E-vans: Cheaper, greener, and in demand

Why it's time for the EU to ramp up supply

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Executive Summary

Vans have so far kept on the slow lane to electrification. Vans are the road transport mode with the fastest growing emissions: +63% in 2019 compared to 1990, and are responsible for 11% of oil demand from road transport. While the 2020/21 light-duty CO_2 standards have propelled sales of battery-electric cars from 2% in 2019 to 9% in 2021, the e-van market lags behind at 3% in 2021 due to much weaker standards. The ongoing revision of the van CO_2 standards as part of the EU's climate package represents the key opportunity to accelerate this transition and align vans with the EU Green Deal ambition. Moveover, in the light of the ongoing war in Ukraine and given that EU vans consume 210 million barrels of oil every year, reducing EU oil dependence and accelerating the transition to electric vans is now more urgent than ever. As the CO_2 standards are currently being discussed by co-legislators in the European Parliament and the Member States, T&E has analysed the current van market and the economics of electric vans, showing that the market and van users are ready for this transformation.

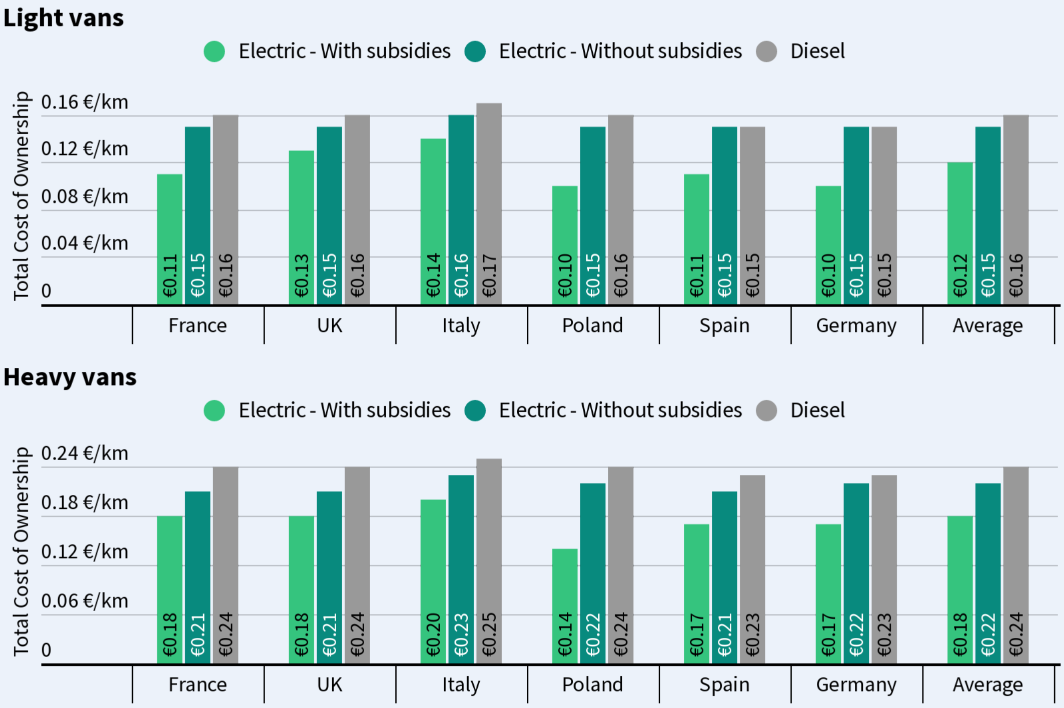
Electric vans are already the cheapest option for all

The vast majority of new vans are registered by commercial users, who make vehicle purchase decisions based on total cost of ownership (TCO) including vehicle purchase, running and maintenance costs. It follows that if and when electric vans become cheaper than diesel vans on a TCO basis, van buyers would switch to electric vans instead of diesel vans, provided they do not face major operational constraints.

In order to assess TCO parity, T&E has modelled the TCO of diesel and electric vans for six groups of end-users (business-to-consumer and business-to-business transporters, vocational users, short-term rental services, lessees, and private users) in six countries (France, Germany, Italy, Poland, Spain, UK), making up 76% of the EU+UK van market. Inputs for van use by user group are derived from a separate survey by Dataforce.

This analysis finds that electric vans are already the cheapest option for all user groups considered in all six countries when purchase subsidies are included. The average EU electric van is 25% cheaper than the average diesel van (0.15€/km for the e-van versus 0.20 €/km for the diesel van). Even if purchase subsidies are excluded, electric vans are already cheaper on a TCO basis in five out of the six countries considered (and are cheaper in all countries and for all user groups by 2024 at the latest).

Electric vans already cheaper across Europe in 2022



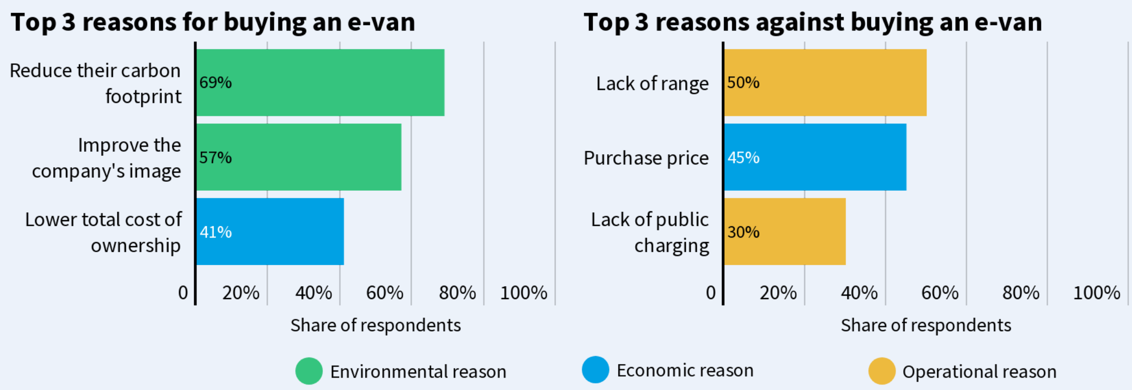
Source: Assuming 4 years ownership for short-term rental services and lessees, and 5 years for other user groups.

Van users want to go electric

In December 2021, T&E commissioned Dataforce to conduct a survey of van fleets in all six countries considered here in order to understand their attitudes towards electric vans. Out of 745 users surveyed, 84% of survey respondents said they considered going electric: just over one third already have at least one e-van in their fleet (36%), another one third plan to buy an e-van in 2022 (32%) and 16% consider buying one in the next 5 years. The survey shows that e-van adoption is strongest in Italy with 91% and lowest in Germany with 62%.

Respondents were also asked about their purchase behaviour in order to identify the main drivers for, and barriers to, e-van adoption. Findings show respondents who buy electric vans primarily do so for environmental and economic reasons, while respondents who have not purchased electric vans justify their decision based on operational constraints, such as range.

84% of survey respondents either own an electric van, will buy one in 2022, or consider buying one for their next purchase



An increasing offer of electric vans

In 2022, e-van buyers can pick from 43 models (19 light van models and 24 heavy van models), more than doubling from 18 models in total in 2019. Eight additional new e-van models have been announced to hit the market by 2025. In 2021 the average light e-van could drive 192 km on a single charge in real driving conditions (up to 255 km for longer range models), while a heavy electric van had a real range of 133 km (up to 154 km for longer range models). New models coming on the market in 2022 advertise higher official ranges (293 km for light e-vans and 263 km for heavy e-vans on average), showing range limitations are quickly being addressed.

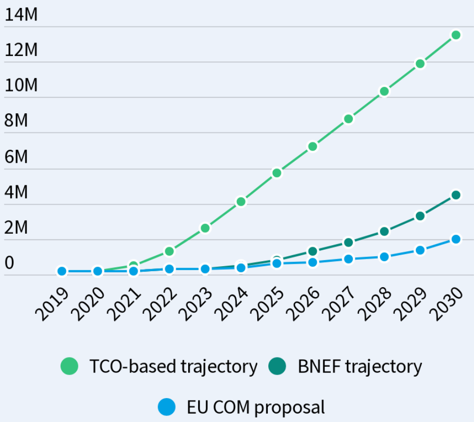
Regarding average purchase price, a light e-van on the market today costs 34,400€, while a heavy e-van costs 52,900€. Although these e-van models cost around 40%–55% more than equivalent diesel models, these higher upfront costs are more than compensated for by the lower operating costs.

The EU van market is ready to go electric, but at what speed?

The vast majority of van users are willing to make the switch to greener and cheaper electric vans, showing that e-vans are already a strong and credible proposition. Based on economics alone, the cost-optimal trajectory would lead to 100% electric van sales already in 2025—when e-vans are cheaper to own across the board, even when owned for less than four years. However, because of operational and industrial challenges, as well as a lack of political will, a more realistic e-van adoption trajectory would be in line with the adoption modelled by BNEF: 17% e-vans in 2025, 36% in 2027 and 73% in 2030.

The EU would miss out on benefits under suboptimal e-van adoption

Number of e-vans on EU roads



T&E calculates that the higher targets would save 1.4 $MtCO_2$ in 2025 and 5.6 $MtCO_2$ in 2027. Annual emission savings would rise to 12.8 $MtCO_2$ in 2030—equivalent to the emissions from all German and Slovakian vans in 2019. It would also bring 4.5 million electric vans to the roads in 2030, versus only 2 million under the European Commission proposal. In addition, it would reduce oil demand from vans by 7% in 2027 and by 17% in 2030. It would also improve air quality and reduce health problems associated with air pollution, especially in cities where vans are often one of the largest contributors.

On the contrary, adopting the Commission proposal instead of the T&E targets would deny EU van users 13.1 billion euros in cost savings in 2025–2030. As a consequence, van users and the EU as a whole would miss out on numerous economic, environmental and health benefits by leaving the potential of electric vans unmet and letting vanmakers continue to sell outdated diesel technology.

Stronger targets for electric vans will save EU emissions, oil, and money

In comparison with the EU Commission's proposal, the targets proposed by T&E would lead to:

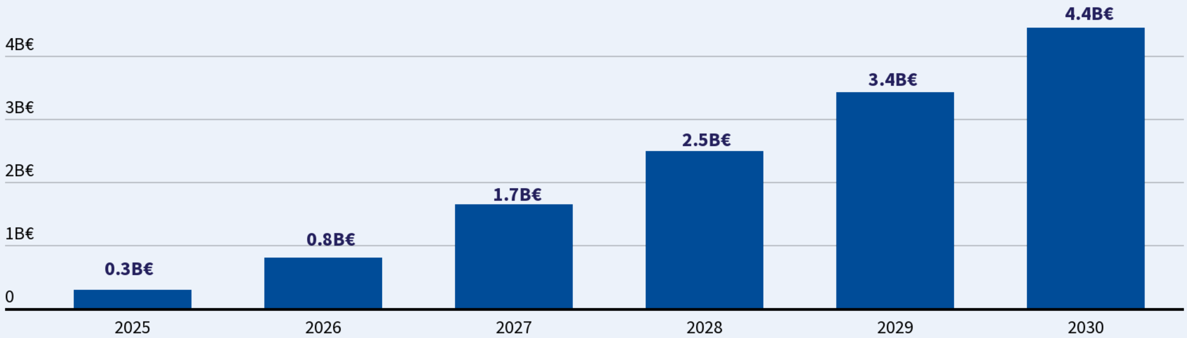
1 million additional e-vans on EU roads by 2027

14 million fewer oil barrels burnt in 2027

10 less $MtCO_2$ emitted in 2025–2027

6 less $MtCO_2$ in 2027, more than all Spanish vans in 2019

Cost savings for European businesses



Source: T&E EUTRM modelling of the EC proposal and T&E targets and TCO modelling. Total Cost of Ownership savings per van are assumed constant from 2027 onwards. **Scope:** EU27

Strong CO_2 targets are needed to increase the supply of electric vans

In spite of e-vans being already the best choice from a TCO perspective, only 3% of vans registered in the EU in 2021 were battery-electric. This is chiefly because current van CO_2 targets are too weak to drive sufficient supply of e-vans.

For cars, manufacturers delayed supplying EVs until they were required by the car CO_2 standards to clean up their sales. In the meantime, carmakers promoted sales of profitable polluting SUVs. Similarly, without stronger targets in the 2020s, vanmakers are likely to hold up the electric transition until after 2030 when the CO_2 emissions standards are stringent enough to require them to sell zero-emission vans. Under the van CO_2 targets proposed by the European Commission, the targets in the 2020s would remain untouched (-15% from 2025 to 2029), meaning that zero-emission vans could remain well below 10% of new sales as late as 2029. This would be in spite of van buyers being economically better off purchasing electric vans.

T&E recommendations for the review of the van CO_2 standards

Given the need to reduce climate emissions, oil use, and health impacts—and enable van users to reap major economic benefits—T&E urges the co-legislators from the European Parliament and Member States to deliver stronger CO_2 emission targets to accelerate the uptake of e-vans in the 2020 and early 2030s. The legislative reforms needed to deliver more e-vans are clear (see T&E position paper for more detail):

- Increase the ambition of the 2025 reduction target from -15% to -25%
- Set an additional intermediate target of -45% in 2027
- Raise the 2030 target from -50% to -80%
- Safeguard the 2035 100% emission reduction target

These asks are supported by many stakeholders. In a letter published in March 2022, cities, hauliers, companies, health and environmental organisations, and civil society call on MEPs and Member States to increase the ambition of the CO_2 targets in the 2020s and set 100% zero-emission van sales in 2035 into law.

Vans are often the neglected area of EU road transport policy despite their disproportionate impact, especially in urban areas. The EU can address the current van legislative loophole, and deliver on the many benefits of electrification by making vans a priority in the current review of the cars and vans CO_2 emission standards.

