

Fast-charging infrastructure for electric freight

Issue

Operational models based on charging at the depot only can create 'range anxiety' for certain types of logistics operations

Overnight charging is lengthy and requires the installation of a large number of charging points at depots

Solution

The cities of Oslo (Norway) and Stockholm (Sweden) have installed fast-charging stations to allow for 'opportunity charging' during operational hours

Results & Benefits

Operationally and economically viable solution

Adapted to logistics schemes for which battery range can be an issue

Context

In most of the FREVIEW demonstration sites, the urban freight operators charge their electric freight vehicles in their own depots overnight at a low current. This process is generally lengthy and normally requires one charge point per vehicle. Furthermore, this charging method is best adapted to urban freight operations for which daily distances are limited. For some, however, the battery range currently available can be an issue and might limit the successful operation of electric freight vehicles.

Fast charging

Fast charging stations provide electric vehicles with charged batteries (usually 80%) in less than 30 minutes.



Solution



To overcome the limited battery range issues and to allow additional charging during operational hours, the cities of Oslo (Norway) and Stockholm (Sweden) have installed fast-charging stations that can be used by all types of electric vehicle users, including freight operators.

Stockholm



In cooperation with the electricity providers Fortum (FREVIEW partner) and Vattenfall,

eight fast charging points have been installed in the Swedish capital – with the objective to reach a minimum of 10 fast charging stations in the near future. These are public charging points which intend to further develop electric mobility uptake in Stockholm, including for the electric freight sector. This accompanies the installation of more than 600 standard charging facilities prior to 2016.



Uptake has been promising. In

2016, the Fortum fast charger installed as part of the FREVIEW project was used on average 4 times a day, which is a three-fold increase compared to the previous year).

Effects of top-up charging on operations and electric batteries

- Flexible charging
- Time savings
- Reduction of range anxiety



- Increase of battery temperature
- Impact on battery range
- Impact on battery lifetime



Fast charging has generally been carried out mainly during weekdays with less charging events during weekends and evenings/nights. This can be interpreted as a usage of the fast-charging facility strongly linked to work, including freight operators. This assumption is confirmed by the data from public fast charging stations which clearly shows that the majority of users are commercial electric vehicle drivers. Therefore, fast charging is seen by the local authority as a way of supporting the uptake of electric freight vehicles.

Two types of behaviour can be distinguished in relation to fast charging in Stockholm: short “top-up” of 0–10 minutes, or longer charging sessions of 10–30 minutes. This depends mainly of the location of the charging stations and the usage of the vehicles made by the drivers.





Oslo

Thanks to the FREVIEW project the City of Oslo has tripled the number of quick chargers in the Norwegian capital in 2016. The three largest sites in Oslo are now operating a total of 11 fast chargers and 22 semi-quick chargers. The three sites are located at the Munch Museum parking, at the “Margarinfabrikken” in Bjølsen and in Skøyen.

All sites offer a pre-booking system which allows freight operators using electric vehicles (including e.g. local FREVIEW partner Bring) to reduce the waiting time and the uncertainty related to the availability of the public chargers.



The charging station located on the Munch Museum parking uses a solar panel solution while the one in Skøyen is also prepared for the new generation super quick DC chargers of more than 150 kW and can easily be upgraded as soon as the new protocols are approved.

The installation of public fast-charging infrastructure proves to be useful as the uptake at all sites is high. The station in Skøyen is especially successful with more than 400 charging sessions per week on average during the first months of 2017 while the Bjølsen site is near full capacity during peak hours. In Bjølsen, the city of Oslo is considering the conversion of semi-quick chargers into fast chargers and the installation of an additional fast charger. All stations can be easily upgraded with more chargers in case of higher demand.

Economics



The business model used in **Stockholm** is based on access rights agreements between the city and electric utility companies. The city authorises the companies to install fast chargers and to operate the service at a public location. Companies are also in charge of signage and maintenance of the charging facilities. The first two access rights agreements in Stockholm were given in exchange of an annual fee. The city has decided to make it free for the other agreements. The city estimates that for being profitable, a station should be functioning at least 90-95% of the time

In **Oslo**, the business model for quick charging infrastructures is based on a joint-venture between the City of Oslo and private companies. Both investment costs and future incomes are shared equally between both parties. The municipality estimates that in the long run, investments will be profitable for all parties involved. In addition, the operational benefits for operators and electric freight vehicle owner are evident.

And for the users?

In **Stockholm**, until the beginning of 2015, fast-charging was free. This changed in early 2015, making the number of users decreasing at this time. In January 2017, the price for fast-charging is of approximately 0.20€ - 0.25€ per minute. In **Oslo**, prices are similar with a rate of approximately 0.10€ per minute for semi-quick charging and approximately 0.25€ for fast charging.

The users seem satisfied with the present price range which is still regarded as cheap compared to the price of fossil fuels. Additionally, in Oslo, a discount applies to electric taxis and FREVIEW Bring vehicles.

Lessons learnt & Recommendations



The choice of location of the fast charging stations is important to attract high usage by electric vehicle drivers

Drivers of commercial electric vehicles are frequent users of fast chargers. In Stockholm, they are so far the most frequent user group.

Fast opportunity charging coupled with a pre-booking system allows for an efficient use of public infrastructure by commercial electric vehicle drivers and strongly reduced the issue of “range anxiety” among drivers

Cooperation with private companies for the installation and management of fast charging infrastructure is highly recommended

Further information:



FREVUE Coordinator: Tanja Dalle-Muenchmeyer
tanjadallemuechmeyer@crossriverpartnership.org

FREVUE website: www.frevue.eu

More information: *Experiences from setting up public charging facilities for electric vehicles in Stockholm*
<http://bit.ly/2px1OSg>

Pictures: Cecilia Nordstrand (pages 2 & 4)



The FREVUE project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 32162