Manchester Urban Institute

Governing Urban Transformation

The feasibility of electric freight vehicle adoption in Greater Manchester

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Author declaration:

I confirm that this report is based on my own work and that I am happy with both my own and my partner's contribution to the final submitted version.

Executive summary

This report aimed to analyse the feasibility of the adoption of EFVs in Greater Manchester. The Greater Manchester Combined Authority and Transport for Greater Manchester have a commitment to improving air quality for the benefit of its citizens, yet there is no mention in their Air Quality Action Plan (AQAP) of implementing policies favourable to EFVs, or any collaborative efforts with other stakeholders to encourage this change. Similarly, their 2016 report *‘Greater Manchester’s Freight and Logistics Strategy’* mentions the polluting effects of last-mile delivery, but does not mention EFVs as a solution.

Three case studies were chosen from around Europe: Cargohopper (Utrecht, NL), Chronopost (Paris, FR) and Gnewt Cargo (London, UK), schemes that have all implemented EFVs in the last mile of delivery. The context of each scheme, the stakeholders involved, their relative impacts and their applicability to Greater Manchester were all explored. Emails were sent asking questions about EFVs to two relevant employees at TfGM, although only one replied.

Cargohopper would be the most difficult to implement in Manchester. It’s train-like EFV is well suited to the narrow streets of Utrecht, but would be unsuitable over longer distances in a larger city like Manchester. However, the Dutch government’s subsidies meant the project could be completed through private business involvement alone, a model which may be useful in the fragmented UK logistics industry.

Chronopost and Gnewt Cargo are most relevant to Manchester. The Urban Consolidation Centres, small warehouses in the urban centre, could be applied and serviced by conventional vehicles using the larger warehouses around the M60 motorway. Gnewt Cargo’s bimodal electric vans and power-assisted tricycles are a viable model, whilst their involvement with private businesses like TNT and Hermes proved a resounding success.

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Glossary

- AQAP – Air Quality Action Plan
- CDC – City Distribution Centre
- CO_2 – Carbon dioxide
- EFV – Electric Freight Vehicle
- FREVUE – Freight Vehicles in Urban Europe
- GMCA – Greater Manchester Combined Authority
- HGV – Heavy Goods Vehicle
- LGV – Loaded Goods Vehicle
- TfGM – Transport for Greater Manchester
- ULS – Urban Logistics Space

Chapter 1. Introduction

The GMCA has noted the poor air quality across Greater Manchester, and has subsequently implemented a Climate Change Strategy to reverse the effects of climate change and improve the health of Greater Manchester's residents. By collaborating with TfGM, Public Health England, Highways England and businesses such as Manchester Airport and Network Rail, an *Air Quality Action Plan* has been created to meet EU targets and create a culture of low-emissions across Greater Manchester by 2025. However, despite addressing the role freight vehicles and HGVs play in air pollution, AQAP does not mention EFVs as a potential solution to Greater Manchester's pollution issues.

This report will present case studies of EFV schemes around Europe: Cargohopper, Chronopost, and Gnewt. Their relative impacts and stakeholder involvement will be analysed, before their applicability in a Greater Manchester context will be explored. The report will conclude with remarks on how numerous aspects of the EFV case studies can be implemented and applied within Greater Manchester, to inform the GMCA on how to improve the county's EFV infrastructure, attract private sector investment and balance private/public sector interests.

Chapter 2. Methodology

2.1. Introduction

To form an effective research project, a comprehensive methodology is needed. This section will outline the case studies required to apply EFV's feasibility to Greater Manchester, the structure of the report and the limitations of the data collection.

2.2. Case studies

To explore the suitability of implementing EFVs in Greater Manchester, secondary data from numerous case studies of EFV applications was analysed. The case studies: Cargohopper (Utrecht, Netherlands), Chronopost (Paris, France), and Gnewt Cargo (London, UK) were selected as they are at the forefront of EFV innovation. Reports on the case studies above were compiled by the FREVUE organisation, who act as an investigatory body into the application of EFVs in European cities. For the purpose of this analysis, the majority of data is extracted from the FREVUE report, unless otherwise stated. Each report was analysed, with the benefits and drawbacks of each scheme being related to Greater Manchester in terms of feasibility and similarities.

