



**FREIGHT
ELECTRIC
VEHICLES IN
URBAN EUROPE**

FREVUE Results and Guidance for Local Authorities



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Introduction

Electric vehicles are one of the key options to reduce road freight emissions. These guidelines will support public authorities in developing an understanding of how they can support the future uptake of electric vans and trucks.

The FREVUE Project

FREVUE is a 4.5-year EU-funded project that involved 32 partners across Europe and deployed over 80 fully electric freight vans and trucks. 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.

The significance of road freight pollution

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; with freight vehicles significantly contributing to this, for example:

// IN ROTTERDAM, A TRAFFIC MONITORING CAMPAIGN (2012) IN THE INNER CITY FOUND 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.

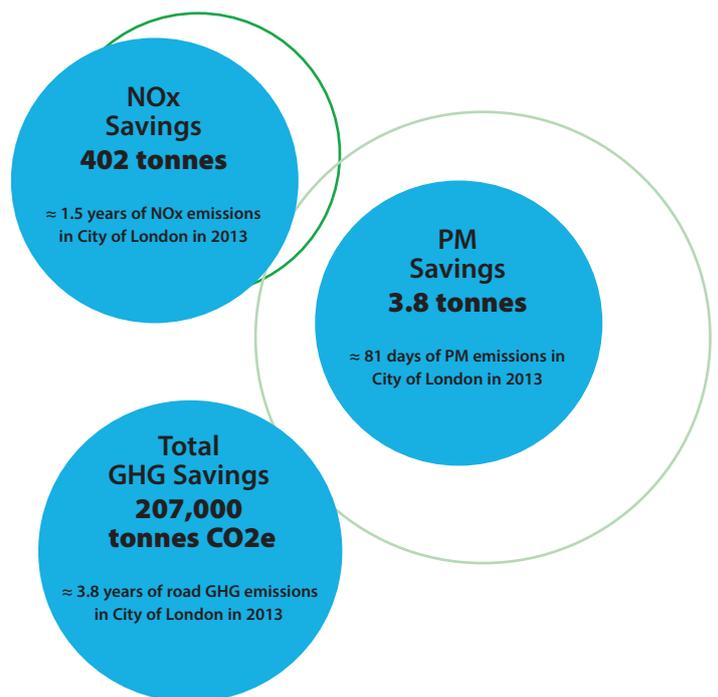
The general public is becoming increasingly aware of poor air quality levels in European cities and supports actions taken to mitigate this.

Advantages of electric freight vehicles

Environmental benefits

The FREVUE environmental and social analysis based on data from 105 vehicles confirms the significant environmental benefits of electric freight vehicles:

If, by 2021, 10% of the entire London freight fleet were electric, we would see the following air quality and CO2 impacts¹:



¹ Referring to the local authority district, not Greater London.

For CO₂ emissions, significant variations are observed between different operators and cities. As the power sector is gradually decarbonised, the total GHG emission benefits of using EFVs would increase further.

Although difficult to quantify, EFVs also address noise pollution. Especially at low speed in the urban environment, electric freight vehicles are quieter than their diesel equivalents.

Cost savings

The environmental benefits translate into significant cost savings too. As an example:

// IF, IN LONDON ALONE, WE COULD ELECTRIFY 10% OF THE FREIGHT FLEET BY 2021, WE COULD SAVE OVER **€ 1 BILLION** PER ANNUM IN PUBLIC SPENDING ON REDUCED HEALTH IMPACTS AND ABATEMENT COSTS.

Impact on traffic congestion

Several FREVUE demonstrators have successfully deployed EFVs from urban and construction consolidation centres without offsetting work undertaken by public authorities to address congestion. It will, however, be important to further increase vehicle availability among larger fully electric trucks to avoid the load of a relatively small number diesel trucks in inner cities going onto a large number of small electric vans, simply because the right payload is not available in electric mode.

Positive experience with EFVs

Overall, the experience FREVUE industry partners have made with EFVs 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.

// 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 BELIEVED THAT ELECTRIC FREIGHT VEHICLES WERE A VIABLE ALTERNATIVE.

Potential (perceived) barriers to the electrification of freight traffic

While electric freight vehicles offer clear and significant benefits, their uptake is still hindered by a number of barriers. The most important of these are:

- Limited availability of electric freight vehicles of 3.5t and above. Information on vehicle finders on the FREVUE website (<http://frevue.eu/links/>) will help locate suppliers.
- Procurement costs: For small electric freight vehicles of under 3.5 tonnes a positive business case is possible within a depreciation period of approximately 5 years. For larger vehicles, especially those over 7.5t, this remains more challenging.
- Range: Freight operators consistently ask for vehicles with more range. However, the FREVUE analysis clearly shows that the range of EFVs currently available on the market is sufficient for the vast majority of freight trips in the urban environment.
- Lack of charging infrastructure and clear understanding of charging needs: 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. For their future deployment, the availability of public fast

charging networks are important. Also, sharing of charging infrastructure, for example with electric buses, should be explored to ensure a holistic approach to electro-mobility overall.