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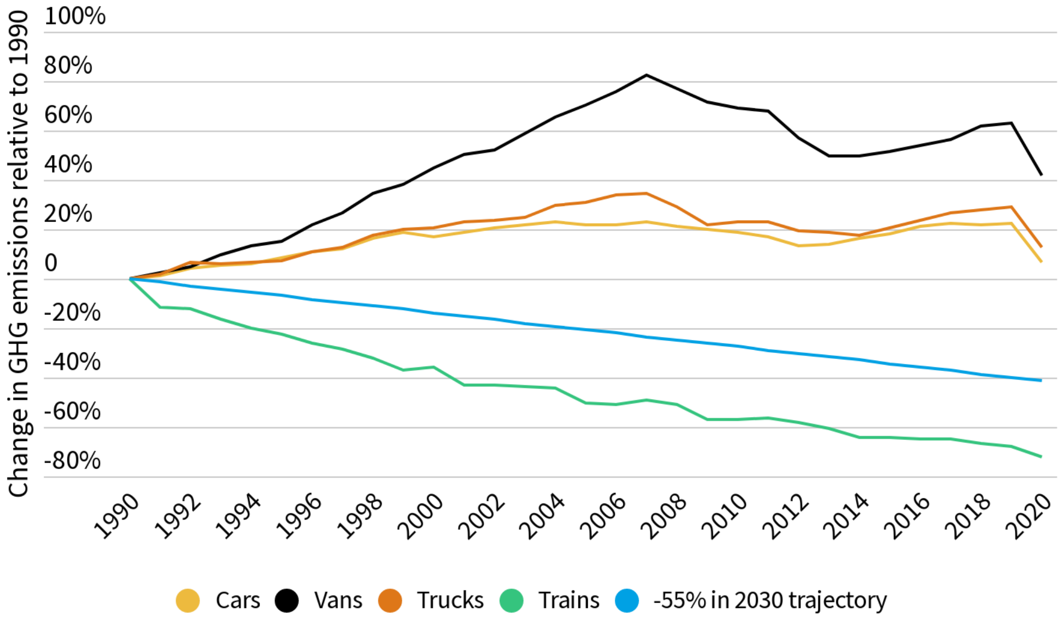
List of abbreviations

B2B	Business-to-business
B2C	Business-to-consumer
BEV	Battery-electric vehicle
CO_2	Carbon dioxide
EV	Electric vehicle
LCV	Light commercial vehicle
NEDC	New European Driving Cycle
p.p	Percentage point
STR	Short-term rental
TCO	Total cost of ownership
VAT	Value added tax
WLTP	Worldwide Harmonised Light Vehicles Test Procedure
ZEV	Zero-emission vehicle

1. Introduction

The European Union is currently revising the legislation which addresses CO_2 emissions for both new passenger cars and light commercial vehicles (i.e vans). The European Commission proposed new targets in July 2021 as part of the Fit for 55 climate legislative package and the file is currently being discussed in the European Parliament and at Member State level. While much ink has been spilled on cars, vans are often overlooked in the discussions.

Yet, the importance of vans has been increasing. In 2021, 14% of new light vehicles[1] in the EU are vans, up from 12% in 2019 and 13% in 2020. Moreover, van registrations have also been less affected by the Covid-19 pandemic. While the car market has contracted for two consecutive years (-24% in 2020, -2% in 2021), sales of new vans decreased by 18% in 2020 and rebounded by 8% in 2021 [1–4]. Vans are predominantly registered by business users as they account for 88% of the sales in the EU+UK [5] (versus 56% of EU+UK cars) [6]. Vans accounted for approximately 11% of road transport CO_2 emissions in 2020 [2]. Relative to 1990, van emissions were 42% higher in 2020 (63% higher in 2019) (see Figure 1). This makes them by far the road transport sector with the largest emission increase. For comparison, car and truck emissions in 2019 were respectively up by 23% and 29% relative to 1990.

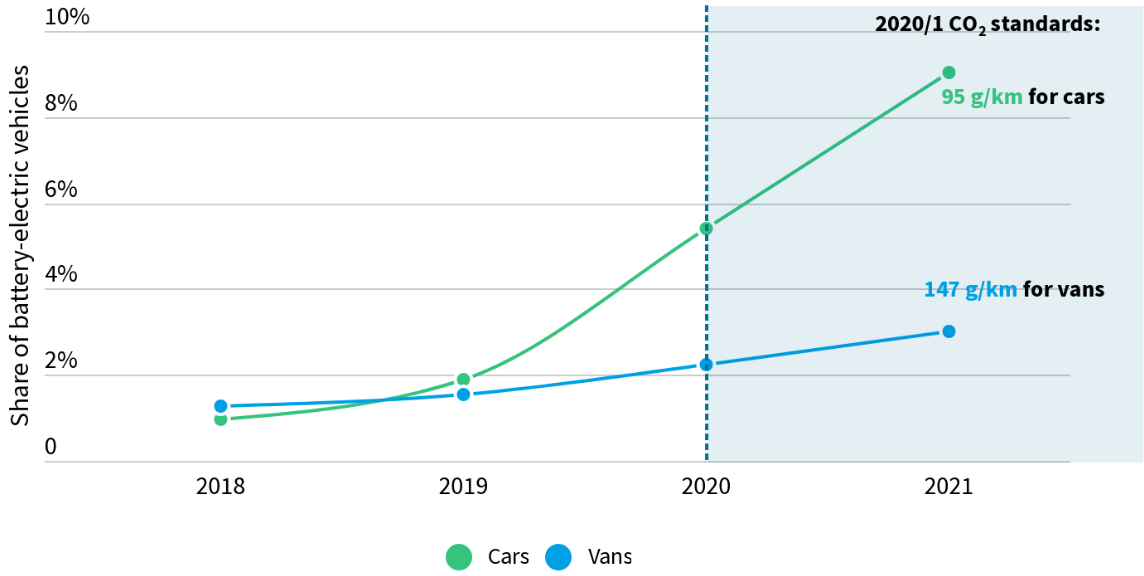


Source: UNFCCC (2021) GHG inventories. Data for 2020 is provisional.

Figure 1: Historic emissions in the road transport sector

[1] Light vehicles include cars and vans.

However, vans are electrifying much more slowly than cars, as a result of weaker CO_2 emission targets. Vans only had to reduce their CO_2 emissions by 1% to meet the EU CO_2 standards[2], compared to a 20% cut from cars[3]. Both electric cars and vans accounted for 1% of sales in 2018 and 2% in 2019. But as the 2020/21 CO_2 emission targets of 95 g/km for cars and 147 g/km for vans kicked in, BEV market share among cars skyrocketed, while it barely took off among vans. In 2021, 9% of new cars were fully electric [9][4], compared to 3% of new vans [10] (Figure 2).



Source: ACEA (2022) Fuel types of new passenger cars. EEA (2021) Monitoring of emissions from vans. ICCT (2022) Market monitoring

Figure 2: BEV market share for cars and vans

The environmental benefits of electric vans are not limited to cuts in CO_2 emissions, but extend to improvements in air quality. Vans are responsible for 14% of NO_x pollution in cities [11]. On average, vans emit three quarters more NO_x per kilometre than cars[5]. As a result, a coalition of cities and health groups across Europe, along with industry and transport companies, are calling for higher ambition with regards to van CO_2 targets and a guarantee that mobility will be zero-emission in 2035 [13].

The ongoing revision of the van CO_2 targets represents the only opportunity to accelerate this transition and align vans with the EU's Green Deal climate ambitions. As the file is currently being discussed by co-legislators in the European Parliament and the Member States, T&E has analysed the current van market and the economics of electric vans to assess if the market and van users are ready for this transformation.

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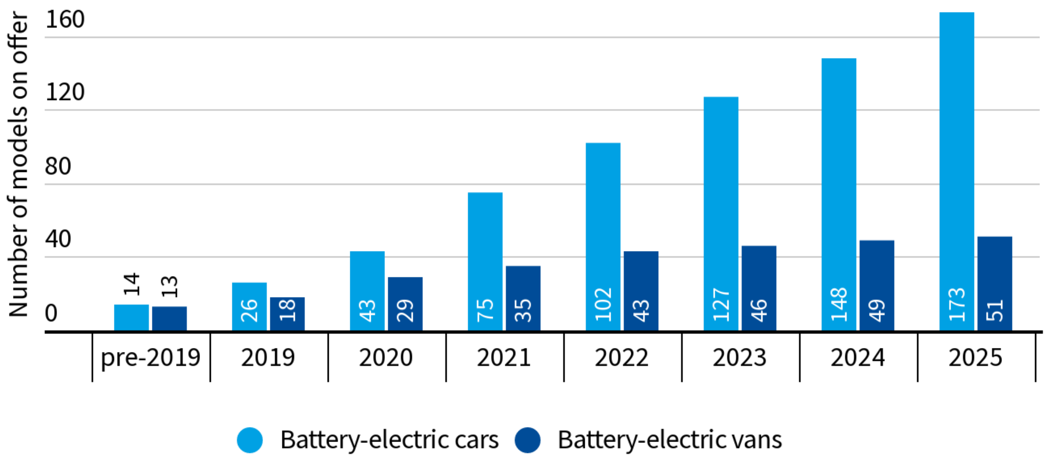
[2] Vans emitted159.3 g/km on average in 2019. Their target, 147 g/km on paper, was 158.5 g/km with flexibilities [7].
[3] Cars emitted 122 g/km on average in 2019. Their target, 95 g/km on paper, was 98 g/km with flexibilities [8].
[4] 10% according to the ICCT Market Monitor [10]
[5] T&E calculations based on remote sensing by the ICCT in Paris found that on average passenger cars emit 0.46 gNO_x/km while light commercial vehicles emit 0.8 gNO_x/km [12].

This report assesses the benefits and drawbacks of electric vans, both from a total cost of ownership (TCO) perspective and as perceived by van users. It also identifies the use cases in which electric vans are preferable to diesel vans and why. Section 2 describes the current e-van market in Europe. Section 3 presents the results of a survey of 745 van users in France, Germany, Italy, Poland, Spain, and the United Kingdom. This survey, conducted in late 2021, asked respondents how they used their vans and their motivations for buying an electric van or not. Section 4 then compares the TCO of diesel and electric vans, both light and heavy vans, for the various user profiles obtained from the survey. Section 5 discusses the findings from Sections 3 and 4. Finally, Section 6 presents T&E's policy recommendations.

2. Overview of the current e-van market

24,000 electric vans were registered in the EU+UK in the first half of 2021 [5], almost as many as in 2020 for the full year (26,100) [14]. Part of this growth was due to the post-Covid economic recovery, as the whole van market grew by 8% from 2020 [4]. However, it was mainly driven by market electrification, as e-van market share rose from 2% in 2020 to 3% in 2021 [10]. Though electric van sales and market shares are slowly going up, the e-van market still lags far behind the electric car market.

Before 2019, both the car and van markets had a similar offer of fully-electric models (14 car models vs 13 van models; Figure 3). In 2021, with the 2020/21 CO_2 standards fully in force, BEV buyers could pick from twice as many car models as van models (75 car models vs 35 van models). Based on manufacturers' public announcements, BEV buyers in 2025 will have more than three times as much choice for cars as for vans (173 car models vs 51 van models).

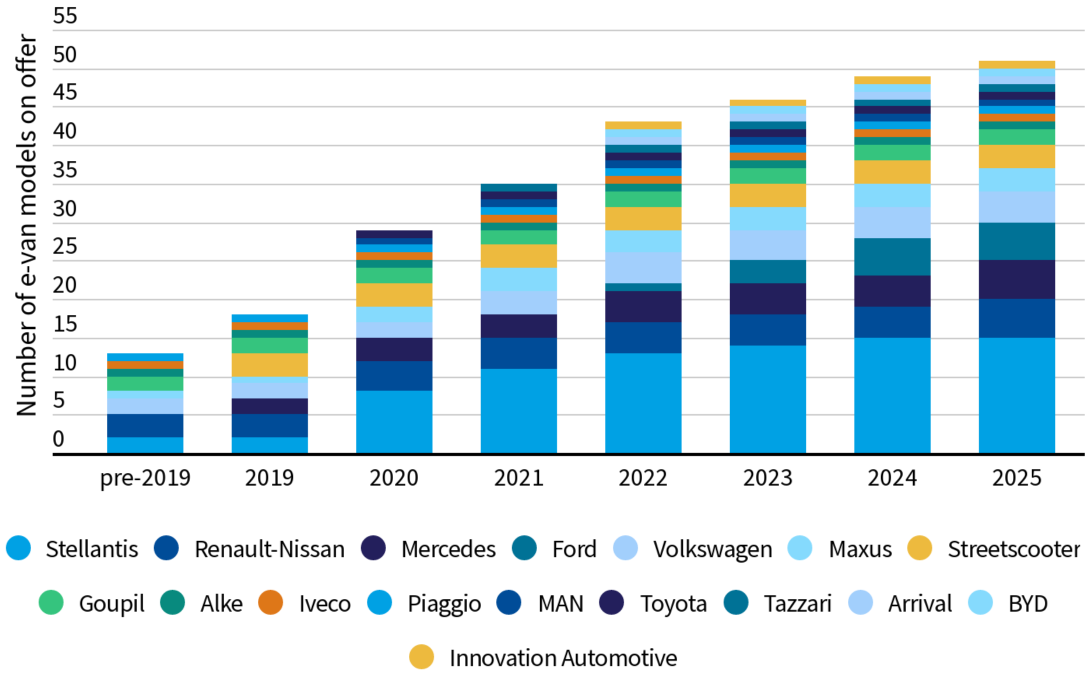


Source: T&E market monitoring.

Figure 3: Battery-electric car and van models

As a result of the limited interest from traditional van manufacturers, new players started offering models to meet the growing demand for electric vans (Figure 4). StreetScooter—a start-up owned by DHL from 2014 to 2022[6]—accounted for 41% of all German e-vans and 11% of all EU vans in 2020 [14]. New start-ups, such as Arrival [16], are launching zero-emission vans. In addition, Chinese vanmakers such as Maxus [17] and BYD [18] are also entering the market. Large vanmakers have begun announcing new e-van models (e.g Fiat Ulysse and Scudo [19], VW ID Buzz [20]). Three Stellantis brands (Opel, Citroën and Peugeot) now offer the passenger versions of their van models only as battery-electric vans [21]. However, the question remains to what extent production volumes would be ramped up in the absence of stronger targets in the 2020s.

[6] StreetScooter was sold to Odin in January 2022 [15]



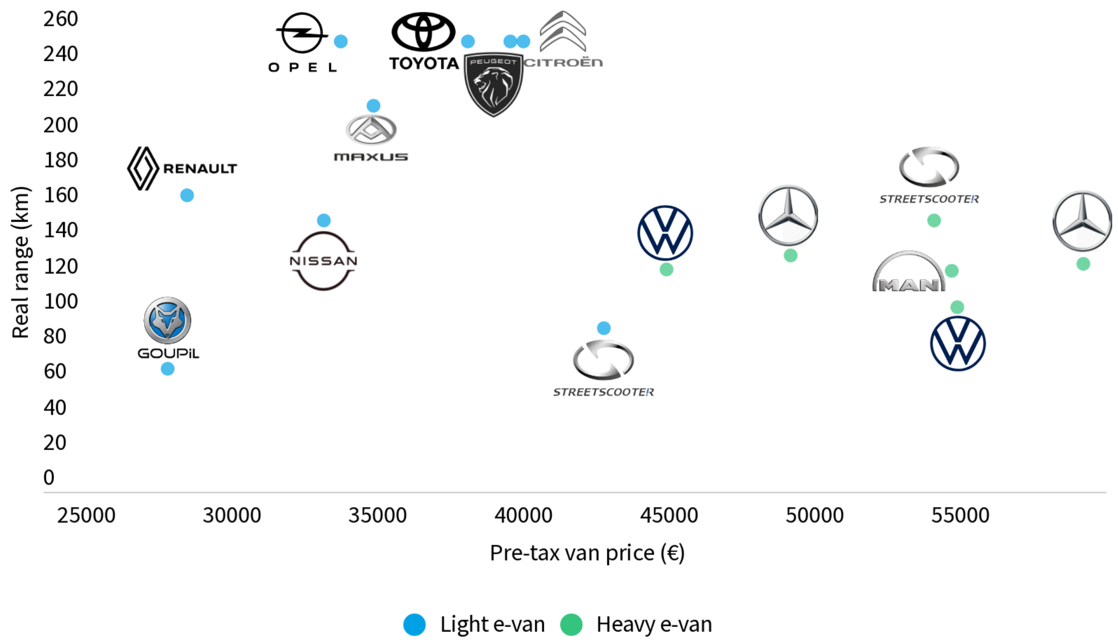
Source: T&E market monitoring.

