

E CleanCities

REPORT - OCTOBER 2024

Zero-emission fleets in cities

The e-van market is ready



Transport & Environment

Published: October 2024

Author: Max Mollière Expert group: Sofie Defour, Jens Mueller, Martin Baierl, Anna Krajinska

Editeur responsable: William Todts, Executive Director © 2024 European Federation for Transport and Environment AISBL

To cite this report

Transport & Environment. (2024). Zero-emission fleets in cities: The e-van market is ready.

Further information

Max Mollière Road freight analyst Transport & Environment max.molliere@transportenvironment.org Mobile: +32(0) 486 37 92 21 www.transportenvironment.org | @transenv | fb: Transport & Environment

Acknowledgements

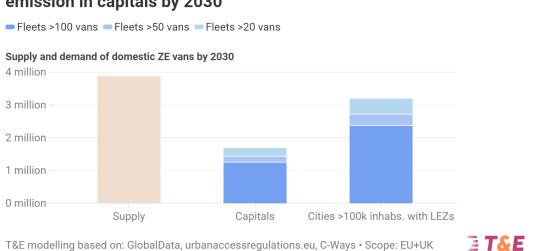
The authors thank Venn Chesterton for his thorough review of the report. The findings and views put forward in this publication are the sole responsibility of the authors listed above. The same applies to any potential factual errors or methodological flaws.



Executive summary

E-van market ready for zero-emission freight zones throughout Europe by 2030

- Made-in-Europe supply of zero-emission vans —largely battery electric between 2025-2030 is sufficient for all fleets above 20 vans in EU+UK capitals to go fully zero-emission.
 - In the more ambitious scenario where all 156 cities with low-emission zones and over 100,000 inhabitants implement zero-emission freight zones, projected e-van supply still exceeds demand.
 - Supply is thus ready for a breakthrough of zero-emission freight zones, the first of which will be rolled out in 19 European cities in 2025.

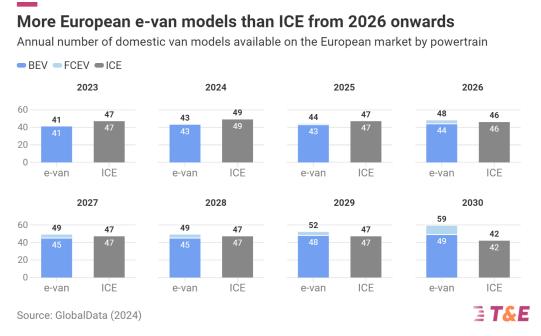


Enough European supply for all large van fleets to go fully zeroemission in capitals by 2030

- The new, more stringent EU ambient air quality directive (AAQD) will require cities to consider zero-emission zones as a priority measure when air pollution limit exceedances are expected.
 - Like cars, vans are regulated by CO₂ standards: but despite weak van CO₂ standards, supply for e-vans is ramping up because of increasing demand from the private sector, air quality regulation and requirements of zero-emissions zones.



- For the planned supply to materialise, it is essential that the EU does not weaken its CO₂ standards and holds up the 2035 end date for diesel vans.
- A broad array of zero-emission van models are already on the market, suitable for a variety of applications.
 - From 2026 onwards, van buyers will have more e-van models (48) to choose from than conventional models (46).



- Battery-electric vans will be cheaper to buy than diesel by 2027, thanks to a drop in battery prices.
 - Existing studies find battery-electric vans are already cheaper to own and run than diesel vans in 12 European countries out of 16 reviewed, when financial incentives are considered.

Recommendations

Based on these findings, T&E and its Clean Cities Campaign conclude that rolling out zero-emission freight zones throughout European cities is feasible by 2030 when prioritising large van fleets.

Zero-emission freight zones could provide certainty of demand to vanmakers, thereby giving them the confidence to accelerate zero-emission vehicle production and further bring down prices thanks to economies of scale.

At the European level, the EU should stick to implementing the agreed target of cutting emissions from new vans by 100% by 2035. This is key to ensure e-van supply ramps up as projected, or faster, until 2035, and to keep city dwellers' air clean.



Introduction: Decarbonising city logistics

The European Union has taken significant action over the past years to decarbonise road transport. As part of the European Green Deal, several regulations were adopted to increase the supply of zero-emission vehicles, such as ambitious CO₂ standards for new cars, vans and heavy-duty vehicles.

Whereas these policies have mainly been focused on supply-side measures, demand for zero-emission vehicles has been driven by national policies (e.g. tax incentives) and local initiatives, such as plans for zero-emission zones. According to a recent analysis by Clean Cities, 35 local authorities have already adopted such plans [1]. Modelling by Clean Cities has shown that zero-emission zones can curb greenhouse gas and pollutant emissions from road transport by more than 90% [2].