The Head of Logistics and Environment at TfGM was contacted via email, as well as the Senior Manager of the Freight Programme at TfGM. They were sent six questions regarding Greater Manchester's approach to adopting EFVs.

2.3. Structure

The report's analysis will present each aforementioned case study in turn. Each case study was reviewed to determine the roles of stakeholders, impacts and lessons learned to identify the relevance to Greater Manchester.

2.4. Limitations

Two emails were sent out to the contacts at TfGM, but only the Senior Manager for the Freight Programme replied and sent a 2016 policy document: *Greater Manchester Freight and Logistics Strategy.* However, the lack of reply from the other potential respondent meant that some key information was potentially missed. It was deemed that the reports of FREVUE and other EFV literature would be suitable to fill in this knowledge gap, particularly TfGM's *Air Quality Action Plan* mentioned above.

The disadvantage of analysing Cargohopper in particular was it applied to a region much smaller than Greater Manchester, whilst the Chronopost and Gnewt Cargo schemes have all been implemented in more sprawling regions with a far more robust and integrated freight transport infrastructure than Greater Manchester's, particularly in regards to charging points.

Chapter 3. Analysis

3.1. Introduction

Worldwide, 5.5% of greenhouse gas emissions are generated by the logistics industry (World Economic Forum, 2009). It is a sector that is continuing to grow (DHL, 2010), so its deleterious impacts on the environment need to be tackled as soon as possible.

3.2. Cargohopper, Utrecht, the Netherlands

3.2.1. Context

Utrecht is a city that actively pursues urban policy to improve its air quality and reduce traffic congestion, with the ultimate goal of improving residents' quality of life. The Cargohopper is an electric vehicle with attached trailers (figure 1), operated without any public funding by local firm Hoek Transport. It began operating in 2009, with large trucks delivering to the CDCs operated by other local logistics companies on the periphery of the city. This provides a base for the EFV to run the last 10km into the city centre.

Figure 1: A Cargohopper EFV in operation in Utrecht (Idee Green, 2017).

3.2.2. Stakeholders

The local government's drive for green transportation facilitated the creation of Cargohopper; the city already had fossil-fuel vehicle restrictions and environmental zones in place which provided the necessary policy framework for an EFV scheme to successfully integrate with existing infrastructure. The lack of public funding is remarkable, which perhaps stems from the sizeable subsidy that the Dutch government provides on electric vehicles (Taefi *et al.,* 2016). This means the cost of EFVs is affordable for private business without local government funding. Retailers themselves pushed for Cargohopper to be implemented as it means fewer large, inconvenient deliveries and more frequent, smaller manageable deliveries (Velo Mondial, 2011).

3.2.3. Impacts

In an environmental sense, Cargohopper has been an unbounded success. An investigation by the CIVITAS MIMOSA (Making Innovation in Mobility and Sustainable Actions) project, a collaboration between Utrecht, Bologna, Tallinn and other European cities, calculated that the number of combustion-engine fuelled trips had dropped by 4,080 since 2009. The train-like design of the vehicle results in a similar payload to 5-8 delivery vans. This means 88,332 fewer kilometres are travelled by fossil-fuel using vehicles (CIVITAS, 2013). Subsequently, this has led to a 73% reduction in CO_2 emissions across Utrecht's city centre (Eltis, 2015) and the scheme being implemented in Amsterdam due to its significant success in combating greenhouse gas emissions.

3.2.4. Applicability to Greater Manchester

The involvement of business stakeholders in talks with the local government has meant it has become a profitable example of sustainable technology. It set realistic targets which could be easily met. Cargohopper II, the next generation of the scheme, saw the innovative use of solar panels alongside improvements in speed and payload (Taefi *et al.,* 2016). In applying the scheme to Manchester, using solar panels might be a pertinent idea as they have been a significant success in generating clean energy.