- Possible grid infrastructure constraints: Local electricity supply constraints and the high costs of upgrading the grid can hinder the electrification of larger fleets that are charged at an operator’s depot. Smart charging technology will address some of these constraints but this is also a wider policy issue that will need to be addressed if larger electric freight vehicle fleets are to be encouraged.
- Road user safety: Some stakeholders are worried about road user safety of EFVs as they are so quiet. Over the duration of the FREVUE demonstration, no safety related issue were reported.

What role can local authorities play in the process

PUBLIC AUTHORITIES REMAIN THE KEY INFLUENCER OF THE UPTAKE OF ELECTRIC FREIGHT VEHICLES THROUGH MONETARY AND NON-MONETARY SUPPORT.

Local authorities can assist with the uptake of EFVs in several ways, the most important of which are:

- Economic and fiscal measures
- Legal and regulatory measures
- Communication and awareness measures
- Providing charging infrastructure
- Procurement

European cities all have their unique contexts. The selection of appropriate measures will depend on the nature of challenges in the city, objectives, physical properties of the urban area, legislation in effect and the nature of logistics and transport

chains. A lot depends on the existing level of EFV usage, as well as the legal and cultural context. Also, measures have to be combined wisely, considering the potential cross-effects of impacts.

Economic and fiscal measures

Economic and fiscal measures improve the total cost of ownership (TCO) of EFVs. Examples that can be implemented at local authority level are:

- Congestion charge exemption for EFVs
- Other road pricing exemption for EFVs, e.g. toll bridges, tunnels, etc.
- Free parking for EFVs

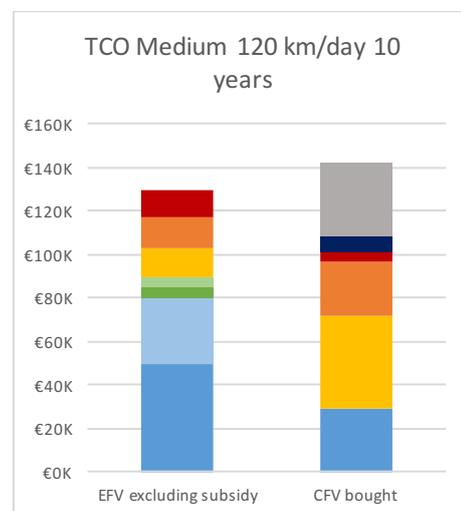
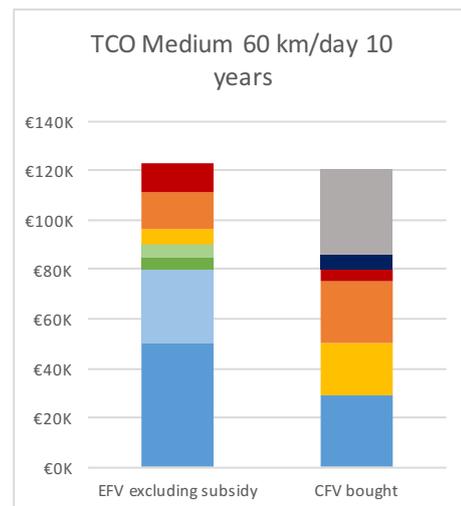


Figure 1. Source: FREVUE Deliverable 3.2

Figure 1 shows that over 10 years, the TCO for EFVs and conventional freight vehicles (CFVs) is broadly similar when travelling 60 km per day, and positive for a vehicle travelling 120 km. The exemption of EFVs from the congestion charge (in grey in Figure 1) significantly contributes to the positive business case for EFVs in city logistics.

A positive business case becomes especially important where EFV drivers are self-employed and further removed from the other potential motivations to deploy this type of vehicle.

Once EFV uptake increases, the costs of these measures to authorities will also increase and are likely to require adjustments.

Legal and regulatory measures

Non-monetary incentives to use EFVs can give them a long-term competitive advantage. For small EFVs under 3.5t that are readily available on the market and for which a positive business case can be made, these can be introduced as of today. For larger vehicles, a clear strategy and the announcement of long-term measures to be implemented will support the future availability of large EFVs and help bring prices down.

Examples of such legal and regulatory measures that can be implemented at local authority level are:

- Access regulations: pedestrian zones, low emission zones and zero emission zones
- Timed access privileges, such as permitting access only to EFVs at peak times
- (Un)loading permissions: granting permission for EFVs to use privileged loading areas
- Allowing EFVs to use bus and tram lanes
- Noise restrictions, e.g. restricting access to EFVs only during certain time windows based on their quietness compared to conventional vehicles

As for financial measures, the above are likely to require adjustments as EFV uptake increases.

The use of bus lanes, for example, will pose an obstruction to an effective bus system once too many EFVs are on the road.

EXAMPLE OF ACCESS RESTRICTIONS: MILAN AREA C

In 2012, FREVUE partner the Municipality of Milan introduced the congestion charge Area C.



In February 2017, Milan launched new rules for Area C in order to further

reduce traffic congestion on the one hand, and provide strong support for fully electric mobility on the other. Now access to Area C is limited to Euro 5/V diesel vehicles or above subject to a charge of Euro 5.00. Fully electric vehicles are exempt from the charge and so are hybrids until October 2019.