Most of these zones are designed as zero-emission freight zones, applying only to commercial vehicles, which are vital to deliver goods and services in cities. Prioritising requirements for companies to shift to zero-emission vehicles in cities is a sensible choice. Corporate fleets have an outsized impact on air quality and the climate, as well as the necessary resources and expertise to lead the transition. Indeed, more than 180 companies have already joined local businesses alliances for zero-emission urban logistics in European cities [1].

Vans in particular, i.e. commercial vehicles under 3.5 tonnes, are the pillar of urban logistics. In the UK, vans now account for 89% of urban road traffic from commercial vehicles in 2023 [3]. But predominantly fuelled by diesel, vans choke city dwellers' air: they are responsible for 14% of nitrogen oxide (NO_x) emissions from inner city traffic in European cities [4], and 12% of greenhouse gas (GHG) emissions from road transportation in the European Union and United Kingdom [5].

In 2035, all new vans in the EU+UK will be zero-emission. While crucial to meet our long-term climate targets, the diesel end date on its own will not make cities healthier places to live in the near term, and will not suffice to reduce emissions fast enough [6]. Zero-emission freight zones can accelerate the shift to clean air and climate-neutral logistics before then.

A major concern of cities when considering creating zero-emission freight zones is supply. Namely, cities need assurances that there will be enough zero-emission vans to meet demand from affected companies, and that the characteristics of e-van¹ models match what companies need. This study seeks to investigate whether these concerns are grounded.

The first section compares projected e-van supply to overall demand from several cities simultaneously implementing zero-emission freight zones by 2030. The second section looks at the variety of e-van models already on the market, focusing on their size and range. The last section explores the cost gap between diesel and battery-electric vans.

¹ Here, e-vans is used as a shorthand for zero-emission vans and includes both battery-electric and hydrogen vans.



Beyond zero-emission vans: the potential of electric cargo bikes

This study assumes that companies shift to emission-free operations by replacing their diesel vans with e-vans on a one-to-one basis. This is to model the maximum potential impact of zero-emission freight zones on van supply and forecast the upper end of required e-van demand.

In practice, there are also other ways to reduce the use of polluting vans. Electric cargo bikes have proven successful over the past years. They are able to carry between 50 to 250 kg, and are used both for delivering goods and parcels and by service providers, technicians and trades workers. Cargo bikes could replace 10% of delivery and service trips in cities [7][8], as they are most viable in dense urban areas [9]. However, their deployment requires certain changes to conventional delivery processes, such as the creation of micro-hubs closer to the customers.

Their small size makes them fit to navigate congested streets and use more direct routes that are not accessible to vans and trucks. Real-world data shows that cargo bikes often take less time and travel fewer kilometres than vans for the same deliveries [10][11]. Cargo bikes can also be more cost-efficient than both diesel and e-vans [11][12]. What's more, cargo bikes save carbon emissions and air pollution compared to diesel and e-vans [11][13], and reduce urban space use and congestion [10].

Section 1. Enough supply for zero-emission freight zones throughout Europe

1. Estimating demand for e-vans by 2030

1.1. Selecting cities with zero-emission freight zones by 2030

Assessing whether there will be sufficient supply of zero-emission vans begins with estimating the demand driven by the deployment of zero-emission freight zones. There is no official estimate of their future introduction due to the absence of binding national or European legislation.

A recent Clean Cities analysis has shown that currently 35 such zones are already planned for the 2030s [1]. Furthermore, the new EU ambient air quality directive, which will take effect in 2030, will require cities to consider such zones as a priority measure if air pollution limit exceedances are expected. Additionally, a growing number of local alliances among cities and companies aim for accelerating the transition to zero-emission urban logistics. These factors will all have an impact on which cities will implement zero-emission zones.



This study models two hypothetical scenarios to estimate the upper end of the potential impact on e-van demand. We sourced recent city population data from citypopulation.de.

The first scenario assumes all 27 EU **capitals**, as well as London, take the lead by all implementing zero-emission freight zones by 2030. Being visible markets, action in capitals could stimulate accelerated electrification across the country, as well as send a strong signal to manufacturers that a country is keen to get rid of polluting fossil-fuelled vans. In this case, zero-emission freight zones would be present in all EU countries and the UK.

In the second scenario, zero-emission freight zones are implemented in all **156 cities with populations above 100,000 which already have low-emission zones** active or to be implemented soon [14]. However, this skews the geographical scope of the analysis as low-emission zones are not equally present in all Member States, with some countries having none.

1.2. Affected companies

Zero-emission zones can be designed to apply differently based on users. To date, most cities planning to introduce zero-emissions zones will initially target commercial vehicles. This report only looks at light commercial vehicles, excluding cars and trucks.