Despite this, an extra transhipment hub was required to be built in Utrecht due to the limited range of EFVs (Best Fact, 2013), which is highly unsustainable and is not mentioned in any official reports on the Cargohopper project. Greater Manchester's road infrastructure is well developed and may not require this, as the M60 has acted as a key artery for logistics firms. Bus lanes on the M60 can perhaps be used by a Cargohopper-like vehicle in Greater Manchester, akin to the bus lane access they have in Utrecht, which has lead to speedier deliveries. However, any EFVs would have to travel greater distances across Greater Manchester than in Utrecht, so may require a larger range.

3.3. Chronopost, Paris, France

3.3.1. Context

The congestion issues in Paris are impacting on people's health as well as business activities; the transport of freight produces between 20-60% of transport pollution in the city (Dablanc, 2013). Chronopost have anticipated prospective environmental regulations that restrict certain operations, and have subsequently developed clean vehicle technology. In 2004 they developed a fleet of EFVs (figure 2) in addition to their conventional operations. The company, operated by French postal company La Poste Group, transfers parcels from a hub on the city's periphery to an underground ULS in central Paris. The items are then consolidated into smaller Goupil electric vehicles to be delivered to their final destinations.

Figure 2: The Chronopost EFV used in Paris (Spotting Web, 2017).

3.3.2. Stakeholders

The Parisian government actively encourages the expansion of ULSs as well as state-ownership of the facilities. Public subsidies established Chronopost through a combination of financing for concept demonstrations, impact assessment studies, low-rent space allocation and the purchase of EFVs. The company itself invested in modifications to parking infrastructure and logistical spaces. The Ministry of Ecology, Environment, Sustainable Development and Energy established a tax incentive charter, signed by industrialists, and financial support for local authorities to establish EFV infrastructure and loading stations with a budget of €50 million.

3.3.3. Impacts

EFVs' minimal impact on the environment enabled Chronopost to locate their distribution facilities closer to central Paris and reach up to 70 delivery points; greater than the 56 delivery points reached when they had to operate on the periphery of Paris. While delivering up to 2,000 parcels on 14 EFVs per day, Chronopost reduced the total kilometres travelled by their polluting vehicles by 41,000 km and their CO_2 emissions by 60% (Dablanc *et al.,* 2011). Chronopost and the Paris municipality were satisfied with the success and impact of the EFV service to the extent that a second ULS was opened in 2013 to accommodate a fleet of 30 vehicles.

3.3.4. Applicability to Greater Manchester

For Chronopost's EFV scheme to be a success in Paris, the company relied on public-private cooperation that promoted sustainability and aided the development of consolidation facilities close to the urban area. Large financial investment was also made by the company itself to develop vehicles tailored to their pre-existing services. Based on this scheme, delivery businesses that already operate in Greater Manchester would have to invest a proportion of their own money into any fleet technology upgrades in addition to any public subsidies. A difficulty that must be considered was the complicated process of finding spaces in Paris' centre, where goods could be loaded safely and efficiently, and that are also within the local authority's budget, who subsidised the rent payments of the Paris ULS.

3.4. Gnewt Cargo, London, United Kingdom

3.4.1. Context

Last mile deliveries cause significant congestion in the centres of cities, none more so than in London. Parking spaces are increasingly difficult to find, whilst road vehicle traffic delays have increased by 17-31% from 2008-2015 (Allen *et al.,* 2016). The contribution to CO_2 emissions in Greater London from LGVs and HGVs is also significant (10% and 13%, respectively; TfL, 2012, cited in Allen *et al.,* 2016, p. 23) which means any reduction in vehicle emissions will be welcomed. One of the market leaders in last mile deliveries, Gnewt Cargo uses a fleet of over 100 EFVs (figure 3) and bicycles to deliver parcels in the centre of London (Gnewt Cargo, 2016). Gnewt operates numerous UCCs across Central London which act as small hubs for the EFVs.

Figure 3: A fully electric freight vehicle used to deliver goods by Gnewt in London (Gnewt Cargo, 2016b).