Figure 4: Number of battery-electric van models on offer

In 2021, battery-electric vans represented only 3% of the European van market, up from 2% in 2020 [10]. The leader is Renault-Mitsubishi (5% BEV in both 2020 and 2021), followed by Mercedes-Benz (2% in 2020, 4% in 2021), Stellantis (1% in 2020, 2% in 2021), and VW-Ford-SAIC (2% in 2020 and 2021). Other vanmakers sold 2% of electric vans in 2020 and 3% in 2021 on average [10].

In addition to battery-electric vans, a few hydrogen fuel cell models are on the market or in the works. Stellantis offers fuel cell variants of three of its models (Opel Vivaro, Citroën Jumpy, Peugeot Expert) [22], Mercedes has unveiled its concept Sprinter F-Cell [23], and IVE, a UK-based startup, announced a small hydrogen van for 2024 [24]. However, fuel cell van production volumes are projected to remain below or at 1% of van production until 2030 [7]. The future of some models (e.g the hydrogen version of the Renault Kangoo) is also uncertain [25]. As a result, this report focuses on battery-electric vans as the most mature and market-available technology to replace diesel vans in the coming years.

Vans can be classified into two weight categories: light (below 1.76 tonnes, corresponding to EU Classes I and II) and heavy (strictly above 1.76 tonnes, or Class III) [7]. Out of the top 15 e-vans in 2021, which account for 95% of e-van registrations, 9 are light and 6 are heavy [5]. All e-vans in the top 5 are light: Renault Kangoo, Nissan e-NV200, Opel Vivaro-e, StreetScooter Work, Toyota Proace (see Annex 7.1). On average, a light e-van on the market today costs 34,400€ before tax and subsidies and can drive 192 km on a single charge in real driving conditions. A heavy e-van costs 52,900€ and has a real range of 133 km[7] (Figure 5).



Source: T&E market monitoring.

Figure 5: Real range and pre-tax price of top 15 e-van models

In total, e-van buyers in 2022 can pick from 43 models—including 19 light and 24 heavy, more than doubling from 18 models on offer in 2019. Based on manufacturers' public announcements, e-van models coming on the European market in 2022 have a higher range than previous models. The average range of light e-vans launched in 2022 is 293 km, compared to 263 km for heavy e-vans. The highest announced range of all 2022 models is 350 km, for the Ford e-Transit [26].

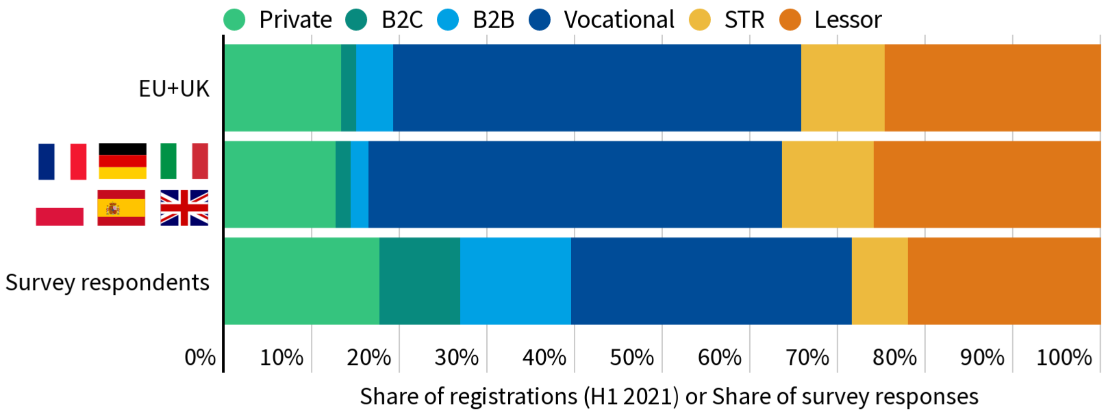
[7] Based on T&E market monitoring. Averages are obtained from price and range data on the top 15 e-van models, weighted by the share of registrations in H1 2021. [5]

3. Van user survey results

3.1. Overview of the van user categories

In order to better understand the European van market, T&E commissioned a survey of van users in six European countries: France, Germany, Italy, Poland, Spain, and the United Kingdom. Together, these six countries represent 76% of the EU+UK market, totalling 778,000 new van registrations in H1 2021 out of 1,028,000 [5].

The survey questions focused on who van users are, how they use their vehicles, and how they feel about electric vans. Users were grouped into categories based both on their business model and on their ownership and driving characteristics. The six categories are: private users, lessors[8], short-term rental services (STR), transport of goods to businesses (business-to-business, B2B), transport of goods to customers (business-to-consumer, B2C)—which mostly covers e-commerce—, and vocational (i.e. users who do not engage in goods transport as their primary activity)[9]. Figure 6 shows how the van market was split with regards to these categories in the first half of 2021, as well as the respondent split. Vocational users register the most vans (47% of van registrations in the six countries considered), followed by lessors (26%), and private users (13%). Short-term rental services, B2B, and B2C transporters register 11%, 2%, and 2% of vans respectively. The results indicate that the six countries considered here are representative of the wider EU+UK market in terms of segmentation by user group. All groups were well-represented in the survey, including goods transporters (B2B and B2C) though they each registered only 2% of new vans in H1 2021 [5].



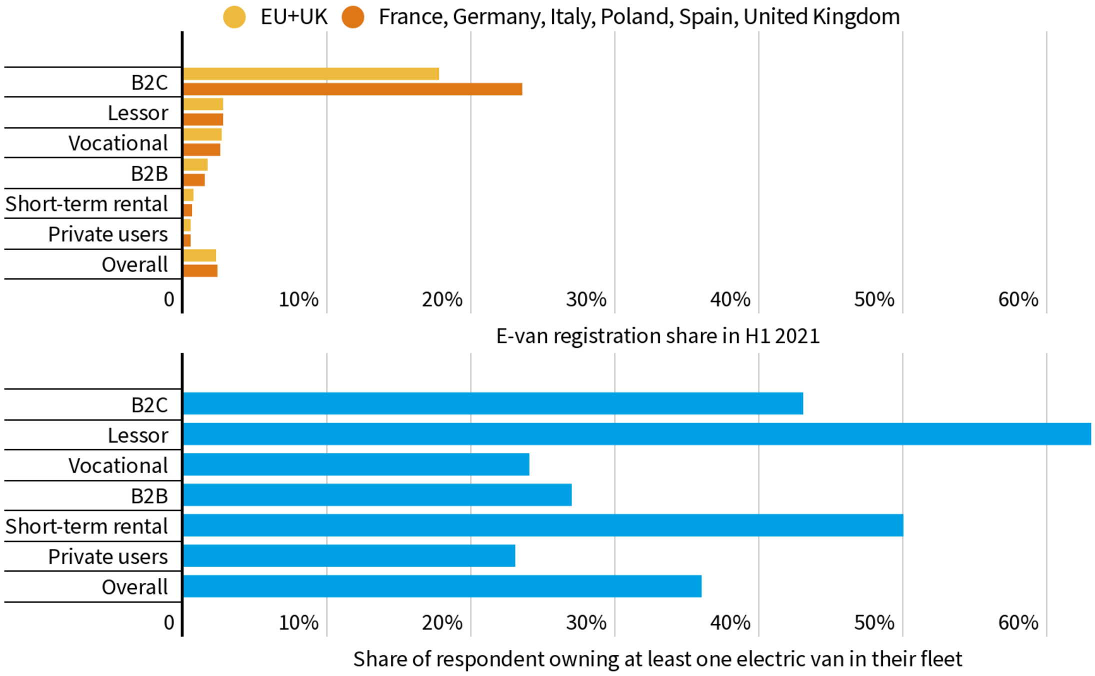
Source: Dataforce (H1 2021) LCV registration data

Figure 6: Market share by van user categories in the EU+UK and in selected countries

[8] From here, "lessor" groups dealer, manufacturer, leasing and long-term rental. This grouping was decided as their van uses are similar, based on survey data.

[9] This includes agriculture, forestry, fishing, construction, power, water and waste, communication, taxi, diplomats and exterritorial organisations, financial and insurance, public administration, security, and health, and others (mainly in the service industry). Note that the "other" subcategory on its own makes up 38% of the EU+UK van market or 87% of the vans registered in the broader vocational category [5].

In terms of battery-electric van uptake, the six countries considered are also representative of the EU+UK market as a whole for most categories: 2.4% of vans registered in the six countries were battery-electric, compared to 2.3% in the EU+UK [5]. Regardless of the geographical scope considered, B2C users have the highest penetration of electric vans, with 17.7% in the EU+UK (and 23.5% in the six countries considered). Most of the other user groups (lessor, B2B and vocational) register 2%–3% of electric vans while private users and short term rentals lag behind with less than 1% of electric van registrations (Figure 7).



Source: Dataforce (H1 2021) LCV registrations

Figure 7: E-van share by van user categories in the EU+UK, in selected countries, and in the survey

Survey respondents have higher e-van ownership than what is suggested by new van sales. Indeed, 36% of respondents said that they owned at least one e-van. However, many of the van owners operate an entire fleet of vans (27 vans on average). Fleet managers who answered "yes" may only own a few electric vans among many diesel ones, so the share of electric vans in their purchases would be much lower. It is also possible that there is a sampling bias towards e-van owners: the users who are more likely to respond to surveys could also be the ones who are the most informed about technological or market developments and could thus be more likely to be early e-van adopters.

3.2. Van user group characteristics

On average, survey respondents drive 175 km per day, with a maximum daily driving distance up to 425 km and totalling 37,700 km per year. Respondents keep their vans for an average of five years, though 30% of respondents own their vans for three years or less (Table 1). Rental services (both long- and short-term) have shorter holding periods than average at four years. They also tend to operate larger fleets—40 vans on average for short-term rental and 46 vans for lessors (i.e. long-term rental), compared to an average fleet size of 27 vans. Respondents only slightly prefer heavy vans (54% of the fleets surveyed). Lessors, followed by B2C users, have the strongest preference for large vans (61% and 57% respectively). Regarding mileage, B2C users drive the most both annually (51,300 km/year) and daily (250 km/day, with a maximum of 520 km/day). Conversely, private users drive the least—only 32,400 km/year or 120 km/day.

Group	Ownership years	Fleet size	Share of large vans	Average daily distance (km)	Maximum daily distance (km)	Annual distance (km)
All respondents	5	27	54%	180	430	37,700
	4	24	46%	190	490	40,100
	6	29	61%	130	380	28,500
	5	23	57%	180	410	37,800
	5	31	57%	190	490	45,400
	5	26	49%	170	390	38,700
	4	30	56%	190	410	36,300
Private	5	1	51%	120	360	32,400
Lessor	4	46	61%	210	480	41,400
Short-term rental	4	40	54%	190	480	41,800
Goods - B2B	5	25	52%	190	440	39,500
Goods - B2C	5	29	57%	250	520	51,300
Non-Goods	5	26	52%	140	380	33,000

Notes: Daily distances are rounded to the nearest 10 km. Annual distance is rounded to the nearest 100 km.

Table 1: User characteristics used to determine total cost of ownership

3.3. Attitudes towards electric vans

3.3.1. Rates of e-van adoption

Users with at least one electric van in their fleet made up 36% of respondents, and 32% of all respondents will buy an electric van in 2022 (Figure 8). Country-wise, Germany has the lowest share of respondents who either already own an electric van or will buy one this year: 35%. This is particularly low as such respondents make up 70%–80% of users in all five other countries surveyed. Looking at user groups, private users are the least likely to already own an e-van or buy one in 2022 (52%), while rental services are the most likely (92% for short-term rental services, 90% for lessors). In addition, 16% of respondents would consider buying an electric van in the next five years. This share is highest for Germany (27%) and lowest in France and Italy (10% and 11% respectively). Similarly, it is highest for private users (23%) and lowest for rental services (6% for short-term rental and 4% for lessors). In other words, the share of respondents who would consider buying an e-van is lower where existing e-van adoption is already high, as most users with a positive view of electric vans have already made the switch. Overall, 84% of respondents consider going electric. This share rises to 91% for Italians but falls to 62% for Germans.

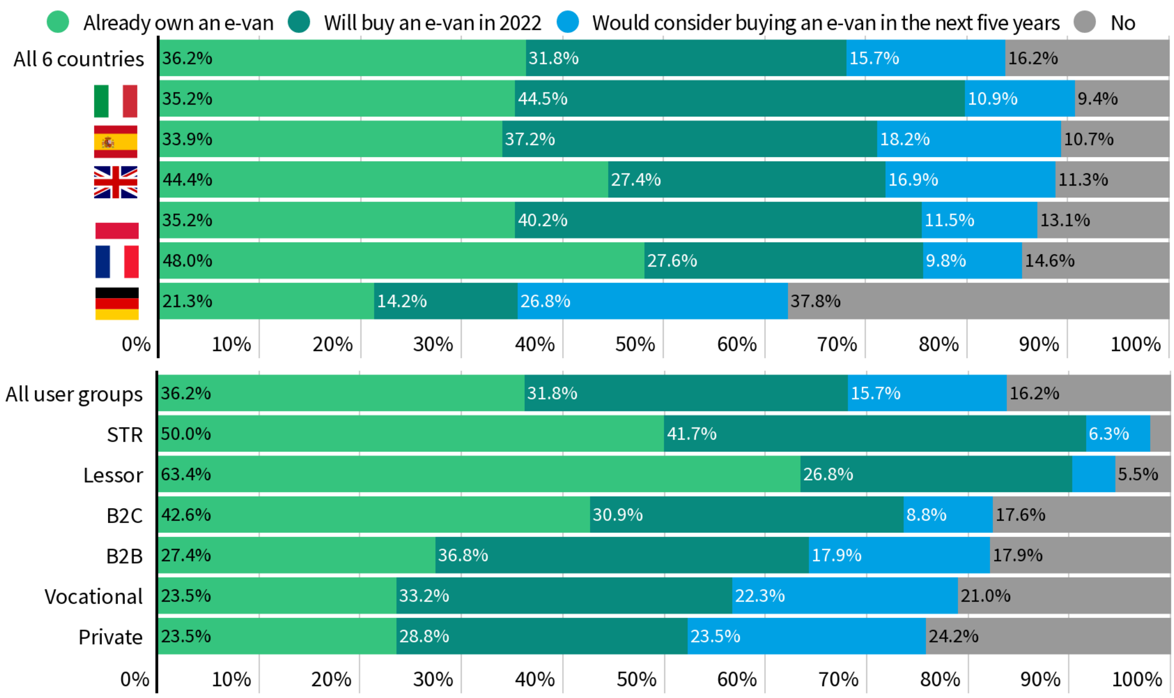


Figure 8: Rates of e-van adoption in the survey

3.3.2. Drivers of e-van adoption

Respondents who either already own or will buy an electric van in 2022 and respondents who consider buying one over the next five years were asked about their reasons for going electric using a multiple choice questionnaire. Figure 9 lists all possible reasons for buying an electric van and the rate at which they were selected.

