



FREIGHT ELECTRIC VEHICLES IN URBAN EUROPE

FREVUE Results and Guidance for Fleet Managers and Operators



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1. Introduction

As part of the Freight Electric Vehicles in Urban Europe (FREVUE) project, ten fleet operators integrated fully electric vans and trucks into their operations. This recommendation document is based on their experience with these electric freight vehicles as well as further FREVUE research and analysis.

It provides an overview of the reasons to electrify your fleet, the technical suitability of electric freight vehicles, their availability and economics.

2. Positive experience with electric freight vehicles

Overall, the experience FREVUE industry partners have made with electric freight vehicles throughout the project has been very positive. So positive, that most operators have increased the number of electric vehicles in their fleet following the initial trial. For example:

Heineken initially trialled four vehicles and now successfully run a 19t truck in Rotterdam, and one 12t and seven 13t trucks in Amsterdam to distribute beer.

UPS trialled 16 electric freight vehicles as part of the FREVUE London demonstrator (in addition to the 18 EFVs previously deployed) and have increased the total number of EFVs to 52 as of early 2017. This represents nearly a third of the central London fleet and UPS are looking to increase this share further.

The Lisbon Post, CTT, started with 10 electric vans in 2013, increased to 17 vehicles during the project,

and has plans to add 10 vans per year over the next two years. In addition, CTT are increasing their number of electric quadricycles in Lisbon from 50 in 2017 to 100 until 2020.

2.1. The FREVUE Project

FREVUE is a 4.5-year European-funded project that started in March 2013. It involved 32 partners across Europe and deployed over 80 fully electric vans and trucks in eight European cities. Data from the project provides an evidence base on the technical and operational suitability of electric freight vehicles; their environmental, transport and social impacts; their economics; and policy/governance changes that are required to increase their uptake. For further information as well as detailed project reports, factsheets and other resources, please see www.frevue.eu.



3. Why introduce an electric freight vehicle to your urban freight fleet?

3.1. Pollution from conventional freight vehicles

The road transport sector is a major contributor not only to greenhouse gas (GHG) emissions but also to local air pollutants. Two air pollutants of the most concern are nitrogen oxides (NOx) and particulate matter (PM) because of their effects on human health and the challenges many cities face in reducing them.

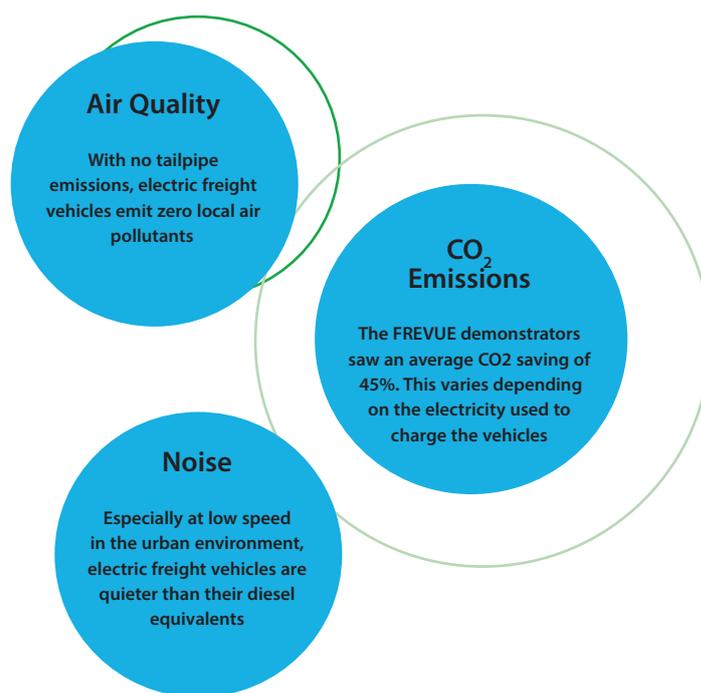
Most local air pollutants stem from diesel vehicles and freight vehicles significantly contribute to this, for example:

// IN ROTTERDAM, A TRAFFIC MONITORING CAMPAIGN (2012) IN THE INNER CITY HAS SHOWN THAT FREIGHT TRAFFIC (LIGHT, MEDIUM AND HEAVY-DUTY VEHICLES), COVERED ONLY 13% OF THE TOTAL MILEAGE, BUT ACCOUNTED FOR **25%** OF PM10 EMISSIONS AND MORE THAN **50%** OF NOX EMISSIONS

Results from the FREVUE project confirm the important role that electric freight vehicles can play in addressing these issues:

The general public is becoming increasingly aware of poor air quality levels in European cities and supports actions taken to mitigate this. The analysis of FREVUE surveys has shown that customers have very positive attitudes towards electric freight vehicles and believe that they play a key role in resolving poor air quality, global warming and traffic noise problems in cities.