In addition, we assume that private van users and small companies are always exempted from zero-emission freight zones driving restrictions. In the early years, it may make sense to only tackle large companies. We therefore look at fleet size thresholds of 100, 50, and 20 vans as starting points. Zero-emission freight zones can then be gradually expanded to cover smaller companies and eventually private vehicles in later years.

An important assumption made here is that all affected companies owning vans in the city replace their entire van fleet to comply. In practice companies can distribute their fleets geographically, with e-vans operating in zero-emission freight zones and a remaining stock of diesel vans operating in the rest of the city and its suburbs [15]. Conversely, zero-emission zones can lead to companies outside the city to electrify to maintain access to the zero-emission zone. Here, the two effects are assumed to cancel each other out.

1.3. Calculating demand for e-vans

Demand for e-vans driven by zero-emission zones corresponds to the estimated van stock of affected companies operating in selected cities. We assume affected companies have to replace their entire van fleets to comply, given the currently limited size of the e-van stock. In addition, some vans might also be replaced by other vehicle types, such as electric cargo bikes (see box above).



First, the average number of vans to be replaced per capita was calculated based on French van fleet data from the data science consultancy C-Ways. The C-Ways data can be broken down by company fleet size and whether the van is registered in a city with a low-emission zone. This data was combined with population data from citypopulation.de for French cities with low-emission zones. On average, in these cities, companies with 21–50 vans own 8.2 vans per 1,000 inhabitants, companies with 51–100 vans own 5.9 vans per 1,000 inhabitants, and companies with over 100 vans own 40.9 vans per 1,000 inhabitants.

Second, the above estimates were adjusted for each EU+UK country based on the overall national number of vans per capita, derived from van stock data from the European Automobile Manufacturers' Association (ACEA) [16] and national population data from the World Bank [17].

Third, the number of affected vans in selected cities was calculated using the nationally-adjusted estimates and population data for the selected cities from citypopulation.de.

2. Enough supply for large fleets to go zero-emission

Between 2025 and 2030, 3.9 million e-vans are projected to be sold in the EU+UK, excluding imports [18].

Assuming that capitals take the lead in implementing zero-emission zones, impacted fleets above 100 vans would absorb 32% of total domestic e-van supply. If zero-emission freight zones were extended to cover fleets above 50 vans and 20 vans, demand would rise to 37% and 43% of domestic supply respectively.

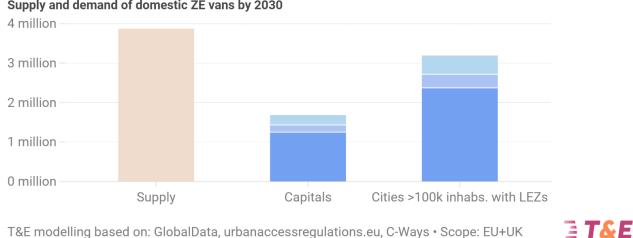
In the more ambitious scenario, where all cities with at least 100,000 inhabitants and existing low-emission zones implement zero-emission freight zones, affected fleets over 100 vans would absorb 61% of total domestic supply. Demand would increase to 70% and 82% respectively if zero-emission freight zones also covered fleets above 50 and 20 vans respectively.

In all scenarios, a large share of supply is absorbed by demand from companies affected by zero-emission freight zones. Their deployment can thus boost demand and increase certainty for vanmakers. In turn, vanmakers can ramp up e-van production beyond original plans. However, this requires that zero-emission freight zones are introduced with sufficient lead time and well communicated.



Enough European supply for all large van fleets to go fully zeroemission in capitals by 2030

Fleets >100 vans = Fleets >50 vans = Fleets >20 vans



Supply and demand of domestic ZE vans by 2030

Section 2. A diversified offer of e-van models

1. Number of models

Beyond the sufficiency of overall supply, having a broad choice of e-van models also matters as different models may be better suited for different applications.

In 2024, van buyers can choose from 43 European² battery-electric vehicle (BEV) models and 49 European internal combustion engine (ICE) models³ [18]. From 2026 onwards, buyers will have the choice between more e-van models than ICE models, with 44 BEV models and 4 hydrogen fuel cell electric vehicle (FCEV) models, versus 46 ICE models.

By 2030, when the EU van CO₂ standards are further strengthened⁴, the European van market is expected to include 59 e-van models (49 BEVs and 10 FCEVs) but only 42 ICE models.

 $^{^4}$ For new vans, the 2025 and 2030 EU CO₂ reduction targets are -15% and -50% relative to 2020 respectively.



² Here, European refers to models produced domestically within EU+EFTA+UK.

³ ICE models existing in different variants, such as pure ICE or mild hybrids, are only counted once.

More European e-van models than ICE from 2026 onwards

Annual number of domestic van models available on the European market by powertrain



The turning point applies to both light and heavy vans⁵. In 2026, there will be 14 light BEV models and 14 light ICE models, as well as 34 heavy e-van models (30 BEVs and 4 FCEVs) and 32 heavy ICE models.