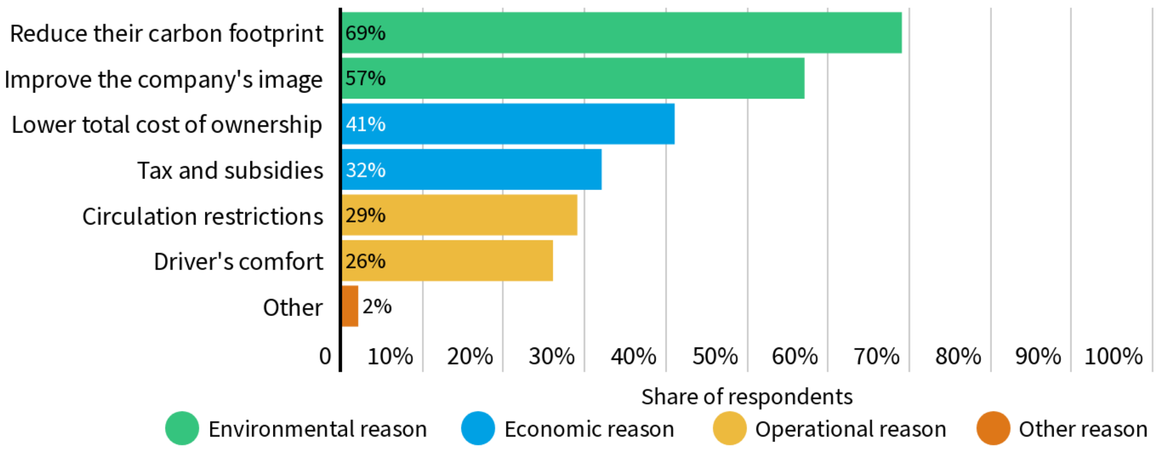


Figure 9: Reasons for buying an electric van

The two most selected options are related to the **environmental benefits** of electric vans. 69% of respondents said reducing their carbon footprint played a role in their decision to choose an electric van. Improving the company's image was selected as a reason by 57% of commercial[10] respondents. Figure 10 maps out where respondents are situated in relation to the attitude of the average user. Reducing CO_2 emissions is particularly important for B2B users (81% of B2B respondents), and less for B2C and vocational users (respectively 64% and 65%) Country-wise, reducing their carbon footprint is most important to Spanish and British users (respectively 76% and 75%), while Germans care the most about improving their company's image (67%).

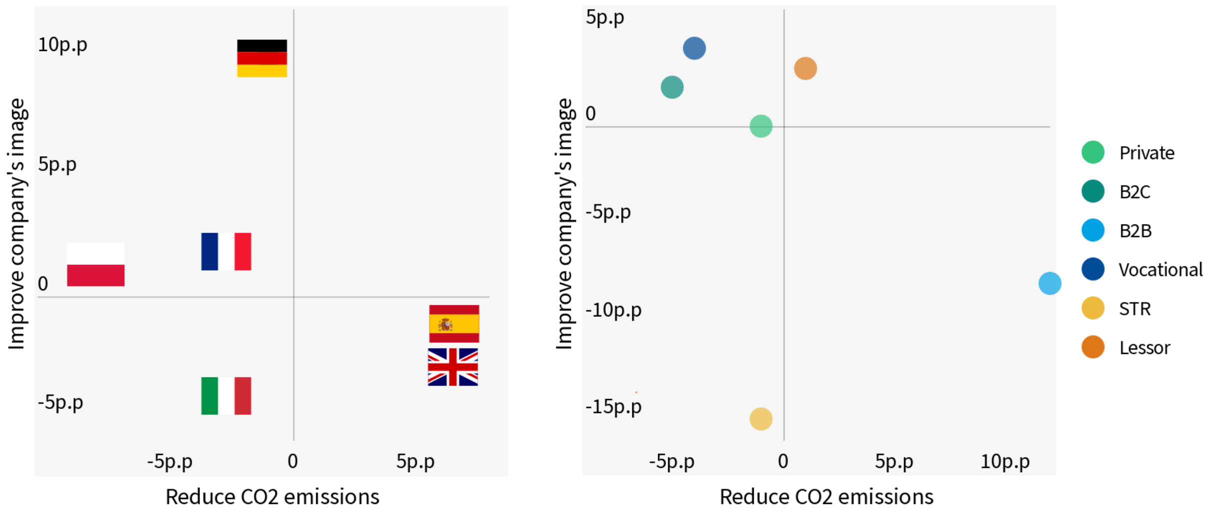


Figure 10: Environmental reasons for e-van ownership—how groups compare to the average

The next two most selected motivations for buying an electric van are **economic**. A lower total cost of ownership was mentioned by 41% of respondents, while tax advantages and purchase subsidies were selected by 32% of respondents. Figure 11 shows how users—either grouped by country or business category—compare to the average user in terms of economic reasons. With regards to business category, a lower TCO matters mostly to B2C and B2B users (respectively, 48% and 45%) and least to private users (33%). Tax and subsidies were cited most frequently by B2B and vocational users (respectively, 42% and 41%), and least by lessors (22%), who can pass on higher purchase prices onto lessees through higher lease payments. In terms of national differences, a lower TCO was cited mostly for British and French users (respectively, 50% and 49%). On the contrary, German and Italian users are the least likely to cite a lower TCO as a motivation for going electric (respectively, 29% and 33%), but the most motivated by subsidies (respectively, 44% and 36%).

[10] This option was not offered to private users.

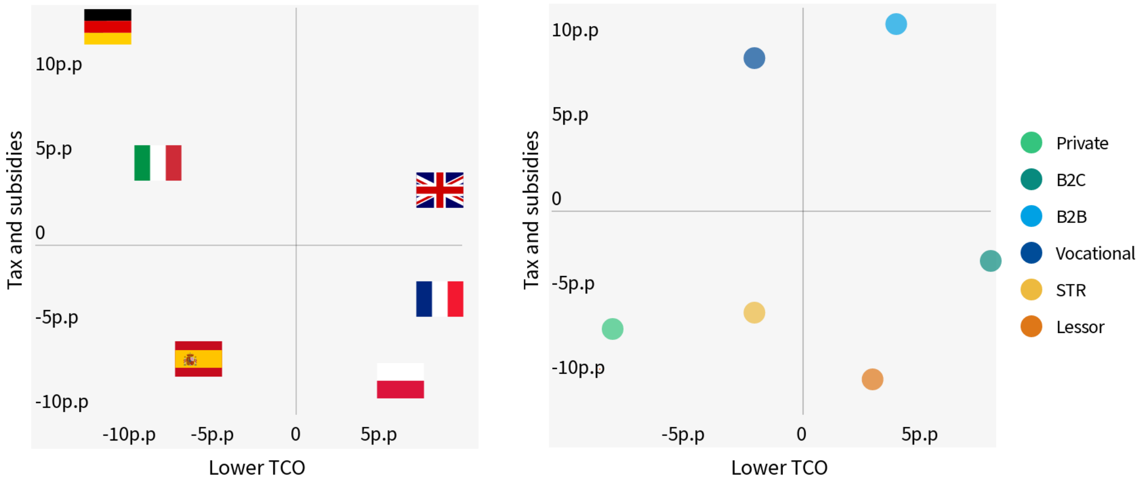


Figure 11: Economic reasons for e-van ownership—how groups compare to the average

Finally, the last two reasons for buying an electric van are **operational**. Circulation restrictions were listed by 29% of respondents, while 26% listed the comfort of the driver. Circulation restrictions were mostly cited by B2C users (45%), i.e. delivery vans, which need to access consumers living in low-emission zones. Country-wise, circulation restrictions were listed most often by French users (41%), likely due to the Crit'Air scheme, which only allows zero- and low-polluting vans in traffic-restricted zones [27]. Driver comfort is listed primarily by lessors and short-term rental services (respectively 37% and 36%), possibly as it is a selling point they advertise to their customers.

3.3.3. Barriers to e-van adoption

Respondents who neither own nor will buy an e-van in 2022 were asked about their reasons against buying an electric van[11] [12]. Figure 12 lists all possible reasons against buying an electric van and the rate at which they were selected by respondents.

[11] This group includes only four short-term rental services respondents. As a result, this user category is excluded from this section.

[12] Note that respondents who neither already own nor will buy an e-van in 2022, but consider buying one over the next five years were asked about their reasons both for and against e-van ownership. As a result, both their reasons for and against e-van adoption were recorded.

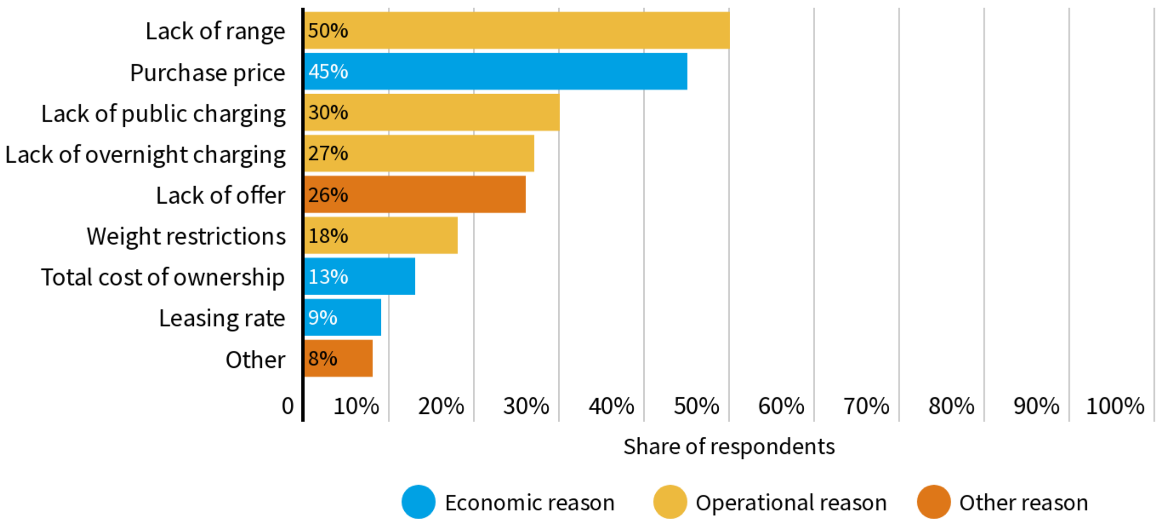


Figure 12: Reasons against buying an electric van

Major obstacles to buying an electric van are primarily **operational**: perceived lack of range, lack of public charging, and lack of overnight charging. They are respectively the first, third and fourth most common reasons against e-van ownership. Since range is a solution to the lack of charging infrastructure and reciprocally, findings related to these three barriers are presented in succession. Figure 13 maps out how different groups compare to the average van user in their propensity to mention either lack of range or lack of charging as an obstacle.

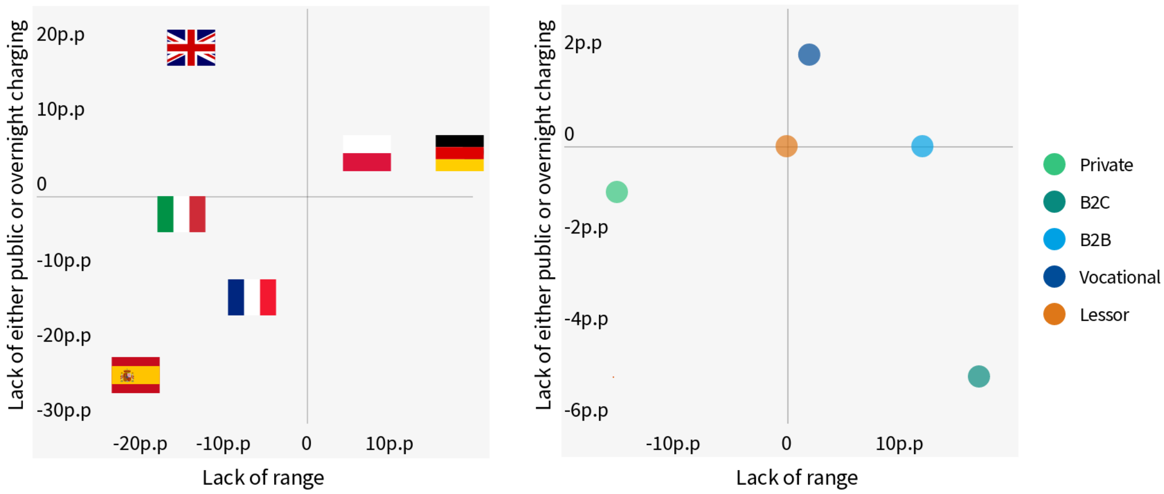


Figure 13: Range and charging reasons against e-van ownership—how groups compare to the average

Lack of range is the most often cited obstacle to e-van ownership, being listed by 50% of respondents. B2C and B2B transporters are the most likely to cite lack of range as an issue (67% and 62% respectively). As a reminder, B2C users have the highest daily mileage, driving 250 km/day on average and up to

520 km/day. Therefore, it makes sense that this is the user category which is the most concerned about range. Conversely, private users are the least concerned with range (35%), as they drive the least (only 120 km/day on average). Country-wise, German and Polish respondents are the most likely to cite range as a reason against buying an electric van (respectively 70% and 57%), while the Spanish are the least likely (29%).

Lack of public and overnight charging are cited by 30% and 27% of respondents respectively, with 44% citing either one. Charging concerns rank highest for vocational users, with 47% of them citing either lack overnight or public charging. B2C users are the least likely to mention lack of charging as an obstacle to buying an electric van (39%). Country-wise, British users are the most worried about lack of charging, with 63% of UK respondents listing either lack of overnight or public charging. However, previous research suggests that non-EV users have a worse perception of the UK charging network than EV drivers [27, 28]. Spanish users are the least likely to mention lack of charging as a barrier to EV ownership (20% of Spanish respondents).