3.4.2. Stakeholders

Since its formation in 2008, Gnewt has collaborated with logistics industry leaders such as TNT and Hermes to provide last-mile delivery solutions from initial deliveries to ex-urban and suburban depots (Gnewt Cargo, 2016). Gnewt have also received government funding, with logistics standards body FORS (Fleet Operator Recognition Scheme) reporting the awarding of £1.11 million by the Low Emission Freight and Logistics Trial scheme, to be used for the lease of 33 EFVs (Frolich, 2017).

3.4.3. Impacts

Yearly, Gnewt delivers approximately 1.5 million parcels. The usage of EFVs and bicycles by Gnewt has led to a 62% reduction in CO_2 emissions per-parcel on deliveries compared to using fossil-fuel powered vehicles (PTEG, 2015). Gnewt's collaborations with TNT saw them use Gnewt's EFV fleet in central London depots. The scheme was so successful that TNT announced in early 2014 they would double their own fleet of EFVs in London (PTEG, 2015).

3.4.4. Applicability to Greater Manchester

Gnewt has undoubtedly been a success. Regular collaborations with logistics companies show EFVs are gaining traction in the industry. However, London's advanced infrastructure regarding EFV charging stations has meant the city can actively support EFVs, including charging at lunch breaks (Taefi *et al.,* 2016). There are approximately 90 charging stations provided by GMEV (Greater Manchester Electric Vehicles, a TfGM scheme) across Greater Manchester according to a GMEV map (figure 4)**,** although TfGM's *Air Quality Action Plan* states there are in fact 200 (TfGM, 2016). The number exceeds 850 in London, with a further commitment to install 4,500 by 2018 (Source London, 2016). With the vital infrastructure in place, businesses will be inclined to change to an EFV model, or newer EFV businesses may be established. The usage of both EFVs and bicycles here shows that bimodal transport is a viable model, and could be used for those deliveries down Greater Manchester's older and narrower streets.