Figure 1. Example of a light van model (Renault Kangoo E-Tech Electric [19]) Figure 2. Example of a heavy van model (MAN eTGE [20])

GlobalData segments the van market into many size categories. For simplicity, light refers here to vans categorised by GlobalData as Basic, Small, or Lower Medium, whereas heavy refers here to vans categorised by GlobalData as Upper Medium or Large.



⁵ Examples of light vans include the Renault Kangoo, or Opel Combo. Heavy vans include the IVECO Daily, Renault Master, or Mercedes Benz Sprinter.

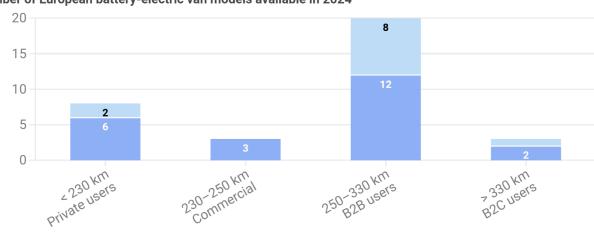
2. Range

Commercial van users drive 175 km/day on average⁶. Vans carrying goods drive even further: 193 km/day on average for business-to-business (B2B) delivery, and 254 km/day on average for business-to-consumer (B2C) delivery. In contrast, private van users average 125 km/day [21].

This variety in operational needs is reflected in the market. Low-mileage users may prefer less range, so as to avoid paying for oversized batteries. On the other hand, high-mileage users may prefer vans with high ranges, so that they can operate without having to rely on opportunity charging every day. Assuming a buffer of 30%, ranges of 230 km, 250 km, and 330 km can be considered sufficient for most commercial, B2B, and B2C users respectively.

E-vans on the market today have ranges for a diversity of users

🗕 Light van 🗢 Heavy van



Number of European battery-electric van models available in 2024

WLTP range category, with preferred user category

Sources: GlobalData (2024), T&E desk research • Only models for which WLTP range data is available are counted.

European models on the market in 2024 already display average WLTP⁷ ranges in the combined cycle in line with what different users need. Of the 34 BEV models for which range information is available, over half have WTLP ranges between 250 and 330 km, i.e. sufficient for most users

⁷ WLTP stands for Worldwide Harmonized Light Vehicle Test Procedure. Primarily developed to measure the CO₂ emissions of new ICE vehicles, it is the current official EU procedure to measure the electric driving range of new electric vehicles. The WLTP combined cycle includes both low-speed and high-speed test phases, designed to model a mix of city and highway driving.



🖹 **T&**E

⁶ Commercial van users refer to users which aren't private nor engaged in leasing or rental activities. The term True Fleets is also used.

except those in the B2C sector. Three models have a WLTP range above 330 km, i.e. generally enough for high-mileage users but possibly too high for users who drive less. Eight models have ranges lower than 230 km, which may not be adequate for commercial users, but is enough for most private users, and three heavy van models have ranges between 230 and 250 km. In addition, BEV models often come with different battery options, allowing users to choose what battery capacity suits their needs best.

If the vans are often used in urban areas, the range will be higher. For models where WLTP city⁸ range is also available, it is on average 45% higher than WTLP combined range. In conclusion, range is unlikely to be a limiting factor for the deployment of city zero-emission freight zones.

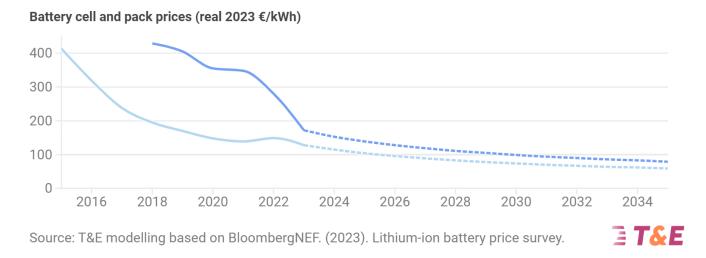
Section 3. Cheaper than diesel to own and operate

1. Cheaper batteries drive e-van cost reductions

In 2021, BloombergNEF projected that BEVs would reach purchase price⁹ parity with ICE vehicles in 2025 for light vans and in 2026 for heavy vans [22]. However, battery prices went up for the first time in 2022, before falling again in 2023, posing the question of whether vehicle price parity will be delayed [23].