The second and fifth most common obstacles are both related to the purchase of electric vans. Namely, they are purchase price (listed by 45% of respondents) and lack of offer of electric van models (cited by 26%). How different groups compare to the average van user is shown in Figure 14. **Purchase price** is most important to lessors and private users (respectively 69% and 56%) and least to B2B users (21%). Looking at countries, van price is most cited as an obstacle by Polish and Italian respondents (respectively 63% and 58%) and least by German respondents (23%). Interestingly, **lack of offer of e-van models** is mostly cited by private users (29%). This may be because vanmakers are catering their limited offer to commercial users, as they register the vast majority of new vans. As a result, existing e-van models may not be suited to the needs of private users. France and the UK are the two countries where van users are most impacted by the lack of offer (respectively, 33% and 31%).

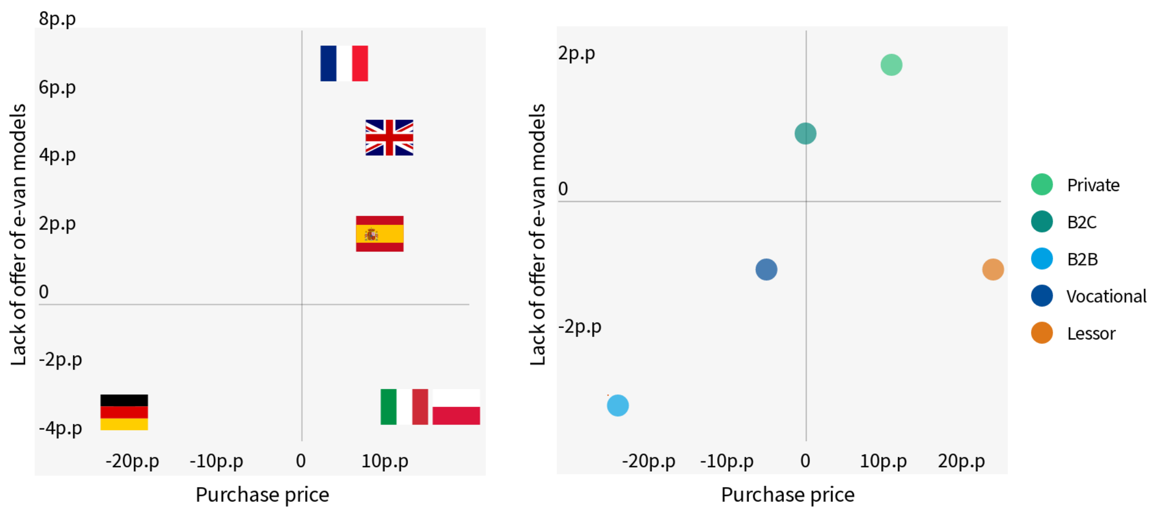


Figure 14: Purchase price and lack of offer reasons against e-van ownership

Finally, two barriers are cited by a small share (10%–20%) of respondents. **Weight restrictions** are cited by 18% of respondents but up to 44% of B2C respondents. This is expected as payload is a critical factor for such users. They are also listed by 32% of Germans, which is likely due to how certain driving licences are conditioned on vehicle weight. **Total cost of ownership** is cited by 13% of respondents, but 38% of lessors. This is possibly because lessors are disadvantaged by higher vehicle prices, but do not benefit from lower fuel costs as other users do, and therefore have a less advantageous e-van TCO. TCO was also mentioned as an obstacle to buying an electric van by 29% of British respondents, the highest national average.

4. Total cost of ownership

4.1. Data and methodology

Electric vans currently are more expensive to purchase than their diesel counterparts, though they are expected to reach pre-tax price parity within the next five years [29]. However, electric vehicles typically have lower maintenance and energy costs, meaning they can reach parity on a total cost of ownership basis years before purchase price parity. While upfront costs can deter private consumers, total cost of ownership is what really matters for commercial users. This report examines when each user group described in the previous section are economically better off with an electric van than with the diesel van.

To do so, the total cost of ownership of both light and heavy vans in France, Germany, Italy, Poland, Spain, and the UK is estimated for private users, lessees[13], short-term rental services, B2B and B2C transporters, and vocational users, from 2021 to 2027. The elements considered in the TCO are net vehicle price, costs related to energy consumption (either diesel or electricity), depreciation, maintenance, and insurance, and ownership tax. For electric vehicles, the costs related to installing an EV charger are also included. For loans, a 1.47% interest rate is applied [30]. Net present values are obtained using an 11% discount rate for private users and a 9.5% discount rate for commercial users [31]. For lease contracts, it is assumed that overheads and profit margins represent 5% and 10% of lease payments respectively[14].

4.1.1. Net vehicle cost

4.1.1.1. Pre-tax van price

The pre-tax vehicle prices used here are based on BloombergNEF 2021's price parity study [29]. However, they have been adjusted in three ways (detailed further below):

1. Battery prices in €/kWh have been revised upwards in line with the latest BNEF battery price survey.
2. Battery capacity has been calibrated to current levels and is assumed to increase, rather than go down (to account for the lower starting point).
3. Pre-tax vehicle prices have been calibrated to match what is currently observed on the market.

First, BNEF forecasted that pre-tax purchase price parity would be reached in 2025 for light e-vans and 2026 for heavy e-vans [29]. This forecast was itself predicated on a battery price projection which assumed a 18% learning rate. However, BNEF has since revised its battery price forecast to assume a 17% learning rate [32]. As a result, battery-electric van prices have been adjusted to reflect the new battery price projection. Figure 15 shows the original price forecast in dark green, and the new price forecast in

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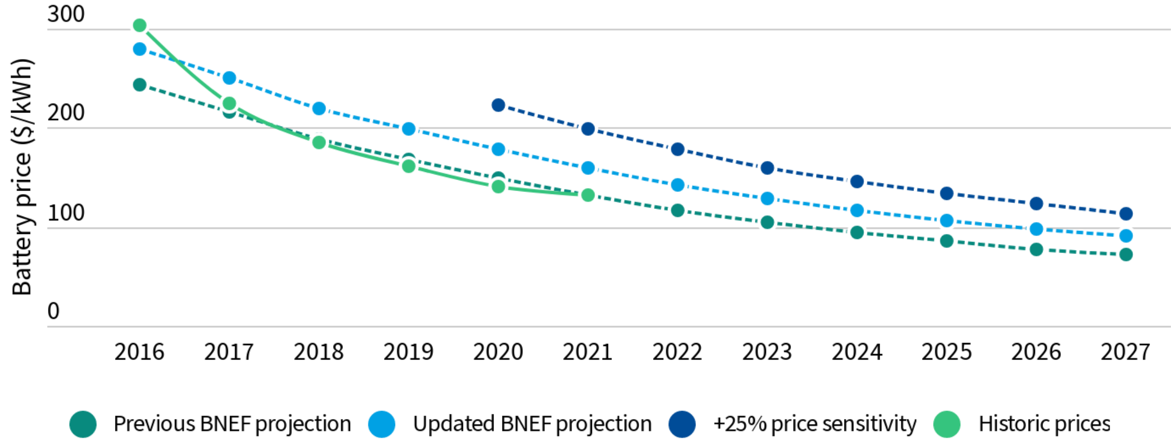
[13] While the survey surveyed lessors (i.e. dealers, manufacturers, long-term rental, and leasing companies), this TCO study focuses on end-users. As a result, data on average ownership period and annual distance driven for lessors was used to examine the total cost of ownership for lessees.

[14] Based on personal communication with a leasing company.

light blue. In addition, higher battery prices were considered as part of a sensitivity analysis (in dark blue). These prices are 25% higher than the prices based on a 17% learning rate.



Source: T&E modelling based on Bloomberg NEF (November 2021) Lithium-Ion Battery Price Survey. Figure 22.

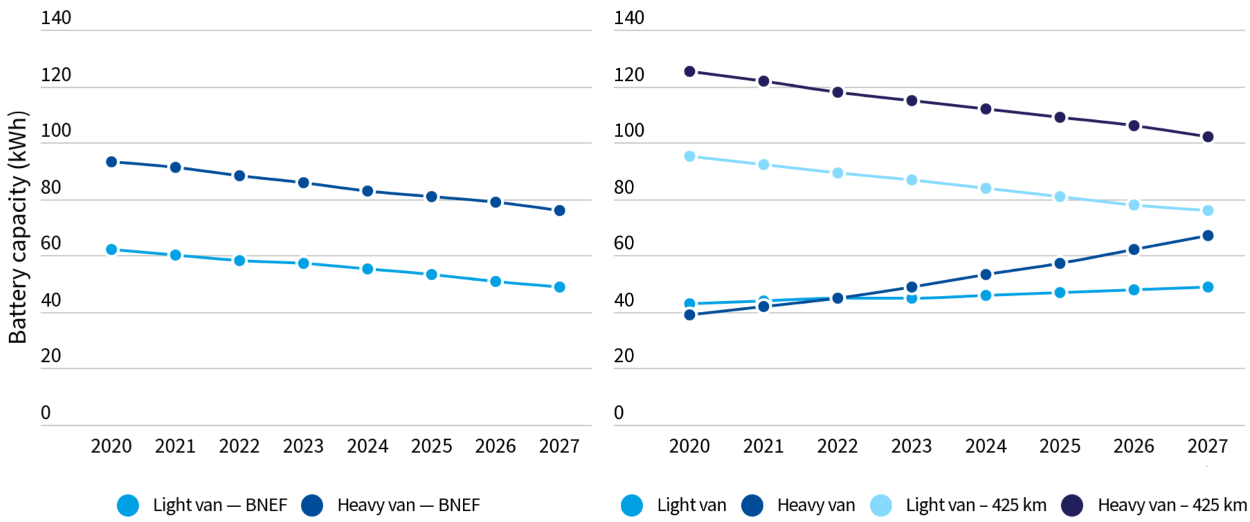
Figure 15: Battery prices as forecasted by BNEF, and higher prices used as part of the sensitivity analysis

Second, the BNEF study assumed constant ranges, set at 335 km for light vans and 445 km for heavy vans [29]. Battery capacity was assumed to start at 62 kWh for light vans and 93 kWh for heavy vans and go down over time as efficiency improved in order to hold range constant. For this analysis, current usable battery capacity has been estimated for light and heavy electric vans based on real efficiency[15] and real range[16] data at 43 kWh for light vans and 39 kWh for heavy vans in 2020.

Since real range is expected to increase[17], battery capacity is modelled to increase over time in order to improve range—by 2%/year for light vans and 8%/year for heavy vans, reaching a range of 277 km in 2027 [18]. Additionally, a sensitivity analysis was conducted where battery sizes are set so that electric vans have a range of 425 km[19]. This corresponds to the average maximum distance driven in a single day by survey respondents (see Section 3.2).

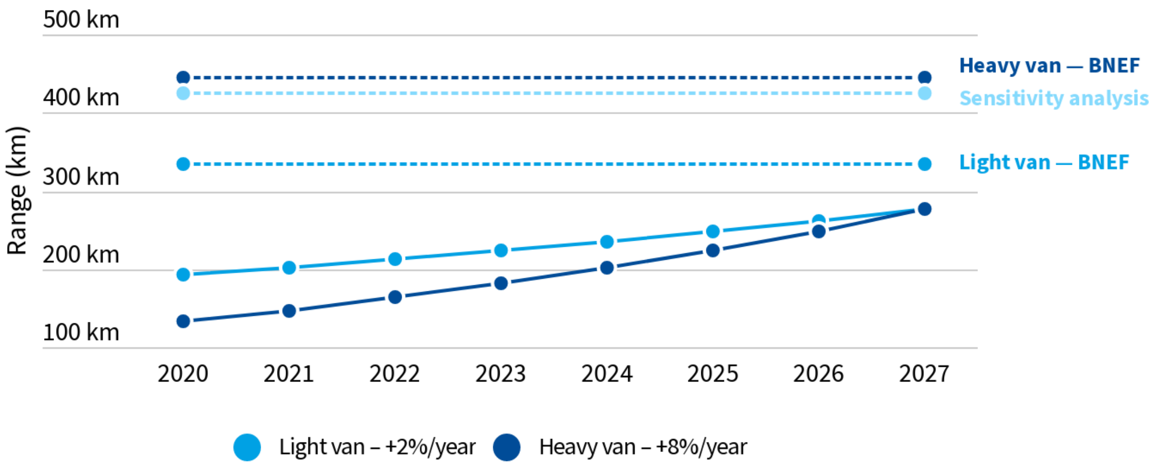
Figure 16 shows battery capacity for light and heavy vans as forecasted by BNEF and as modelled here. Figure 17 shows the resulting range projections assuming battery capacity as presented here, and improvements in real efficiency.

[15] Observed real efficiency is 224 Wh/km for light vans and 294 Wh/km for heavy vans (average efficiency weighted by registrations for the top 15 e-van models).
[16] Observed real range is 192 km for light vans and 133 km for heavy vans (average range weighted by registrations for the top 15 e-van models).
[17] The average range of e-vans launched in 2022 is 293 km for light models and 263 km for heavy models.
[18] The assumptions were chosen to grow closer to the ranges assumed by BNEF on the one hand, without oversized batteries on the other.
[19] Note that such a sudden increase in battery capacity is not meant to be a realistic scenario, but is undertaken simply as an exercise to study its impact on the economics of electric vans.



Source: Bloomberg NEF (May 2021) Hitting the EV Inflection Point. ICE-BEV Price Parity Comparison. Table 3.

Figure 16: Battery capacity, as forecasted by BNEF (left), and as calibrated and modelled by T&E (right)



Source: Bloomberg NEF (May 2021) Hitting the EV Inflection Point. ICE-BEV Price Parity Comparison. Table 3.