To further support electric freight vehicles, Milan has made Area C accessible only to fully electric freight vehicles between 8 am and 10 am, with the exemption for vehicles carrying temperature controlled goods.

While providing operational incentives from which EFVs will benefit, is it also necessary to implement stricter enforcement of fines for conventional vehicles.

Communication and stakeholder engagement

No incentives or regulations are likely to be successful and effective without information sharing and stakeholder engagement.

Communication and awareness measures address the lack of information about EFVs, disseminate experiences of EFV performance, and explain costs and benefits to transport operators.

Providing charging infrastructure

In most of the FREVUE demonstration sites, the urban freight operators charge their electric freight vehicles in their own depots overnight at a low current. However, some need to opportunity charge during the day, generally at lunchtime, to be able to complete their routes.

Supporting adequate fast charging infrastructure will allow for a more extensive use of these vehicles, improve their business case and thereby facilitate their future uptake.

Experience from the FREVUE project shows that 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 to support the installation and management of fast charging infrastructure is highly recommended.

Public procurement

Across the EU, the public sector is responsible for procuring around 575,000 vehicles a year when purchasing goods and services, so introducing green public procurement criteria in the tendering process for public contracts has significant potential to increase the uptake of EFVs.

This is already put in practice by a number of European cities, such as Rotterdam, where the city has set a target of 50% EFVs in its municipal fleet by 2018; Copenhagen with a target of 100% EFVs in the municipal fleet by 2025, and Stockholm where fossil-fuel vehicles are no longer used by the city authority.

The City of Stockholm has included strong environmental requirements for transport services and goods in their public tendering process. These environmental requirements aim at accelerating a technological transition towards fossil-free road

LoCITY, LONDON.

AN EXAMPLE OF STAKEHOLDER ENGAGEMENT

In January 2016, Transport for London (TfL) launched the LoCITY programme with the aim to encourage the uptake of ultra-low emission commercial vehicles, e.g. electric freight vehicles.

The programme brings together the full range of stakeholders needed to stimulate the uptake of low emission commercial vehicles: freight and fleet operators, vehicle manufacturers, fuel providers and

the public sector. LoCity has been designed to be shaped and led by industry, which is seen as vital by TfL for the scheme's success.

LoCITY is working with all stakeholders to provide trusted, impartial information about ultra-low emission vehicles, particularly focusing on their environmental and financial benefits. It aims to demonstrate, through research and real world trials, that using these cleaner vehicles will not negatively impact operations. LoCITY also establishes collaborations with the public sector to improve procurement processes (e.g. the introduction of contractual clauses)

to stimulate accelerated uptake of low emission vehicles.

Stakeholder engagement and interaction is considered critical to the success of the programme: Nearly 1,000 individuals from over 600 organisations are involved in the LoCITY programme. Four working groups have been set up to provide expert advice and guidance on LoCITY and its outputs, each covering a particular part of the commercial vehicle market: Vans; Waste & Construction; HGVs; and Policy, Planning & Procurement.

For further information, please see <https://locity.org.uk/>.

transport and minimising negative impacts of city logistics on the environment. The requirements on vehicles and fuels relate to three specific sectors: passenger transport, furniture and office relocation, and groceries.

The city has taken into consideration each sector's specific characteristics and has taken a flexible approach to the introduction of these requirements, to avoid price rises or limiting competition:

1 Gradual increase of the requirements to enable adaptation

The City of Stockholm introduced conditions of contract instead of qualification requirements to give companies time to comply. The required condition does not have to be satisfied until the contract is signed or after a certain period from when the contract is signed. For example, a supplier must not necessarily deploy a fully electric van at the time of contract signature but within a year of this date.

2 Flexible requirements help avoid limiting competition

In the case of passenger transport with specially adapted vehicles, the requirements are quite strict. To give the suppliers the possibility to build up their vehicle fleet under their own conditions, the maximum emission allowed is not calculated per vehicle, but as an average for the vehicle fleet that is used in the contract with the city.

For grocery procurement, a proportional model was used to exclude the smallest suppliers from the requirement of deploying ultra-low emission trucks. Suppliers with up to five vehicles only have requirements equivalent to the procurement department's basic level. Bigger suppliers are subject to a stricter requirement on the number of green vehicles proportional to the size of the total vehicle fleet.

FAST CHARGING INFRASTRUCTURE IN OSLO

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.

All sites offer a pre-booking system, which allows freight operators using electric vehicles to minimize waiting time and the uncertainty related to the availability of the public chargers.



At all stations more points can be added if demand increases. One of the stations is prepared for the new generation of super quick DC chargers of more than 150 kW and can easily be upgraded as soon as the new protocols are approved.

Uptake at all sites was high soon after their opening. One station recorded

an average of 400 charging sessions per week during the first months of 2017 while another one is near full capacity during peak hours.

The business model is based on a joint-venture between the City of Oslo and private companies. Investment costs and future incomes are shared equally between both parties.

COORDINATION



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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