

# Alternative delivery fleets: the economic viability of last-mile delivery battery-electric trucks in Europe

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# Decarbonizing last-mile delivery fleets is crucial

- **Among the largest heavy-duty vehicles segments by sales volume in Europe**
  - Vehicles between 3.5 and 7.5 tonnes represented 11% of the registrations in 2020
- **Continuous growth in the e-commerce industry which is expected to be sustained**
  - 15% growth between 2019 and 2021
- **Promising application for electrification given their low daily mileages**
  - Smaller batteries required with minimal impact on weight and volume capacity



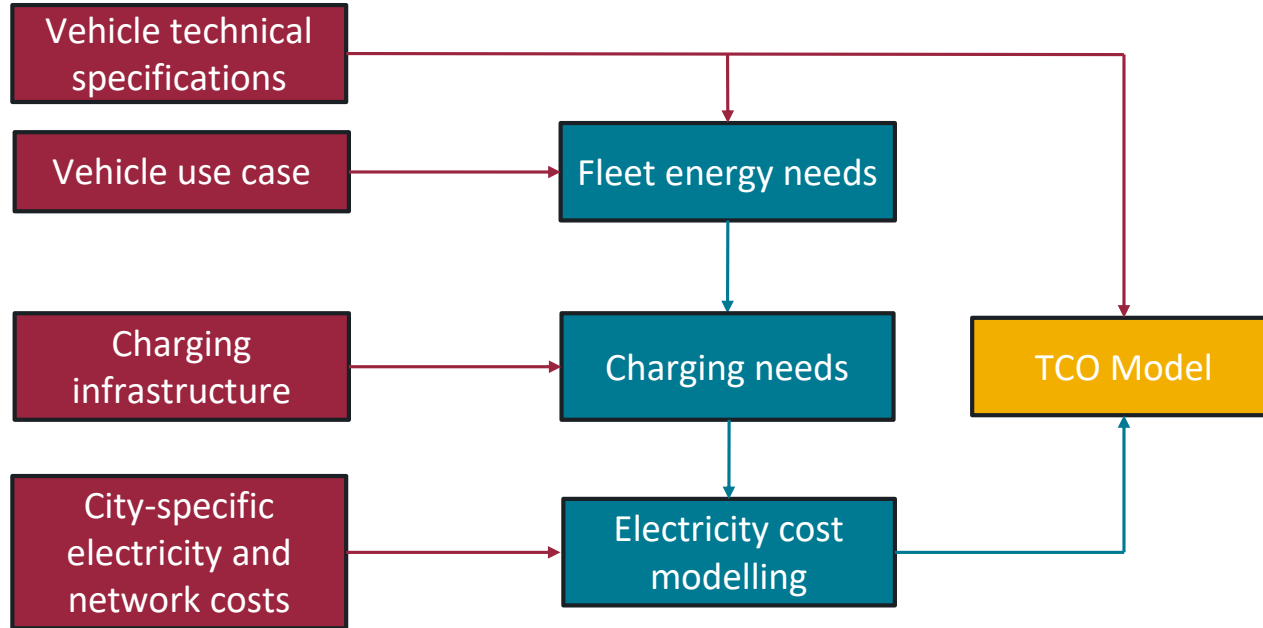
# Use case of urban parcel delivery trucks

- **Geographic scope:** Berlin, Paris, London, Warsaw, Amsterdam, and Rome
- **Representative vehicle:** StreetScooter WORK XL electric truck (2,600 units registered between 2016 and 2020)
- **Fleet:** 23 vehicles that operate for 12 hours a day and charge at the depot (window 6:00 p.m. to 6:00 a.m. at max. 22 KW)
- **Daily mileage:** 40 to 60 km with ~ 15,000 km annual mileage