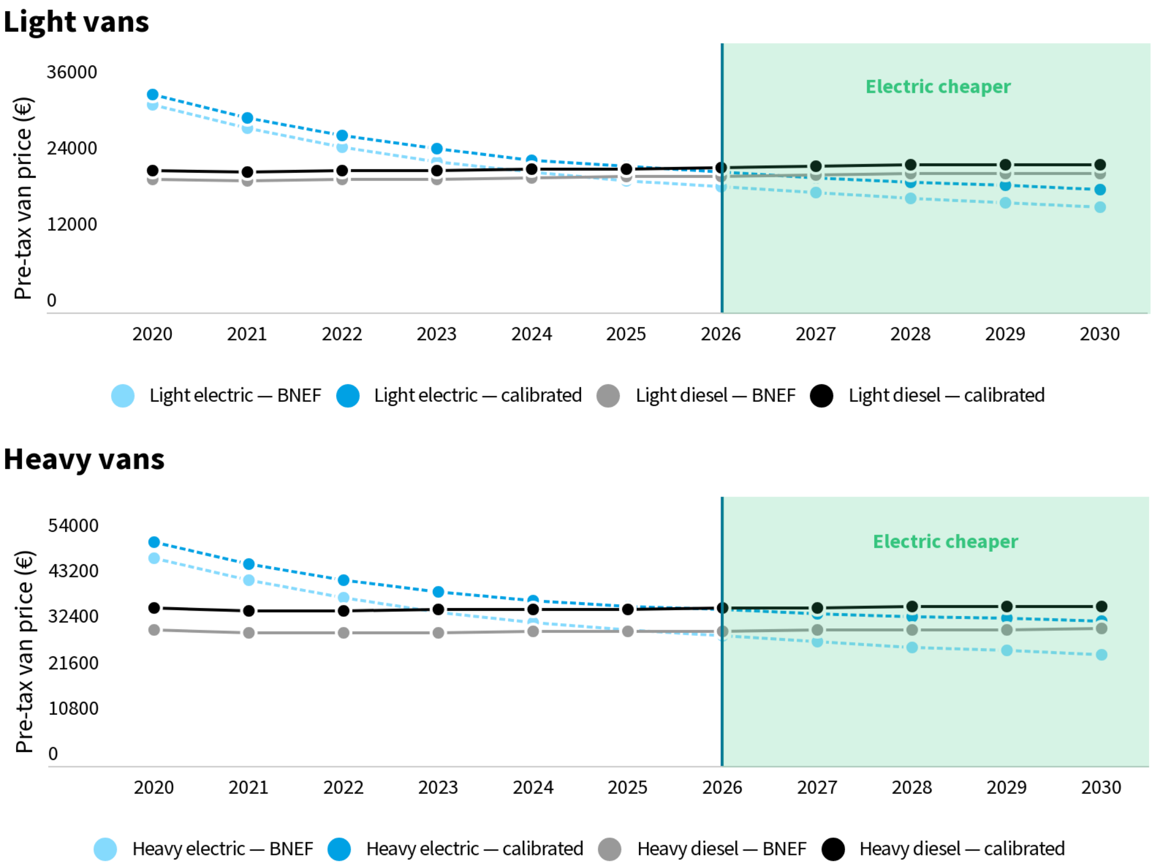
Figure 17: Forecasted driving ranges

The third and final adjustment to pre-tax vehicle price is a calibration based on current average market prices. To do so, data on pre-tax vehicle price was sourced for both light and heavy, diesel and electric vans[20]. This calibration resulted in higher increases in pre-tax van price for electric vans than for diesel

[20] Based on T&E market monitoring. Averages are obtained from price and range data on the top 15 e-van models, and top 25 diesel van models, weighted by the share of registrations in H1 2021. The top 15 e-van models cover 95% of the e-van market, while the top 25 diesel vans cover 83% of the diesel van market in the first half of 2021 [5].

vans[21]. Currently, a light electric van costs 34,400€, i.e. 53% more than a light diesel van, while a heavy electric van costs 52,900€, or 42% more than a heavy diesel van.

Pre-tax van prices, obtained after updating battery costs and calibration to current market prices, are shown in Figure 18. Based on this modelling, upfront price parity between diesel and electric should be reached in 2026 for both light and heavy vans—i.e. a one-year delay for light vans compared to what BNEF found.



Source: BNEF forecasts from Bloomberg NEF (May 2021) Hitting the EV Inflection Point. ICE-BEV Price Parity Comparison. Calibrated forecast is based on updated battery price forecast from BNEF (November 2021) Lithium-Ion Battery Price Survey. Figure 22, on currently observed prices and battery sizes, and on a scenario of increasing battery capacity (+2% annually for light e-vans, +8% annually for heavy e-vans).

Figure 18: Electric vans cheaper to buy than diesel in 2026 (before tax and subsidies)

4.1.1.2. Vehicle taxation

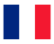
Value added tax and registration charges are considered in the TCO where applicable [33]. In the case of commercial users, it is assumed that they always recover VAT paid on van purchases. Only two countries included in this report (France and Spain) levy registration charges at different rates for diesel and electric

[21] Light e-van: + 9%, light diesel van: +6%, heavy e-van: +22%, heavy diesel van: +17%.

vans. In France, electric vans are exempt from the regional component of the registration tax, however, the monetary sums are relatively small[22], so upfront purchase price parity is unaffected. In Spain, electric vans are exempt from the Special Tax on Certain Means of Transport[23], which amounts to 4.75% of pre-tax vehicle price for a light van purchased by a commercial user and 9.75% for a heavy van. As a result, upfront purchase price parity is advanced to 2025 for light vans and 2024 for heavy vans purchased by Spanish commercial users when taxes are included.

4.1.1.3. Purchase subsidies

The impact of purchase subsidies on total cost of ownership is also considered, with subsidies assumed to remain at their 2021 levels until 2027 (Table 2) ([33], France: [34], Germany: [35], Italy[24]: [36] Poland: [37], [38], Spain: [39], UK: [40]). Notably, Germany and the UK are prolonging current subsidies through 2025 [33, 41].

Country	Private users	Commercial users
	40% of van price, capped at 7,000€	40% of van price, capped at 5,000€
	9,000€ if the van costs under 40,000€, 7,500€ if the van costs under 65,000€	9,000€ if the van costs under 40,000€, 7,500€ if the van costs under 65,000€
	3,200€ for a light e-van, 4,800€ for a heavy e-van	3,200€ for a light e-van, 4,800€ for a heavy e-van
	15% of van price, capped at 18,750zł/4,050€	30% of van price, capped at 70,000zł/15,100€
	7000€	7000€
	35% of van price, capped at £2,500/2,950€ for a light e-van and at £5,000/5,900€ for a heavy e-van	35% of van price, capped at £2,500/2,950€ for a light e-van and at £5,000/5,900€ for a heavy e-van

Sources: ACEA (2021) Tax Guide. Poland: eVan scheme. Spain: MOVES III scheme. UK: Plug-In Car Grant.

Table 2: Purchase subsidies in 2021 in the six countries considered

As shown on Figure 19, purchase subsidies bring forward upfront price parity—expected in 2026 for pre-tax van prices (Figure 18)— by several years, particularly for commercial users. As a result, electric vans are already cheaper to buy today in some countries, when purchase subsidies are taken into account.

[22] Based on average engine capacity in 2020, the regional component is estimated at 245€ for light diesel vans and 335€ for heavy diesel vans. Average engine capacity in 2020 is estimated from EEA monitoring data [14].
[23] *Impuesto Especial sobre Determinados Medios de Transporte*
[24] Note that Italy did not finance any purchase incentives for electric vans in early 2022 but will reintroduce subsidies later this year. As the level of future subsidies remains unknown at the moment, Italian subsidies are assumed to remain at 2021 level.

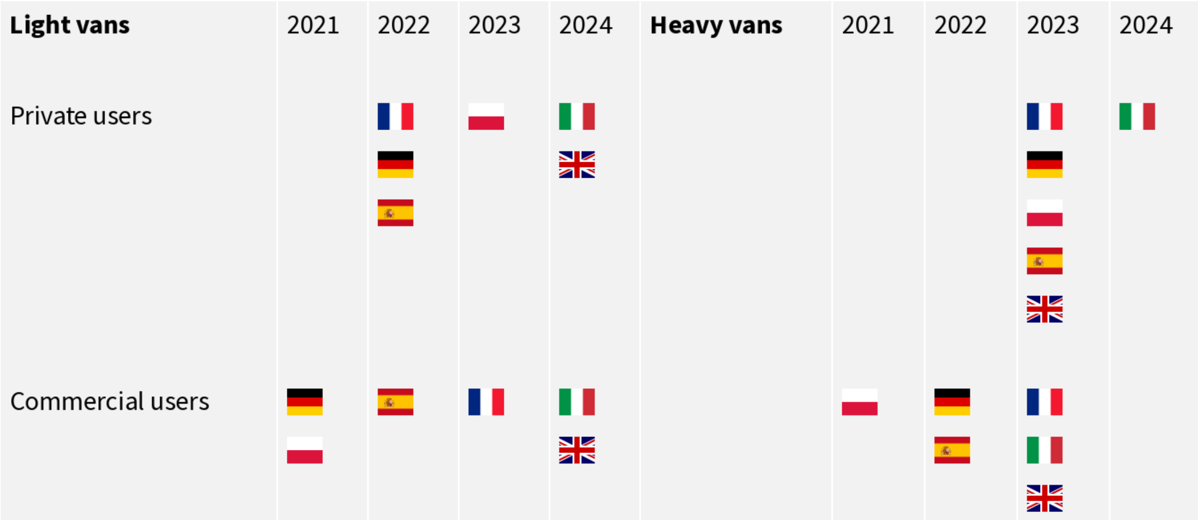


Figure 19: First year purchase electric vans are cheaper to purchase than diesel assuming current level of subsidies

4.1.1.4. Depreciation costs

The final consideration for vehicle cost is that net vehicle cost depends on the resale value of the vehicle at the end of the ownership period. Estimates of resale value as a share of pre-tax vehicle price are based on data collected on popular diesel and electric van models, both light and heavy [42]. T&E analysis finds that electric vans may have slightly smaller depreciation costs as a share of list price. This is in line with recent research suggesting that EVs may retain value better than conventional vehicles, in part due to high demand for combined with low supply of EVs [43], as well as the increase in zero- or low-emission zones. However the differences in resale value as a share of list price by van class or powertrain that were found here fell within the margin of uncertainty and were too small to be used for TCO modelling. As a result, this analysis assumes that the depreciation rate only varies with list price and mileage[25]. For example, in the typical scenario of a five-year ownership period and an average annual distance of 37,700 km, depreciation costs are 81% of list price and the resale value after the 5 years is 19% of the original vehicle price. Since electric vans cost more to purchase than diesel vans for most of the time period considered in this analysis, their total depreciation costs start out higher than that of diesel vans.

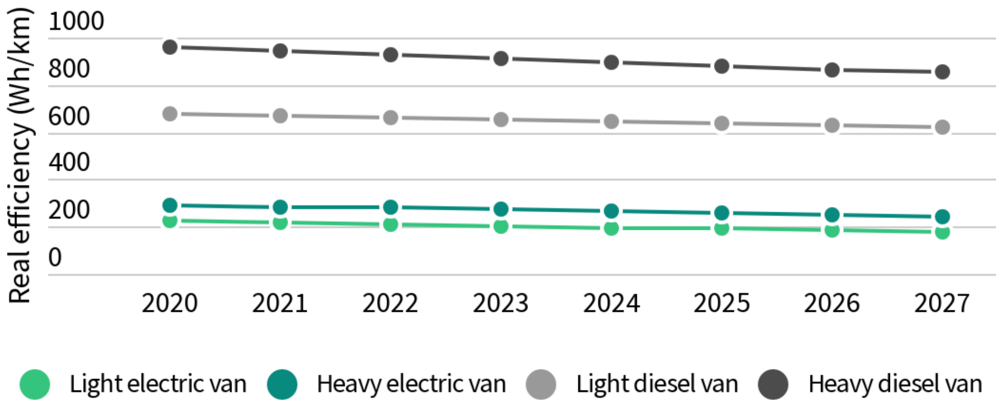
4.1.2. Energy costs

Energy costs depend on annual distance driven (see Section 3.2.), vehicle energy efficiency, and energy prices, which are analysed in turn.

[25] The depreciation rate as a share of list price is estimated to be b*m^x, with x being mileage, m= 0.9999943, and b=0.0000125.

4.1.2.1. Vehicle energy efficiency

The evolution of energy efficiency for light and heavy, diesel and electric vans is taken from BloombergNEF's study on EV price parity [29]. Energy efficiency for electric vans is expected to improve as production moves from diesel-focused to EV-dedicated platforms and as battery density increases. However, efficiency in 2020 has been calibrated to reflect what is observed on the market. For diesel vans, data on real observed fuel consumption has been collected for the top 25 most registered diesel van models [44]. For electric vans, data on real efficiency was collected for the top 15 electric vans registered in H1 2021 [39][44]. Where real efficiency data was unavailable for electric vans, it was estimated from WLTP or NEDC data—assuming a 10% uplift between WLTP and real-world efficiency, and 21% between NEDC and real-world efficiency[26]. Forecasted efficiencies, post-calibration, are shown in Figure 20. For diesel vehicles, calibration reduces energy consumption by 27% for light vans and 35% for heavy vans. For e-vans, calibration increases energy consumption by 21% for light vans and 41% for heavy vans. In 2020, light e-vans are 67% more efficient than their diesel equivalent, while heavy e-vans are 69% more efficient than their diesel counterparts.



Source: Current real efficiency data from Spritmonitor.de and EV database. Forecasted evolution based on BNEF (May 2021) Hitting the EV Inflection Point. ICE-BEV Price Parity Comparison. Table 3.

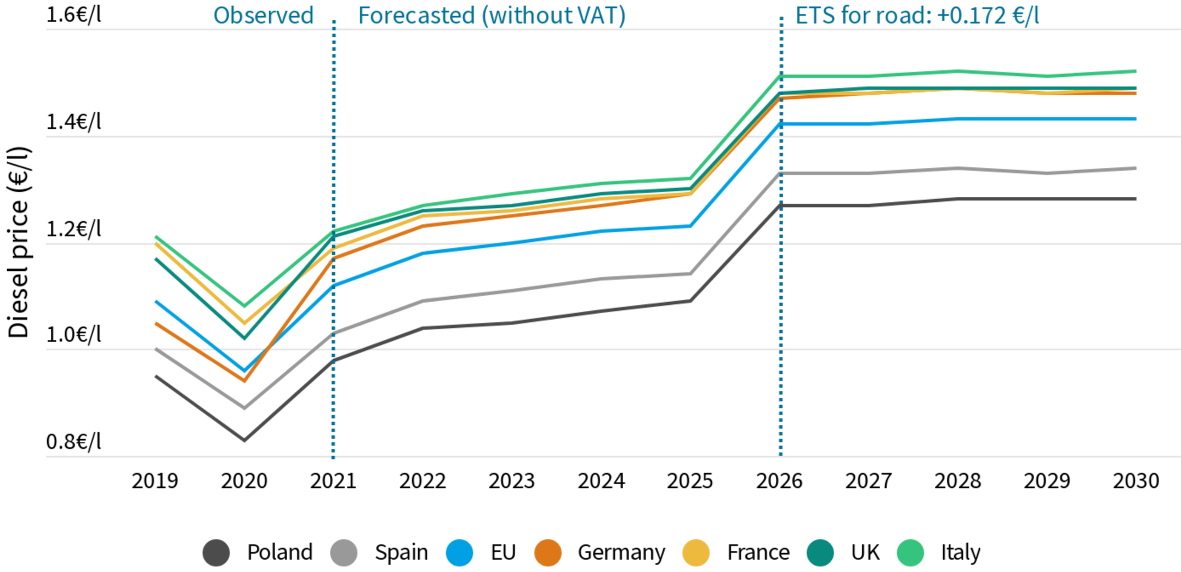
Figure 20: Forecasted efficiency for diesel and electric vehicles

4.1.2.1. Energy prices

Forecasted pre-tax diesel prices are from Stratas[27] [48] and are calibrated by country to match observed 2021 average prices (EU: [49], UK: [50]) (Figure 21). Additionally, taxes on diesel fuel (i.e. VAT and fuel excise duty) are assumed to remain at 2021 levels [33]. Commercial users are assumed to recover VAT on diesel fuel, as well as be exempt from other fuel duties where applicable. That is to say, Spanish van operators are exempt from the Special Tax on Fuel Sales to Private Consumers which increases the price of diesel by 0.38 €/l for private consumers. French transportation companies, interpreted here as B2B and

[26] Uplifts were estimated based on models where data on both real and laboratory efficiency was available. [44] [45]
[27] Although future diesel prices are difficult to predict, the evolution forecasted by Stratas is similar to other oil price projections [46] [47].