While not many customers are willing to pay a premium for electric delivery, clean vehicles can act as a brand differentiator and it is not uncommon



for commercial customers to request their goods to be delivered by electric vehicles.

3.2. Incentives and regulation

As a result, public authorities on national, regional and city levels, have supported the uptake of electric freight vehicles through a mix of regulation and incentives. Examples are:

- Incentives to encourage the uptake of electric freight vehicles, such as exemptions from taxes and charges, free parking, and extended access rights.
- Financial support for the procurement of electric freight vehicles.
- Regulation to discourage the use of diesel vehicles, such as (ultra) low emission zones and restrictions of access to areas for diesel vehicles.

- Provision of electric vehicle charging infrastructure.
- Public procurement requiring or encouraging the uptake of electric freight vehicles.

/// GET IN TOUCH: MANY LOCAL AUTHORITIES WILL BE KEEN TO DISCUSS THE POTENTIAL ELECTRIFICATION OF YOUR FLEET AND CAN PROVIDE **VALUABLE** INFORMATION AND SUPPORT.

✘ City of
✘ Amsterdam

Milano



Comune
di Milano



Stockholms
stad

Amsterdam's successful pilot project granting parking and access privileges to users of electric freight vehicles is being expanded across the city

Only fully electric vehicles can access Milan's low emission zone Area C between 8-10am

The City of Stockholm has included gradual and flexible requirements in their procurement process to increase the use of zero emission capable vehicles in their transport services

4. Electric freight vehicles have proven suitable and reliable

As part of the FREVUE project over 80 fully electric freight vehicles have been deployed, ranging from small vans of under 3.5 tonne to 18 tonne trucks.

The project findings show that the electric freight vehicles of all sizes are suitable to most daily urban freight operations delivering goods including refrigerated and non-refrigerated, construction,

food and beverage, maintenance services, pharmaceutical goods, post and parcel, retail and waste.

// FREVUE SURVEY RESULTS SHOWED THAT AT THE BEGINNING OF THE VEHICLE TRIALS ONLY **39%** OF PARTICIPATING FLEET MANAGERS THOUGHT ELECTRIC VANS AND TRUCKS WERE A VIABLE ALTERNATIVE TO THEIR DIESEL EQUIVALENTS. AT THE END OF THE TRIAL, THIS RATE HAD NEARLY DOUBLED: NOW **72%** OF FLEET MANAGERS BELIEVE THAT ELECTRIC FREIGHT VEHICLES ARE A VIABLE ALTERNATIVE.

The FREVUE analysis clearly shows that the range of electric freight vehicles currently available on the market is sufficient for the vast majority of freight trips in the urban environment.

// SURVEYS WITH DRIVERS AS WELL AS FLEET MANAGERS SHOW CONCERNS OVER VEHICLE RANGE DECREASED OVER TIME: 12 MONTHS AFTER THEIR FIRST INTRODUCTION, RESPONDENTS WERE SIGNIFICANTLY MORE **POSITIVE** ABOUT THE RANGE OF THEIR VEHICLE THAN AT THE START. EVEN THE 18.5T TRUCK IN THE PROJECT HAD A RANGE OF 200KM ON A SINGLE CHARGE.

A FREVUE survey showed high driver acceptance of the vehicles. Most drivers enjoy the instant power, quietness, as well as clean and simple operations. They also think electric freight vehicles have significant environmental benefits and take pride in using them. Driver training can make an important difference to vehicle performance and range.

While FREVUE does not provide conclusive data on savings on maintenance and repair costs from the introduction of electric freight vehicles, the project results suggest that savings are significant. Conservatively, a 25-30% reduction in service and maintenance costs can be expected but this can be much higher. However, a comprehensive maintenance agreement with the vehicle supplier is essential to avoid a potentially lengthy (and costly) repair process. For larger vehicles, e.g. 18t truck, that are retrofitted and made to order, some teething problems are to be expected. However, these tend to settle down after a few months.

Some stakeholders were worried about road user safety of electric freight vehicles as they are so quiet. However, over the duration of the FREVUE demonstration, no safety related issues were encountered. Further, existing literature on this issue does not provide strong evidence that there is an increased risk to road users posed by vehicles with low noise emission.