Battery price projections

Lithium-ion battery prices
Battery prices of commercial vehicles (outside China)

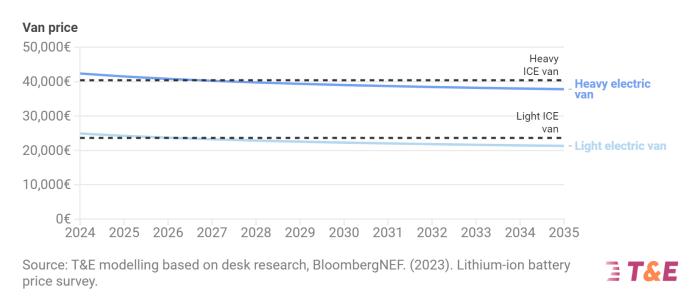


⁸ The WLTP city range is the distance that can be covered with a full battery under urban driving conditions.

⁹ Excluding tax and subsidies



Price data is available for 34 European BEV models on the market in 2024 that have a diesel counterpart¹⁰. Assuming that their battery costs decline in line with BloombergNEF's latest projections, price parity would be reached by 2027 for both light and heavy vans.



Battery-electric vans to be cheaper than diesel by 2027

In practice, other factors will influence vehicle price, such as economies of scale as BEV production ramps up, or the battery size or technology of upcoming models amongst others. These factors could further improve the price competitiveness of e-vans.

2. Total cost of ownership

For companies, total cost of ownership (TCO) is more relevant than upfront purchase price as it includes operating costs such as fuel and maintenance.

In 2022, T&E found that battery-electric vans were already cheaper on a TCO basis than their diesel counterparts in France, Germany, Italy, Poland, Spain, and the UK when purchase subsidies were taken into account [24]. A 2023 peer-reviewed study looking at last-mile delivery fleets in Germany and California confirmed that BEVs were cost-competitive with diesel vehicles [25].

A 2024 peer-reviewed analysis of TCO in 12 EU Member States confirms that battery-electric vans are cheaper than diesel equivalents in most cases when considering financial incentives, but that TCO parity has not yet been achieved everywhere [26]. The authors found small, medium, and large BEVs to be cheaper on a TCO basis in eight countries (Denmark, Luxembourg, the Netherlands, Germany, Ireland, Portugal, Sweden, and France). In Austria, BEVs

¹⁰ Two models exist only as BEVs and do not have a diesel counterpart.



are cheaper in the medium and large segments, but not yet for small vans. In three countries (Lithuania, Czechia, and Latvia), diesel vans remain the cheaper option for now. The authors conclude that financial incentives often remain necessary to achieve cost competitiveness, but that they should be optimised to save taxpayer money.

In total, the above studies compared the TCO of battery-electric and diesel vans in 16 European countries. In 12 countries surveyed, BEVs were found to be cheaper than diesel vans in all segments when financial incentives were considered.

Section 4. Conclusion

The findings presented above show that the e-van market is ready for the large-scale deployment of zero-emission freight zones in large cities throughout Europe by 2030.

Projected European supply is sufficient for all fleets above 20 vans in the selected cities to go fully zero-emission by 2030. Provided zero-emission freight zones are announced with sufficient lead time, the high demand for e-vans would provide certainty to vanmakers, who could then ramp up production beyond their original plans.

Cities can help provide planning certainty by adopting a clear vision and roadmap for the transition to zero-emission transport and logistics. Local alliances amongst city leaders, local business and civil society have proven particularly useful to coordinate the rollout of zero-emission logistics and the necessary charging infrastructure. Cities such as Brussels, Rotterdam, Vienna and Lisbon have been using such alliances [1].

National policy frameworks that harmonise key requirements (e.g. timescales, communications, exemptions) can enhance the effectiveness, predictability and acceptance of zero-emission policies in cities. For instance, the Netherlands set a goal for "medium-size zero-emissions zones in city logistics in 30 to 40 larger municipalities by 2025" in its 2019 Climate Agreement [27]. It later adopted a law in 2023 to establish common rules for all zero-emission zones [28]. Denmark is currently working on a national policy that would allow cities to introduce zero-emission zones [1].

Existing and upcoming e-van models cater to a variety of users. Vans of all sizes are available as battery-electric vehicles, with some fuel cell versions launching in the coming years. BEVs also come with a variety of electric ranges, allowing users to choose models which best align with their operational needs.

While upfront price parity between BEV and ICE vans is around the corner – expected by 2027, BEVs are already cheaper than diesel vans on a total cost of ownership basis in many European countries.

Lastly, zero-emission freight zones would send a clear market signal to vanmakers, encouraging them to further ramp up e-van supply and decarbonise quicker.