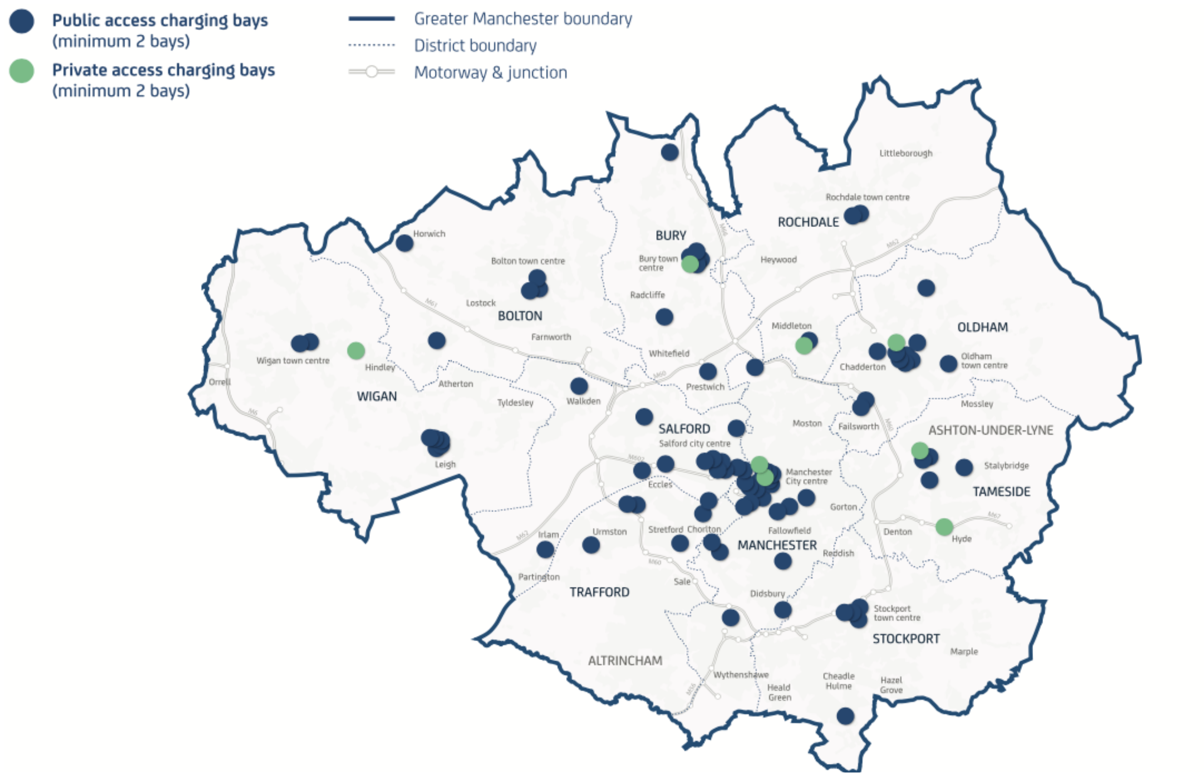

Figure 4: A map of electric vehicle charging points in Greater Manchester (GMEV, 2017).

Chapter 4. Conclusions and lessons learned

Due to the variability of infrastructure, local companies and attitudes towards green solutions, not one case study is entirely applicable to Greater Manchester. However, there are aspects of different case studies that can be relayed in a Greater Manchester context. All the case studies demonstrate that EFV integration is achievable, but collaboration with other stakeholders is a necessity. In particular, Gnewt's efforts with TNT and Hermes demonstrated the effectiveness of EFVs to such an extent that TNT are now adopting a fleet of their own. The UK's favourable financial attitude to the adoption of electric vehicles in general should also be enticing to any logistics firms wishing to adopt EFVs in Greater Manchester. 20% subsidies up to £8,000 costs on vehicles, tax exemptions and free parking (Taefi *et al.,* 2016) are all key pull factors for any prospective investors. However, the fragmented nature of the British logistics industry means that some EFV schemes, like the Distripolis model in Paris (a project similar to Chronopost), could not function the same in the UK (Pink, 2017). Geodis (Distripolis' parent company) holds a 40% share in the French logistics market, so has the influence to involve other stakeholders in implementing EFVs. Such a deeply-involved stakeholder scheme, led by such a clear market leader in the UK, would be a very difficult task to undertake.

The use of ULSs like that of the Chronopost case may be the most applicable model for Greater Manchester to follow. Distribution centres servicing conventional vehicles are already in place around the M60 corridor, so building the ULSs closer to urban centres to provide a hub for EFVs should be relatively straightforward on brownfield sites across Greater Manchester. Chronopost and Cargohopper demonstrates that smaller, more frequent deliveries are more efficient for retailers as they require less time to process than deliveries by conventional vehicles. Manchester is the second most congested city in the UK after London (Crook, 2017), whilst traffic congestion will cost Greater Manchester £1.9 billion (Cox, 2016) over the next decade. Any solution to help alleviate congestion, whilst also allowing more efficient business processes, will be welcomed by logistics companies and the GMCA alike. Pertinently, the newly elected Greater Manchester Mayor Andy Burnham is planning a new *Clean Air Action Plan* (Burnham for Mayor, 2017) which will expand on current plans to improve air quality in Greater Manchester from 2016-2021; this report also includes targets to reduce the impact freight has on air pollution (TfGM, 2016).

It is also clear that, if the use of EFVs is to proliferate across Greater Manchester, there needs to be council-led investment in charging infrastructure. Whilst the depots that the EFVs are based at will have charging facilities, Gnewt Cargo has shown that public charging points are incredibly useful to available to charge the vehicles out in the field and during lunch breaks to increase efficiencies. Regarding EFV charging infrastructure, the Office for Low Emission Vehicles provides significant subsidies for charging points and research in the UK for both private business and public sector stakeholders. It would also be beneficial for charging stations to be placed more evenly across Greater Manchester. The Zap Map (a website which displays all live EV charging points across the UK: https://www.zap-map.com/live/) shows that most charging points in Greater Manchester are clustered within the M60 ring road. Investing in more charging points in the towns surrounding Greater Manchester will not only improve air quality and decrease noise pollution across the county, but will also persuade businesses delivering to retailers that the network is robust enough to support EFV adoption.

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