B2C users, can also partially recover diesel excise duty, between 14.21–17.45 €/100l. To be on the conservative end of fuel costs, this analysis assumes they recover the maximum amount, i.e. 17.45 €/100l. Lastly, road transport is assumed to be subject to an extension of the EU Emission Trading Scheme[28]. A constant carbon price of 65 €/tCO_2 is modelled both to private and commercial users from 2026 onwards, a figure consistent with existing TCO literature [51].



Source: Observed diesel price data from Weekly Oil Bulletin (France, Germany, Italy, Poland, Spain) and BEIS (UK). Forecasted evolution data from StratasDB. Increase due to ETS for road is based on a 65 €/tCO_2 carbon price applied from 2026.

Figure 21: Forecasted diesel prices

Electricity prices by country (including all taxes and levies) in 2021 are based on their level observed in H1 2021 [52][53] (see Table 3 below)[29] and are assumed to increase by 2% annually. When van users drive average daily distances above their vehicle's range, they are assumed to use opportunity charging during the day (e.g. during drivers' breaks) to cover the remaining distance. To account for operational unpredictability, it is assumed that 15 days a year van users have to cover their maximal daily distance without access to their own fast-charger during the day[30]. In such a case they have to use a third-party fast-charger to cover the difference between their van's range and their maximal daily distance, costing 0.53 €/km[31].

[28] While UK users would not be subject to the EU ETS, this analysis assumes the UK ETS would apply to them in an identical way.
[29] Based on estimates of electricity consumption when owning an electric vehicle, private users in all countries are assumed to consume between 5 and 15 MWh annually (Eurostat band DD), and all commercial user categories are assumed to consume between 20 and 500 MWh (Eurostat band IB). Data for the UK was sourced from [54]
[30] Note that users may travel their maximum daily distance more than 15 days a year. This is only supposed to represent exceptional cases where users cannot rely on slow charging or on their own fast charger, and therefore have no other choice but to use a third-party fast charger.
[31] Estimate based on T&E market analysis.

Country	Private users (Band DD) (€/kWh)	Commercial users (Band IB) (€/kWh)
EU	0.1990	0.1895
France	0.1788	0.1718
Germany	0.2924	0.2450
Italy	0.2097	0.2133
Poland	0.1420	0.1649
Spain	0.1869	0.1698
UK	0.2480	0.2090

Table 3: Electricity prices in H1 2021

4.1.3. Maintenance costs

Data on maintenance costs were obtained for popular van models from CommercialFleet [42]. Based on these data, maintenance costs average 0.0249 €/km for light diesel vans, 0.0339 €/km for heavy diesel vans, 0.0220 €/km for light electric vans, and 0.0275 €/km for heavy electric vans. When compared to diesel vans, this corresponds to a 12% reduction in maintenance costs for light electric vans and 19% reduction for heavy electric vans. These reductions in repair and maintenance costs for e-vans are smaller than in existing literature (cars: -23% [55], vans: -50% [56], trucks: -20% [51]). Finally, it is assumed that lease contracts include a maintenance package, i.e. lessors are responsible for repair and maintenance costs.

4.1.4. Other costs

4.1.4.1. Ownership taxation

Taxes on vehicle ownership (Table 4) are also assumed to remain constant at their current level [33]. These usually differ between light and heavy vans, and electric vans are often exempted. For lease contracts, ownership taxes are paid by lessors.

Country	Light diesel (€/year)	Heavy diesel (€/year)	Light electric (€/year)	Heavy electric (€/year)
Germany	90	132	0	0
Italy	41	55	0	0
Spain	73	149	18	37
UK	324	324	0	0

Source: ACEA (2021) Tax Guide.

Table 4: Ownership taxes

4.1.4.2. Insurance

Insurance premiums vary with mileage and pre-tax vehicle price. Due to data scarcity, and the fact that mileage is independent of powertrain, it is assumed here that insurance costs only depend on van price. Pre-tax insurance costs are set at 3% of pre-tax vehicle price annually [57]. Taxes on vehicle insurance are assumed to remain at 2021 levels [33]. For lease contracts, insurance costs are assumed to be covered by lessors.

4.1.4.2. Charging station

For electric vans, the upfront costs of installing an EV charging station are also included. For private users, costs add up to 1,000€, including both equipment and installation costs (600€ for a single-phase charger and 400€ for installation [58]). For commercial users, costs are estimated at 7,743€, including both equipment (2500€ for a 22-kW charger, [59]) and installation costs (1250€, [60]), as well as grid connection upgrades (3,993€)[32]. In addition, commercial users are assumed to spread costs related to EV charging stations over 15 years, or approximately three van ownership periods. Subsidies for EV charging stations (Table 5) are also included when vehicle purchase subsidies are considered in the TCO calculations.

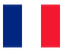
Country	Private users	Commercial users
	500€	600€
	900€	2,500€
	1,100€	3,000€
	–	1,100€
	£350 / 413€	£350 / 413€

Table 5: EV charging station subsidies

4.2. Results: e-vans already have lower TCO today

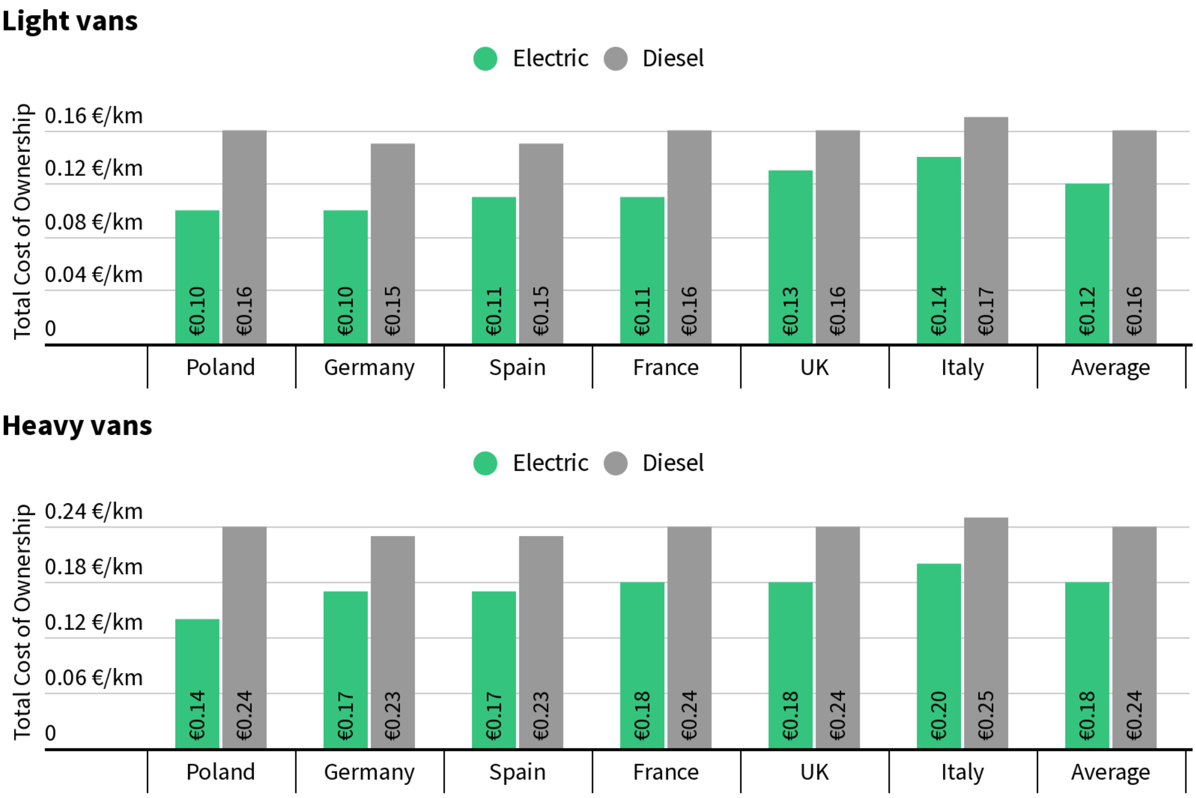
4.2.1. TCO parity including subsidies

When purchase subsidies are included in the analysis, electric vans are cheaper than diesel vans on a TCO basis for all users in all six countries considered here. On average, owning an electric van bought in 2022 costs 0.15 €/km, from 0.12 €/km for a light model to 0.18 €/km for a heavy model. In comparison, the total cost of owning a diesel van purchased this year is 0.20 €/km on average, ranging from 0.16 €/km for a

[32] In practice, grid connection upgrades are not necessary for slow-charging a few vehicles, and when needed, their costs depend on fleet size. As a result, determining the marginal cost of grid upgrade is difficult. This estimate is based on personal communication with a distribution network operator.

light model to 0.24 €/km for a heavy model. On average, e-vans are 25% cheaper than their diesel counterparts on a TCO basis (-26% for a light e-van, -25% for a heavy e-van).

Country-wise, e-vans are most advantageous in Poland, where owning them costs 37% less than owning diesel vans (-35% for a light e-van, -39% for a heavy e-van), and Germany, where they are 28% cheaper to own than diesel vans (-34% for a light e-van, -24% for a heavy e-van). Electric vans are 26% cheaper than diesel vans on a TCO basis in Spain (-27% for light e-vans, -25% for heavy e-vans), 25% cheaper in France (-27% for light e-vans, -24% for heavy e-vans), 22% cheaper in the UK (-19% for light models, -25% for heavy models), and 20% cheaper in Italy (-19% for light e-vans, -21% for heavy e-vans) (Figure 22).

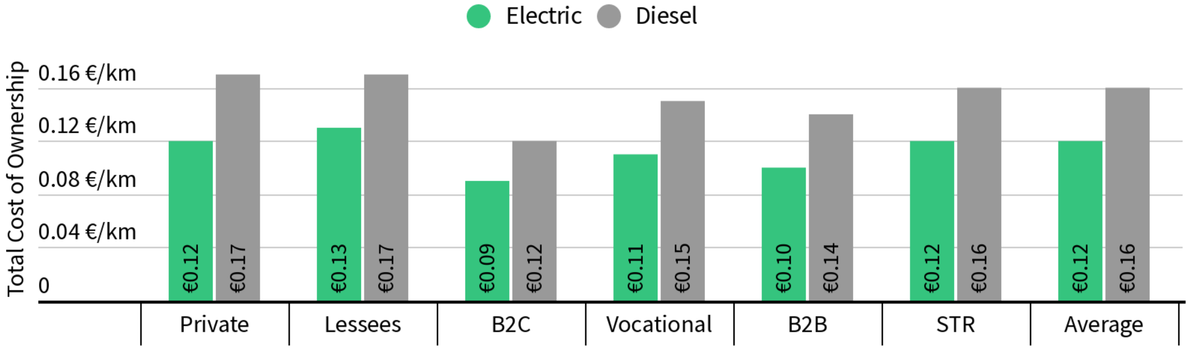


Note: In 2022, assuming 4 years ownership for short-term rental services and lessees, and 5 years for other user groups. Total Cost of Ownership for electric vans includes purchase subsidies.

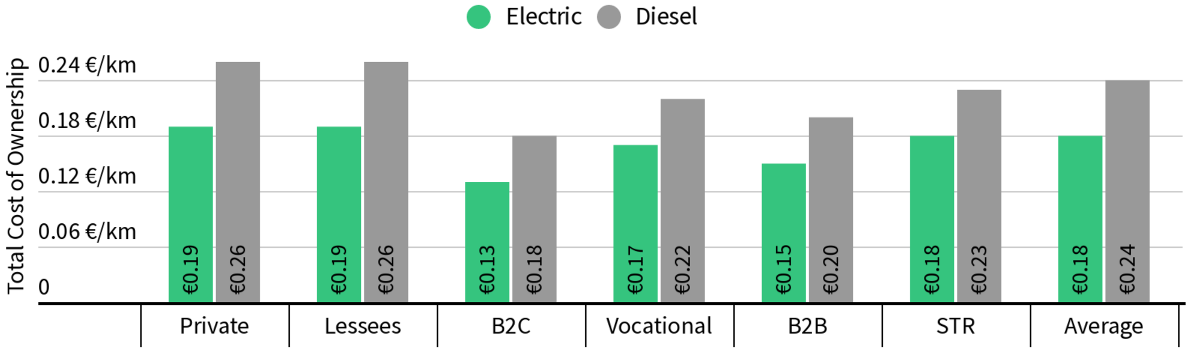
Figure 22: Average TCO of electric vans including subsidies and diesel vans in 2022 by country

Looking at TCO by user categories, electric vans are most advantageous for private users, for whom they are 28% cheaper than diesel on average (-30% for light e-vans, -27% for heavy e-vans), and for lessees, for whom they are 27% cheaper than diesel, both for light and heavy models. Electric vans are 26% cheaper to own and run for B2C transporters (-26% for light e-vans, -27% for heavy e-vans), 24% cheaper for vocational users (-25% for light models, -24% for heavy models) and B2B transporters (-24% for both weight classes), and 21% cheaper for short-term rental services (-21% for light e-vans, -22% for heavy e-vans) (Figure 23).