Recommendations

troduce ange and
fleets to
ng
ns in large
n



Bibliography

Cover page photo: Artem Podrez. (2020). Woman Checking the Boxes. <u>https://www.pexels.com/photo/woman-checking-the-boxes-5025664/</u>

- 1. Clean Cities Campaign. (2024). The pioneers of zero-emission logistics in European cities. Retrieved from https://cleancitiescampaign.org/research-list/pioneers/
- 2. Clean Cities Campaign. (2024). (E)Mission: Zero. Towards zero-emission mobility in European cities. Retrieved from https://cleancitiescampaign.org/research-list/e-mission-zero/
- 3. Department for Transport. (2024). Road Traffic Statistics. TRA0104: Road traffic (vehicle miles) by vehicle type and road class in Great Britain. Retrieved from https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra
- JRC. (2019). Urban NO2 Atlas. Retrieved from https://publications.jrc.ec.europa.eu/repository/handle/JRC118193
- 5. UNFCCC. (2023). National Inventory Submissions. Retrieved from https://unfccc.int/ghg-inventories-annex-i-parties/2023
- 6. Transport & Environment. (2024). Position paper European commissions greening fleets. Retrieved from

https://www.transportenvironment.org/articles/greening-corporate-fleets-an-industrial-and-social-policy-for-europe

- Cairns, S., & Sloman, L. (2019). Potential for e-cargo bikes to reduce congestion and pollution from vans in cities. Retrieved from https://www.bicycleassociation.org.uk/wp-content/uploads/2019/07/Potential-for-e-cargo-bikes-toreduce-congestion-and-pollution-from-vans-FINAL.pdf
- 8. Melo, S., & Baptista, P. (2017). Evaluating the impacts of using cargo cycles on urban logistics: integrating traffic, environmental and operational boundaries. *European Transport Research Review*, 9(2), 1–10.
- 9. Sheth, M., Butrina, P., Goodchild, A., & McCormack, E. (2019). Measuring delivery route cost trade-offs between electric-assist cargo bicycles and delivery trucks in dense urban areas. *European Transport Research Review*, *11*(1), 1−12.
- 10. Possible. (2021). The Promise of Low Carbon Freight. Benefits of cargo bikes in London. Retrieved from

https://static1.squarespace.com/static/5d30896202a18c0001b49180/t/61091edc3acfda2f4af7d9 7f/1627987694676/The+Promise+of+Low-Carbon+Freight.pdf

- 11. Kale AI. (2023). Data-driven Evaluation of Cargo Bike Delivery Performance in Brussels. Assessing operational advantages of cargo bikes over vans in the Brussels urban centre. Retrieved from https://www.larryvsharry.com/media/wysiwyg/cms_pages/Stories/Last_Mile_Delivery/Data-driven_Evaluation_of_Cargo_Bike_Delivery_Performance_in_Brussels.pdf
- 12. Robichet, A., Nierat, P., & Combes, F. (2022). Delivering Paris by Cargo Bikes: Ecological Commitment or Economically Feasible? The Case of a Parcel Service Company. Retrieved from https://hal.science/hal-04099982/document
- 13. Temporelli, A., Brambilla, P. C., Brivio, E., & Girardi, P. (2022). Last Mile Logistics Life Cycle Assessment: A Comparative Analysis from Diesel Van to E-Cargo Bike. *Energies*, 15(20), 7817.
- 14. Urban Access Regulations in Europe. (2024). Retrieved from urbanaccessregulations.eu
- 15. Ecomobiel. (2022). Albert Heijn gaat eerder volledig elektrisch. Retrieved from https://www.ecomobiel.nl/nl/nieuws-item/Albert-Heijn-gaat-eerder-volledig-elektrisch/
- 16. ACEA. (2024). Vehicles on European roads. Retrieved from https://www.acea.auto/files/ACEA-Report-Vehicles-on-European-roads-.pdf
- 17. World Bank Open Data. (2022). Population, total. Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL
- 18. GlobalData. (2024). Global Hybrid & Electric Vehicle Forecast. Q2 2024.
- Newsroom Renault. (2023). 4 millions de Kangoo fabriqués à Maubeuge : les chiffres qui témoignent de son succès ! - Newsroom Renault : Communiqués de presse, dossiers de presse,



articles, photos, vidéos. Retrieved from

https://media.renault.com/4-millions-de-kangoo-fabriques-a-maubeuge-les-chiffres-qui-temoignent-de-son-succes/