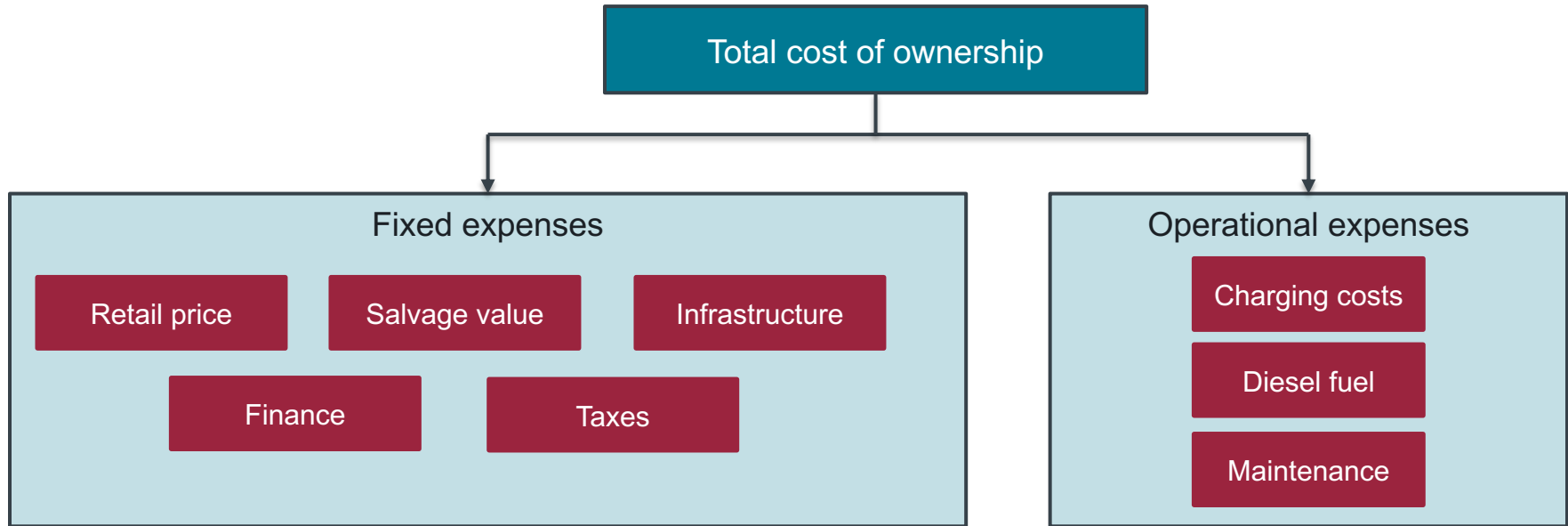


Deutsche Post DHL StreetScooter WORK XL electric truck model

# Methodology framework

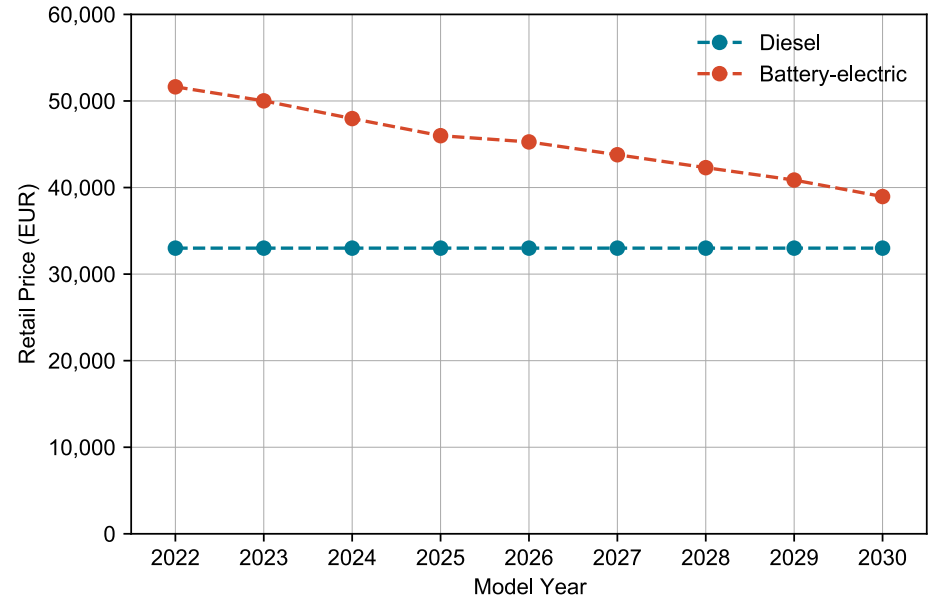


# TCO Calculation



# Fixed expenses: Truck retail price

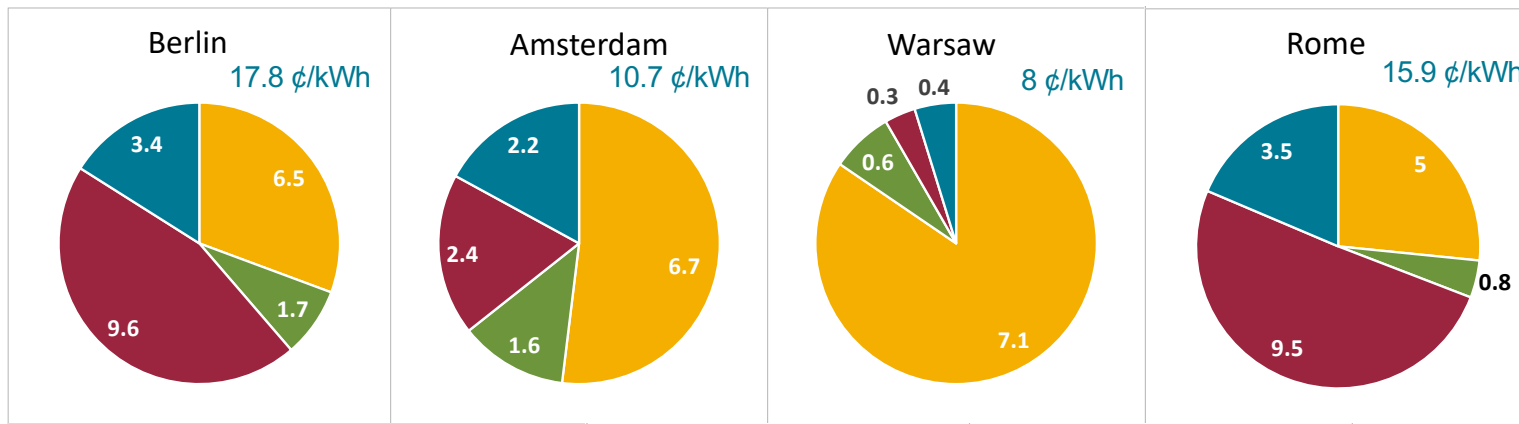
- **2022 prices:** official market prices (*German Federal Office of Economics and Export Control*)