5. Charging

Most operators charge their vehicles overnight at their own depot but some, predominantly the smaller vans, also charge during the day if and when required. When planning an EFV routine, vehicle range and charging locations for the vehicle have to be taken into account. This leads to stricter vehicle routines and less flexibility in their deployment.

Local electricity supply constraints can hinder the electrification of larger fleets that are charged at an operator's depot. Grid infrastructure upgrades are very expensive, disruptive and can require fleet

operators to invest in third party assets. If you are planning to electrify a larger fleet, do engage with your Distribution Network Operator early on in the process to identify possible constraints.

6. Vehicle availability

Availability of electric freight vehicles differs significantly depending on vehicle size.

For smaller electric vans under 3.5 tonnes the market is now well developed and Original Equipment Manufacturers (OEMs) provide a range of models to choose from.

Electric freight vehicles over 3.5 tonnes are available but are, as of 2017, mostly retrofits. While this can provide challenges, the retrofitted vehicles deployed as part of FREVUE have proven technically suitable as well as reliable.

Information on the FREVUE website provides an overview of all vehicles deployed as part of the project as well as links to national vehicle finders <http://frevue.eu/links/>.

Furthermore, an increasing number of OEMs have announced the introduction of large electric vans

and trucks to the market, e.g. the Renault Master ZE, Volkswagen e-Crafter, and the Mercedes e-Truck.

// MANY OEMS REMAIN UNSURE ABOUT ACTUAL DEMAND FOR ELECTRIC VANS AND TRUCKS. THE FREVUE **DECLARATION OF INTENT** AIMS TO ADDRESS THIS BY CLEARLY COMMUNICATING EXISTING DEMAND. AS A FLEET OPERATOR INTERESTED IN ELECTRIC FREIGHT, WE INVITE YOU TO SIGN OUR DECLARATION OF INTENT TO ENCOURAGE A FUTURE INCREASE IN ELECTRIC VAN AND TRUCK SUPPLY. PLEASE SEE [HTTP://FREVUE.EU/DECLARATION-OF-INTENT/](http://frevue.eu/declaration-of-intent/) FOR FURTHER INFORMATION.

7. The economics of electric freight vehicles



The total cost of ownership (TCO) comparison between an electric and combustion engine vehicle is an important purchasing decision criteria for operators. The TCO comparison results differ per vehicle type and usage and also depend on many other elements that can be country or even company specific.

Overall, the FREVUE results show that for small electric freight vehicles of less than 3.5 tonnes, the TCO can be favourable for an EFV within a depreciation period of five years.

REGARDLESS OF THE VEHICLE TYPE AND SIZE, THE MORE KILOMETRES THE VEHICLE CAN BE DEPLOYED ON AND THE LONGER THE DEPRECIATION PERIOD, THE **BETTER** THE BUSINESS CASE.

For a medium sized electric freight vehicle, weighing between 3.5 and 7.5 tonnes, a positive business case is possible although still challenging. Specific circumstances, like the exemption from paying the congestion charge for EFVs, have a very positive effect on the business case for the EFV.



For the large EFVs, the purchase price for the individually retrofitted vehicle currently remains significantly higher than for conventional trucks.

Though not impossible, it remains difficult to get to a positive business case.

AS MORE AND BIGGER SUPPLIERS ENTER THE MARKET AND BATTERY PRICES FALL, VEHICLE PRICES WILL COME DOWN. HOWEVER, WHEN INTRODUCING ELECTRIC FREIGHT VEHICLES TO YOUR FLEET, YOU WILL NEED TO GAIN NEW KNOWLEDGE AND ESTABLISH NEW RELATIONSHIPS. THIS REQUIRES SOME TIME. DO **START THE PROCESS** NOW SO THAT YOU ARE READY TO ELECTRIFY LARGER PARTS OF YOUR FLEET WHEN POLICY CHANGES AND VEHICLE PRICES DECREASE.

For some operations, EFVs can simply replace conventional freight vehicles. In others, some more intelligent route planning may be required, if not wider changes to operations (e.g. the use of urban consolidation centres, grouping of deliveries with other operators, etc.).

CITIES AND AUTHORITIES



RESEARCH AND SUPPORT PARTNERS



LOCAL DEMONSTRATION PARTNERS



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FURTHER INFORMATION

For more information about the FREVUE project, reports, publications and useful links, please see www.frevue.eu.

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