- 20. MAN France. (2021). MAN eTGE : l'utilitaire électrique à la conquête du marché. Retrieved from https://press.mantruckandbus.com/france/man-etge---lutilitaire-electrique-a-la-conquete-du-marche
- 21. Dataforce. (2021). Survey of van users in France, Germany, Italy, Poland, Spain, and the UK. Commissioned by T&E.
- 22. BloombergNEF. (2021). Hitting the EV inflection point. Retrieved from https://www.transportenvironment.org/articles/hitting-the-ev-inflection-point
- 23. BloombergNEF. (2023). 2023 Lithium-Ion Battery Price Survey.
- 24. Transport & Environment. (2022). E-vans: Cheaper, greener, and in demand. Retrieved from https://www.transportenvironment.org/articles/e-vans-cheap-green-and-in-demand
- 25. Lal, A., Renaldy, T., Breuning, L., Hamacher, T., & You, F. (2023). Electrifying light commercial vehicles for last-mile deliveries: Environmental and economic perspectives. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0959652623020917
- 26. Gil Ribeiro, C., & Silveira, S. (2024). The impact of financial incentives on the total cost of ownership of electric light commercial vehicles in EU countries. Retrieved from https://www.sciencedirect.com/science/article/pii/S0965856423003567
- Ministerie van Economische Zaken en Klimaat. (2019). National Climate Agreement The Netherlands. Retrieved from https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-t he-netherlands
- 28. Ministerie van Infrastructuur en Waterstaat. (2023). Besluit van 29 juni 2023 tot wijziging van het Reglement verkeersregels en verkeerstekens 1990 in verband met de tijdelijke voorwaarden en overgangsbepalingen van nul-emissiezones (Tijdelijk besluit nul-emissiezones). Retrieved from https://zoek.officielebekendmakingen.nl/stb-2023-241.html
- 29. Piaggio Commercial. (2020). Technical information Porter Electric Power. Retrieved from http://www.piaggiocommercialvehicles.com/mediaObject/commercial-vehicles/en/Info-tecniche-20 20_en/Electric-Power_PORTER_EN/original/Electric+Power_PORTER_EN.pdf
- Addax Motors. (n.d.). Benne Addax MTN. Retrieved from https://www.loiselet.be/fr/file/3559/download?token=PvMWudhv
- 31. Teoalida. (2024). European Car Database.
- 32. Beev. (2022). Peugeot e-Rifter : Technical data, Range & Price. Retrieved from https://www.beev.co/en/electric-cars/marques/peugeot/peugeot-e-rifter/
- 33. Automobile Propre. (2021). MAN TGE électrique. Retrieved from https://www.automobile-propre.com/voitures/man-tge-electrique/
- 34. Automobile Propre. (2019). Volkswagen e-Crafter. Retrieved from https://www.automobile-propre.com/voitures/volkswagen-e-crafter/
- 35. Pod Point. (2024). IVECO eDaily Van (2023). Retrieved from https://pod-point.com/guides/vehicles/iveco/2023/edaily
- 36. Automobile Propre. (2020). Citroën ë-SpaceTourer. *Automobile Propre*. Retrieved from https://www.automobile-propre.com/voitures/citroen-e-spacetourer/
- 37. EVspecs. (n.d.). Peugeot e-Traveller Max range WLTP. Retrieved from https://www.evspecs.org/technical-data/peugeot/e-traveller/range
- 38. Leichsenring, S. (2024). Opel Zafira Electric nun über 15.000 Euro billiger. Retrieved from https://insideevs.de/news/728226/opel-zafira-electric-facelift-bestellbar/
- 39. Ford. (n.d.). All-new Ford Tourneo Custom. Retrieved from https://www.ford.co.uk/cars/new-tourneo-custom



Annex I. List of cities with a low-emission zone active or implemented soon and above 100,000 inhabitants

(Country	City	Germany	Bremen	Italy	Livorno
	Austria	Graz	Germany	Cologne	Italy	Milan
1	Austria	Vienna	Germany	Darmstadt	Italy	Monza
E	Belgium	Antwerp	Germany	Dortmund	Italy	Naples
E	Belgium	Brussels	Germany	Duisburg	Italy	Prato
E	Belgium	Ghent	Germany	Dusseldorf	Italy	Rome
E	Bulgaria	Sofia	Germany	Essen	Italy	Terni
(Czechia	Prague	Germany	Freiburg im Breisgau	Italy	Trento
[Denmark	Aalborg	Germany	Gelsenkirchen	Netherlands	Almere
[Denmark	Aarhus	Germany	Hagen	Netherlands	Amsterdam
Ι	Denmark	Copenhagen	Germany	Halle	Netherlands	Apeldoorn
[Denmark	Odense	Germany	Herne	Netherlands	Arnhem
F	Finland	Helsinki	Germany	Krefeld	Netherlands	Breda
F	France	Bordeaux	Germany	Leipzig	Netherlands	Delft
F	France	Clermont-Ferrand	Germany	Magdeburg	Netherlands	Eindhoven
F	France	Grenoble	Germany	Mainz	Netherlands	Enschede
F	France	Le Havre	Germany	Mannheim	Netherlands	Groningen
F	France	Lille	Germany	Monchengladbach	Netherlands	Haarlem
F	France	Lyon	Germany	Munich	Netherlands	Leiden
F	France	Marseille	Germany	Munster	Netherlands	Maastricht
F	France	Montpellier	Germany	Neuss	Netherlands	Nijmegen
F	France	Nancy	Germany	Oberhausen	Netherlands	Rotterdam
F	France	Nice	Germany	Offenbach	Netherlands	's-Hertogenbosch
F	France	Paris	Germany	Osnabruck	Netherlands	The Hague
F	France	Reims	Germany	Pforzheim	Netherlands	Tilburg
F	France	Rennes	Germany	Recklinghausen	Netherlands	Utrecht
F	France	Rouen	Germany	Regensburg	Netherlands	Venlo
F	France	Saint-Etienne	Germany	Remscheid	Netherlands	Zaanstad
F	France	Strasbourg	Germany	Reutlingen	Netherlands	Zwolle
F	France	Toulon	Germany	Siegen	Norway	Bergen
F	France	Toulouse	Germany	Stuttgart	Norway	Kristiansand
(Germany	Aachen	Germany	Ulm	Norway	Oslo
(Germany	Augsburg	Germany	Wuppertal	Norway	Stavanger
(Germany	Berlin	Greece	Athens	Poland	Krakow
(Germany	Bochum	Greece	Thessaloniki	Poland	Warsaw
(Germany	Bonn	Italy	Bolzano	Poland	Wroclaw
(Germany	Bottrop	Italy	Genoa	Portugal	Lisbon