- **2023-2030:** bottom-up approach to estimate retail price
- **Battery cost:** continuous reduction until the end of the decade
  - \$100/kWh by 2025, ~\$60/kWh by 2030 according to BNEF.
- **Retail price gap:** €19,000 in 2022 to less than €6,000 by 2030



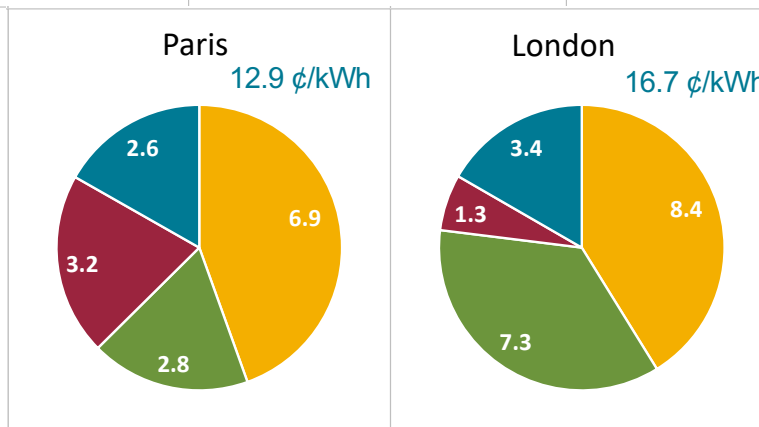
Battery-electric and diesel trucks retail price evolution between 2022 and 2030

