain management to achieve mass production.

## Infrastructure

A precondition for BEVs is the existence of a reliable and easily accessible recharging infrastructure. Therefore, national government agencies and municipalities support the rollout of a national recharging infrastructure in the Nordic countries. An important issue to be addressed, however, is the harmonisation and standardisation of charging solutions regarding charging plugs and cables, communication between cars and charging points and operators, and open access to charging points for all car users.

The recharging infrastructure currently installed in Norway serves the first generation of BEVs. With the new generation of BEVs dominating the market there is now a need for the next generation of public charging solutions to be developed in order to increase safety for users and push forward the possibility for faster charging.

In Denmark, the deployment of vehicle-to-grid technologies is important due to the unpredictable electricity loads generated by Denmark's offshore wind farms. Better Place provided a subscription-based electricity and charging service for BEV users and expensive battery shift stations to address this issue, but went bankrupt.

## Bottom-up support

The experience and expectations of the users are important for the future deployment of BEVs, in that they raise awareness for BEVs while also contributing to the shared knowledge on BEV models on the market, as well as the benefits, incentives, and infrastructure. BEV owners tend to act as enthusiastic advocates both at work and in their communities, and have contributed actively to overcome range anxiety, one of the former major barriers for mass deployment of BEVs in both the Nordic countries and beyond.

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