Spain	Alcobendas	United Kingdom	London
Spain	Almeria	United Kingdom	Newcastle upon Tyne
Spain	Badalona	United Kingdom	Norwich
Spain	Barcelona	United Kingdom	Nottingham
Spain	Bilbao	United Kingdom	Oxford
Spain	Burgos	United Kingdom	Portsmouth
Spain	Cordoba	United Kingdom	Sheffield
Spain	Dos Hermanas	United Kingdom	York
Spain	Fuenlabrada		
Spain	Granada		
Spain	L'Hospitalet de Llobregat		
Spain	Madrid		
Spain	Malaga		
Spain	Marbella		
Spain	Parla		
Spain	Sabadell		
Spain	Seville		
Spain	Terrassa		
Spain	Torrejon de Ardoz		
Spain	Valladolid		
Spain	Vitoria Gasteiz		
Spain	Zaragoza		
Sweden	Gothenburg		
Sweden	Helsingborg		
Sweden	Lund		
Sweden	Malmo		
Sweden	Stockholm		
Sweden	Umea		
Sweden	Uppsala		
United Kingdom	Aberdeen		
United Kingdom	Bath		
United Kingdom	Birmingham		
United Kingdom	Bradford		
United Kingdom	Brighton		
United Kingdom	Bristol		
United Kingdom	Dundee		
United Kingdom	Edinburgh		
United Kingdom	Glasgow		

Annex II. Range of European battery-electric vans on the market in 2024

Make	Model	Size	Launch year of the first BEV version	Average WLTP range (km)	Source
Piaggio	Porter	Small	2020	74	[29]
Addax Motors	MTN	Small	2023	114	[30]
Fiat	Doblo/Doblo Cargo	Small	2022	259	[31]
Peugeot	Partner	Small	2015	275	[31]
Citroen	Berlingo	Small	2015	276	[31]
Toyota	Proace City	Small	2021	276	[31]
Peugeot	Rifter	Small	2021	280	[32]
Mercedes-Benz	Citan/T-Class	Small	2021	283	[31]
Renault	Kangoo	Small	2015	285	[31]
Nissan	NV250/Townstar	Small	2022	288	[31]
Opel	Combo	Small	2021	331	[31]
MAN	TGE	Large	2018	115	[33]
Volkswagen	Crafter	Large	2017	141	[34]
Citroen	Jumper	Large	2018	182	[31]
Peugeot	Boxer	Large	2020	182	[31]
Renault	Master	Large	2018	196	[31]
Fiat	Ducato	Large	2017	209	[31]
lveco	Daily	Large	2017	234	[35]
Mercedes-Benz	Sprinter	Large	2018	239	[31]
Citroen	Jumpy	Large	2020	249	[31]
Opel	Vivaro	Large	2018	260	[31]
Toyota	Proace	Large	2020	260	[31]
Fiat	Scudo/Ulysse	Large	2022	263	[31]
Citroen	Spacetourer	Large	2020	280	[36]
Peugeot	Traveller	Large	2020	280	[37]
Peugeot	Expert	Large	2020	280	[31]
Opel	Zafıra Life	Large	2024	284	[38]
Ford	Transit	Large	2021	284	[31]
Renault	Trafic	Large	2023	291	[31]
Mercedes-Benz	Vito	Large	2015	312	[31]
Ford	Transit Custom	Large	2024	316	[31]
Ford	Tourneo Custom	Large	2024	325	[39]
Opel	Movano	Large	2021	420	[31]
Volkswagen	ID.Buzz	Large	2022	420	[31]