# Operational expenses: Charging Costs

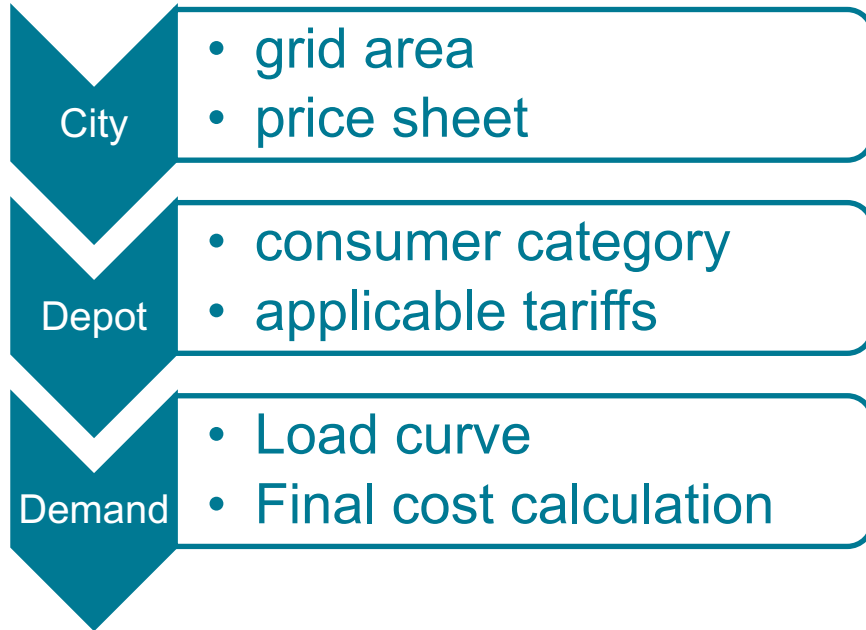
■ Power ■ Network ■ Taxes ■ VAT



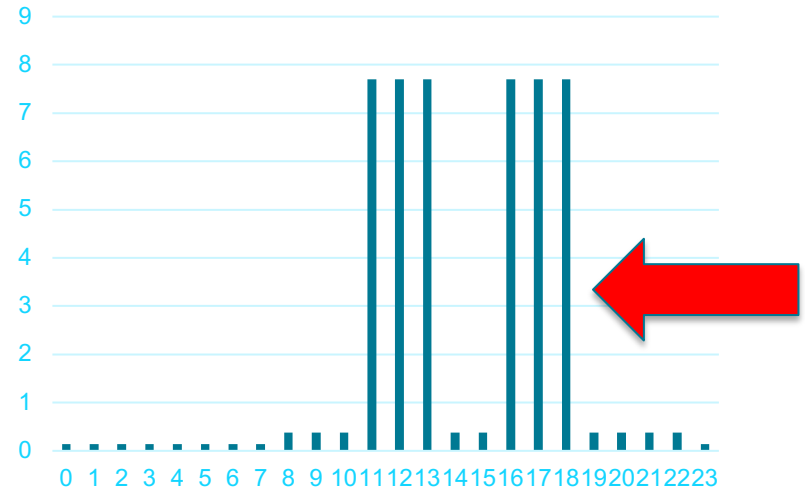
Cost for January – June 2021



# Charging costs – Network Prices (example)



Hourly Network fees in London in p/kWh



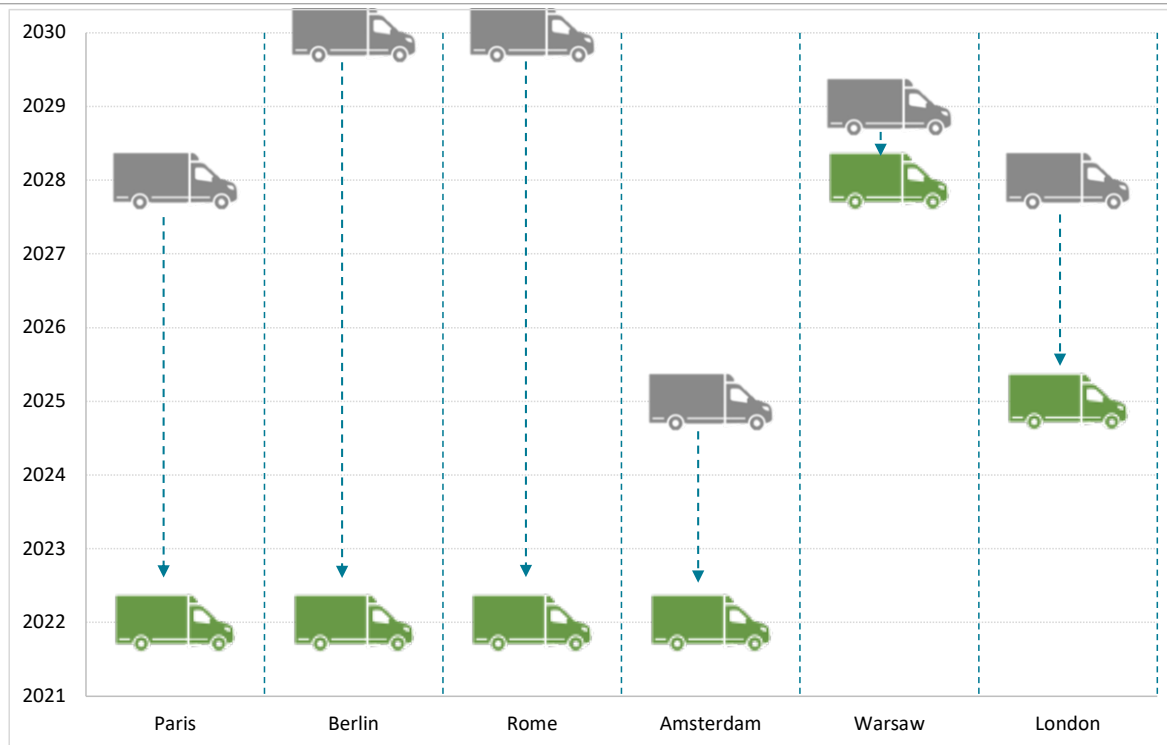
Volumetric time-of-use charges in London.  
Source: [UK Open Power Networks, 2022](#)



# Electric trucks to reach cost parity by the second half of the decade

Diesel and electricity prices for January – June 2021

City	Parity year (no premiums)	Parity year (with premiums)
Berlin	2030	2022
Paris	2028	2022
Rome	2030	2022
Warsaw	2029	2028
Amsterdam	2025	2022
London	2028	2025



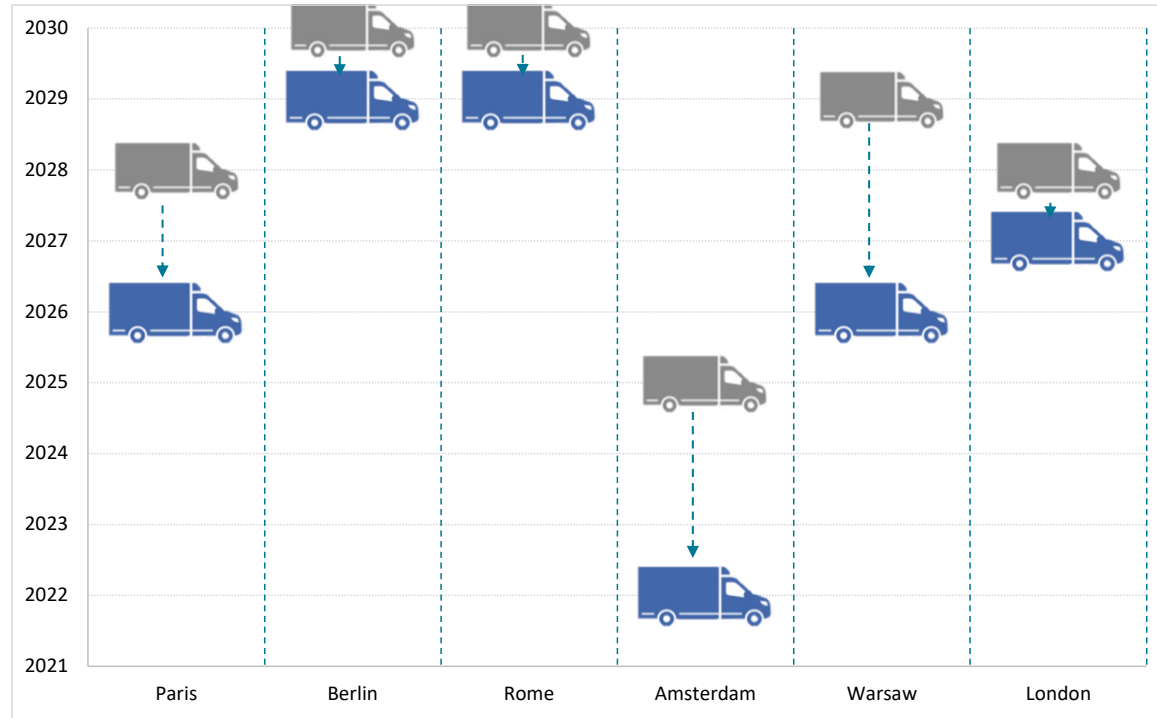
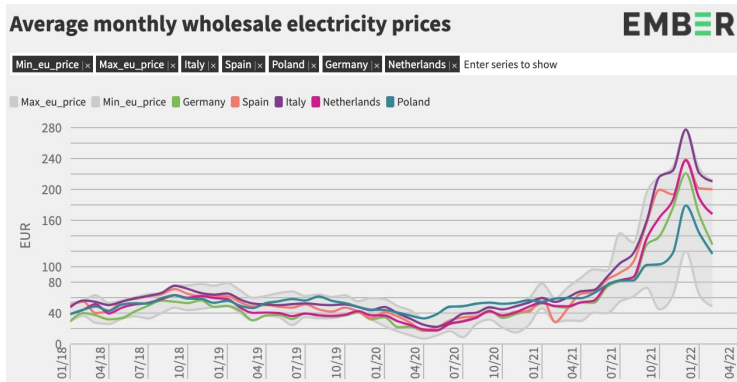
Without purchase subsidies



With purchase subsidies

5-year TCO (first ownership analysis)

# Recent energy crisis further justifies the business case of electric trucks



2021 average diesel and electricity prices

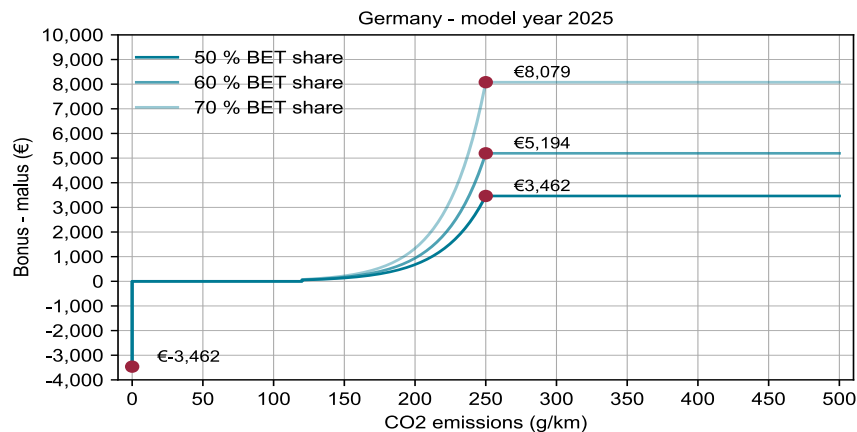
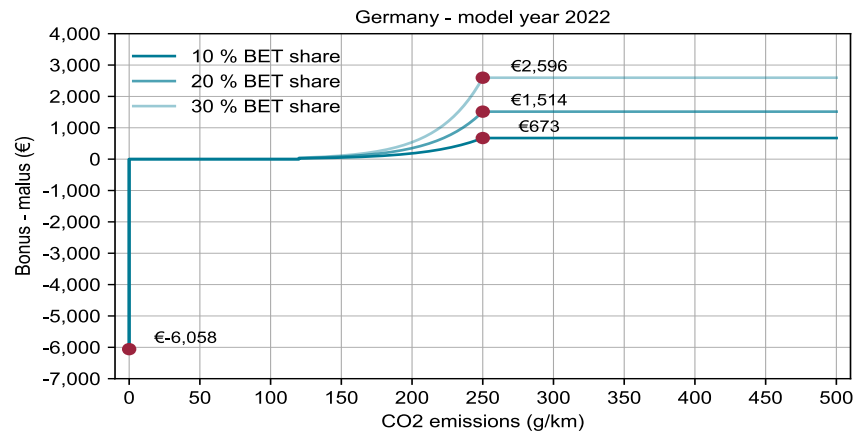


March 2022 diesel and electricity prices

5-year TCO (first ownership analysis)

# A Bonus-malus tax scheme can stimulate the early market uptake of electric trucks.

- **Fiscally sustainable** approach to finance electric truck purchase premiums during the early market uptake phase
- **Properly designed** to cover the TCO gap between an electric truck and its diesel equivalent
- **Designed based on the “polluter-pays” principle** as vehicles with higher CO<sub>2</sub> emissions will be taxed more
- **One-time registration tax for diesel vehicles:** annually updated based on required premiums and electric trucks – diesel trucks market share per country



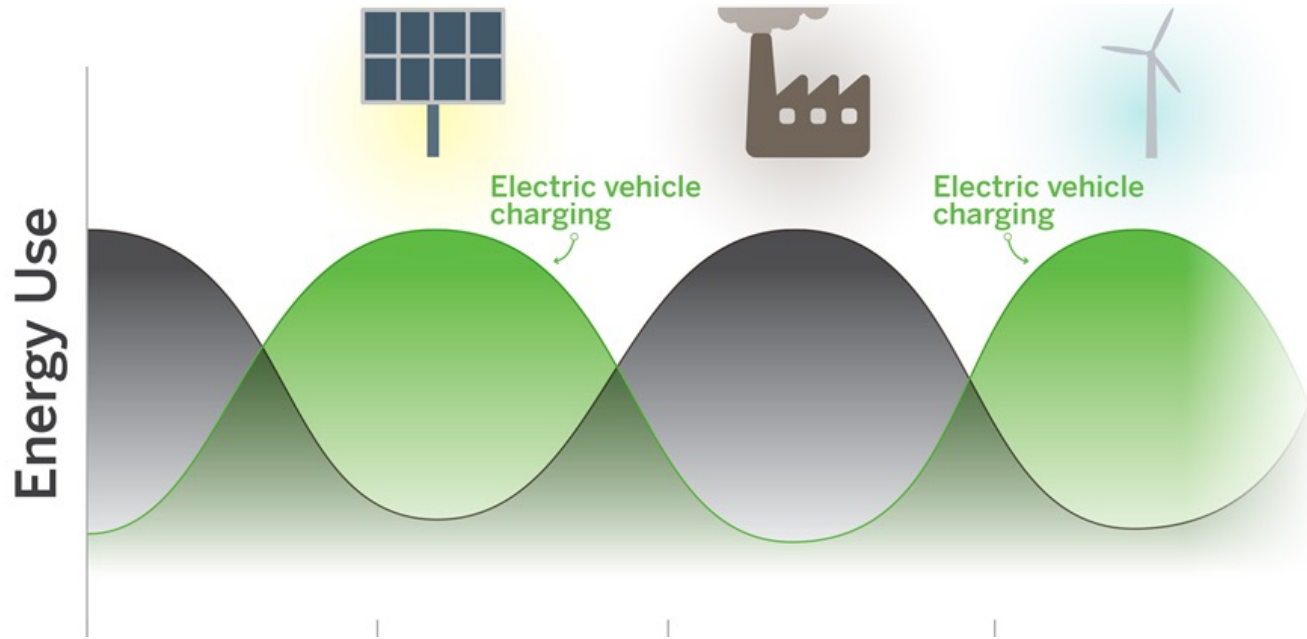
# Emission charges in low- and zero-emission zones can be a game changer for diesel fleets!

- **More than 250** low- and zero-emission zones in Europe
- **Announcement of zero-emission zones** in Amsterdam, Rotterdam, London, Paris, Oxford, and other cities as of 2025-2030
- **Low- and zero-emission zones** either ban specific vehicle from entering the zone or impose a daily access charge
- **An Emission charge on all diesel-powered vehicles between €2/day to €4/day** can bring TCO parity to mid-decade

City	No premiums, proper battery sizing	€2/day	€4/day	€6/day
<b>Berlin</b>	2030	2027	<b>2024</b>	2022
<b>Paris</b>	2028	<b>2024</b>	2022	2022
<b>Rome</b>	2030	2027	<b>2023</b>	2022
<b>Warsaw</b>	2028	<b>2025</b>	2022	2022
<b>Amsterdam</b>	2025	<b>2022</b>	2022	2022
<b>London</b>	2028	<b>2024</b>	2022	2022

TCO parity year between battery-electric and diesel trucks under several emission charge scenarios

# Smart charging coupled with time-varying pricing accelerates truck electrification



# Main takeaways

- **Battery-electric trucks for last-mile delivery applications are already economically viable today**
- **Battery-electric trucks for last-mile delivery applications will reach cost parity by the second half of the decade without purchase premiums**
- **Policy measures, from both the energy and transport sector, are needed during the early-market uptake of last-mile delivery battery-electric trucks in Europe**

# Related publications

- [Electrifying last-mile delivery: Battery-electric delivery trucks soon cheaper to use than diesel trucks in Europe](#) (fact sheet)
- [Electrifying last-mile delivery: A total cost of ownership comparison of battery-electric and diesel trucks in Europe](#) (report)
- [Electrifying city logistics in the EU: optimising charging saves cost](#)
- [Total cost of ownership of tractor-trailers in the EU: battery-electric vs diesel](#) (white paper).

# Questions

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