Light vans



Heavy vans



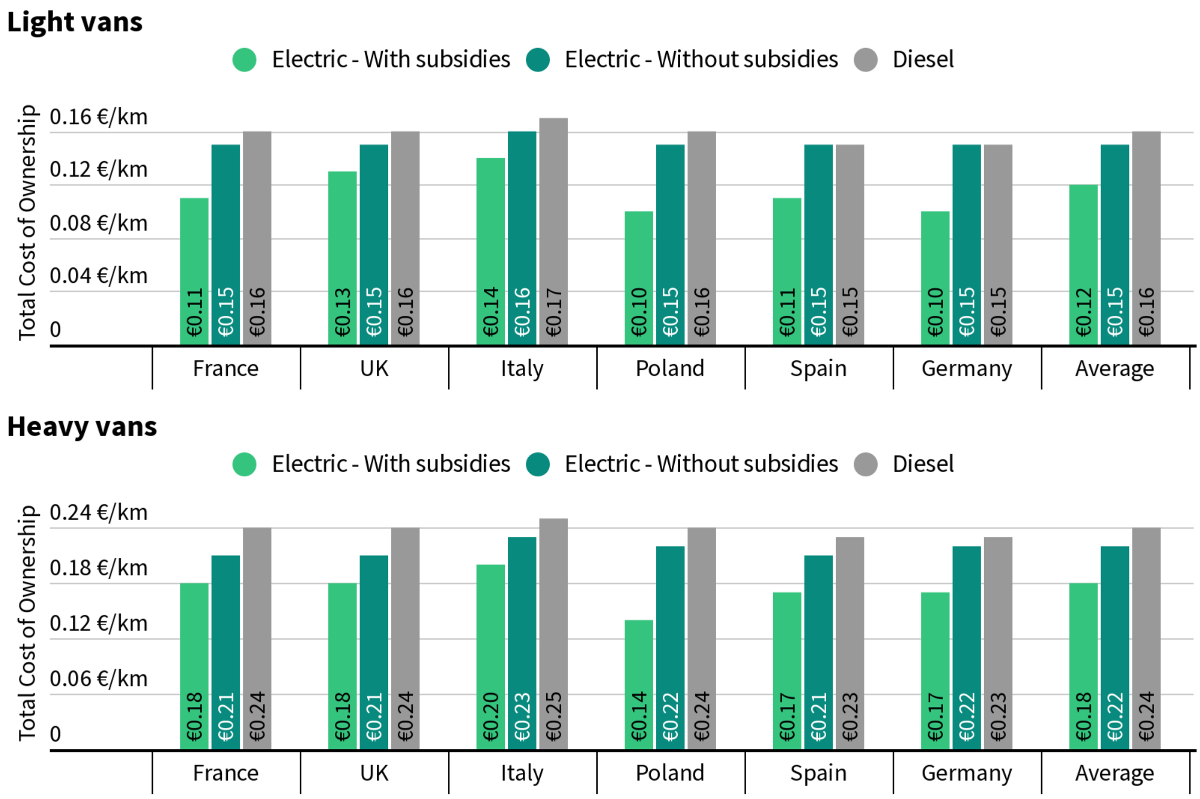
Note: In 2022, assuming 4 years ownership for short-term rental services and lessees, and 5 years for other user groups. Total Cost of Ownership for electric vans includes purchase subsidies.

Figure 23: Average TCO of electric vans including subsidies and diesel vans in 2022 by user group

4.2.2. TCO parity excluding subsidies

When purchase subsidies are excluded in the analysis, electric vans are either cheaper than or at parity with diesel vans on a TCO basis for all users in all six countries considered here. On average, without subsidies, owning an electric van bought in 2022 costs 0.18 €/km, from 0.15 €/km for a light model to 0.22 €/km for a heavy model. E-vans are 8% cheaper than their diesel counterparts on a TCO basis excluding subsidies (-6% for a light e-van, -9% for a heavy e-van).

Country-wise, when excluding subsidies, e-vans are most advantageous in France and the UK, where they cost 10% less to own than diesel vans (-8% for light vans, -11% for heavy vans). As seen earlier, British and French respondents were the most likely to cite lower TCO as a reason to go electric (see Section 3.3.2). Electric vans are 7% cheaper in Italy (-5% for light models, -9% for heavy models), 5% cheaper in Poland (-3% for light models, -7% for heavy models), and 4% cheaper in Spain and Germany (Germany: -1% for light e-vans, -5% for heavy e-vans; Spain: at parity with diesel for light e-vans[33], -7% for heavy e-vans) (Figure 24).

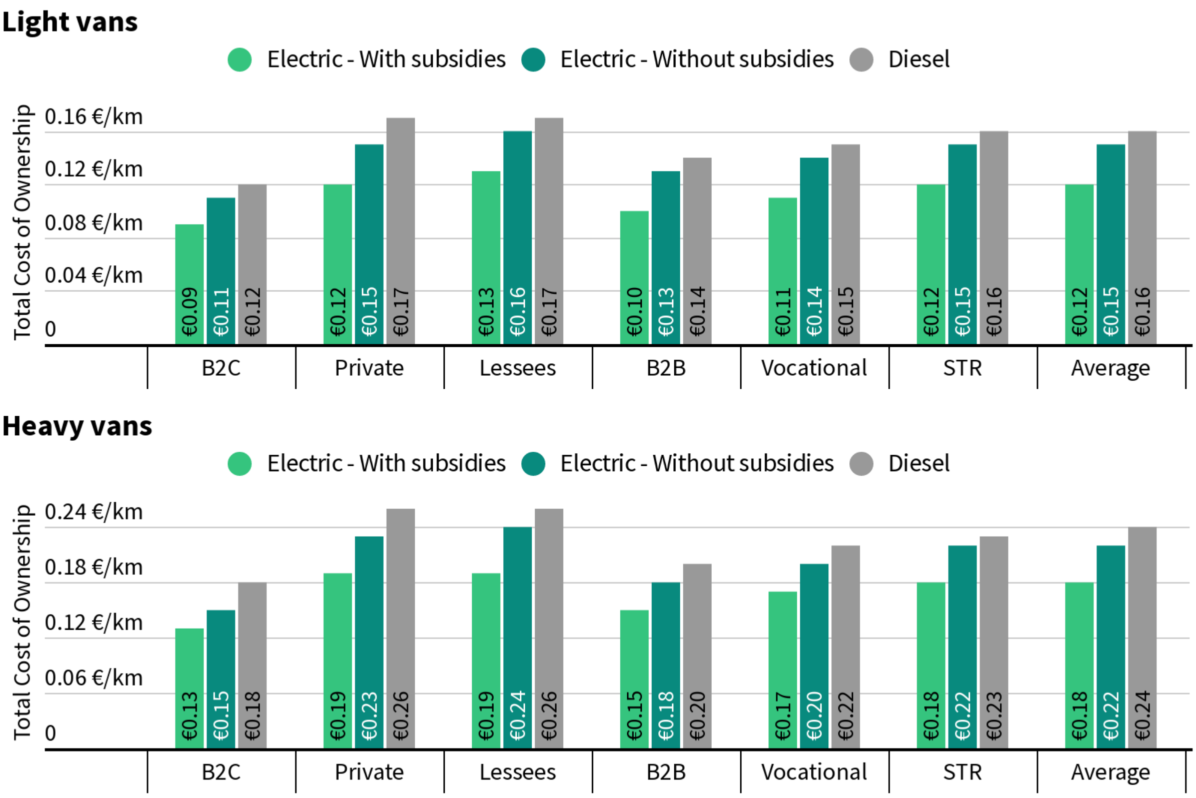


Source: Assuming 4 years ownership for short-term rental services and lessees, and 5 years for other user groups.

Figure 24: Average TCO of electric and diesel vans in 2022 by country

Looking at TCO without subsidies by user categories, electric vans are most advantageous for B2C transporters and private users, for whom they are 12% cheaper than diesel on average (B2C: -10% for light e-vans, -14% for heavy e-vans; private users: -11% for light e-vans, -13% for heavy e-vans). On average, e-vans are 8% cheaper than diesel vans for lessees (-5% for light models, -9% for heavy models), 7% cheaper for B2B transporters (-5% for light models, -9% for heavy models), 6% cheaper for vocational users (-4% for light e-vans, -8% for heavy e-vans), and 5% cheaper for short-term rental services (-2% for light e-vans, -6% for heavy e-vans) (Figure 25).

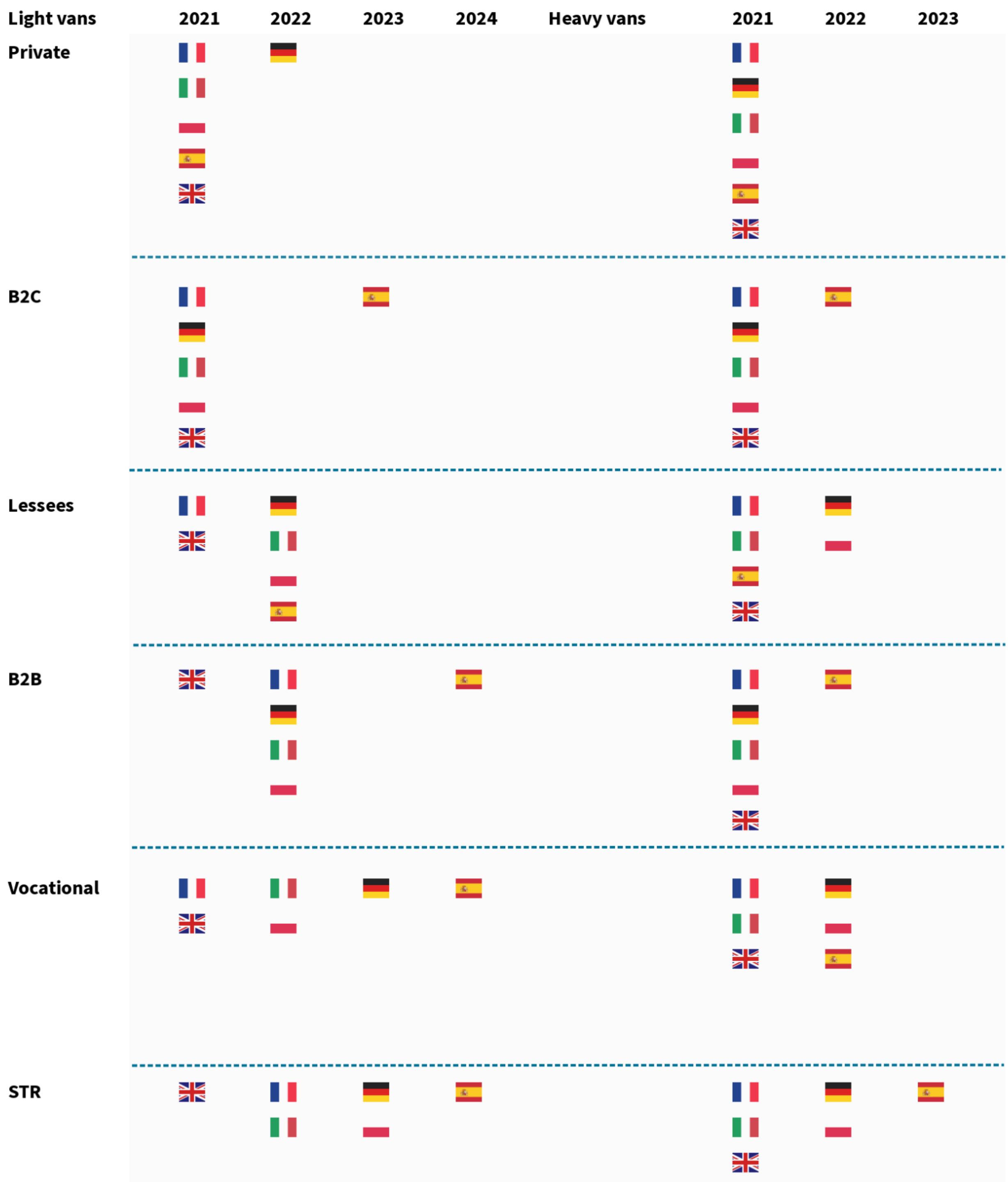
[33] In Spain, light electric vans bought in 2022 without subsidies are 0.1% more expensive than diesel vans on a pre-subsidy TCO basis. This is within the margin for uncertainty, so light electric and diesel vans are considered to cost the same on a pre-subsidy TCO basis in Spain in 2022.



Note: In 2022, assuming 4 years ownership for short-term rental services and lessees, and 5 years for other user groups.

Figure 25: Average TCO of electric and diesel vans in 2022 by user group

Electric vans are cheaper to own and run, even without subsidies, for most user groups in the six countries considered, with only a few exceptions (Figure 26). First, the only case where heavy electric vans are still more expensive on a pre-subsidy TCO basis is for short-term rental services in Spain. In this case, pre-subsidy TCO parity will be reached in 2023. Second, light electric vans are still costlier than diesel vans when excluding subsidies in a few cases. For Spanish B2C transporters, German vocational users, and short-term rental services in Poland and Germany, light e-vans will become cheaper to own in 2023. For Spanish B2B transporters, vocational users, and short-term rental services, light e-vans will become cheaper to own in 2024. The delay observed in Spain is due to commercial users being exempted from the Special Tax on Fuel Sales to Private Consumers.



Note: Assuming forecasted diesel prices, and the extension of EU ETS to road transport from 2026. Ownership period is four years for lessees and short-term rental services, and five years for other user categories.

Figure 26: First year electric vans are cheaper than diesel on a TCO basis, excluding subsidies, by country and user category

When subsidies are excluded, the TCO gap between heavy electric and diesel vans is consistently wider than between light electric and diesel vans (Figures 24 and 25), and heavy e-vans reach TCO parity sooner than light e-vans (Figure 26). Since both light and heavy vans are assumed to drive the same distance annually, this is not caused by differences in mileage. Instead, it is mainly due to savings related to vehicle price, energy consumption related to efficiency, and maintenance. First, while light e-vans start out 53% more expensive than light diesel vans, heavy e-vans are only 42% costlier than their diesel counterparts in 2020[34]. The gap to bridge between diesel and electric vehicles is thus smaller for heavy vans to begin with. Second, an electric powertrain reduces energy consumption by 69% for heavy vans, compared to only 67% for light vans. Third, maintenance costs are 19% lower for a heavy e-van compared to a heavy diesel van, but only 12% lower for a light e-van compared to a light diesel van.

For users who own diesel vans, fuel costs are the largest single TCO component[35] (Figure 27). Diesel costs account for 54% of TCO for B2C transporters (55% for light vans, 52% for heavy vans), 48% for B2B transporters (49% for light vans, 46% for heavy vans), 44% for vocational users (46% for light vans, 43% for heavy vans), 44% for private users (46% for light vans, 42% for heavy vans), 42% for short-term rental (44% for light vans, 41% for heavy vans), and 38% for lessees (40% for light vans, 37% for heavy vans).

For users who own electric vans, energy costs, including both electricity costs and costs related to installing an EV charger, are less important than for diesel van users. On average, they represent 41% of pre-subsidy TCO for B2C transporters (43% for light e-vans, 39% for heavy e-vans), 36% for B2B transporters (38% for light e-vans, 34% for heavy e-vans), 33% for vocational users (35% for light e-vans, 31% for heavy e-vans), 31% for short-term rental services (33% for light e-vans, 29% for heavy e-vans), 27% for private users (29% for light e-vans, 26% for heavy e-vans), and 25% for lessees (27% for light e-vans, 23% for heavy e-vans). This is due to higher net vehicle price, which represents 49% of pre-subsidy TCO for private users (48% for light e-vans, 51% for heavy e-vans), 47% for short-term rental services (45% for light e-vans, 49% for heavy e-vans), 41% for vocational users (39% for light e-vans, 43% for heavy e-vans), 38% for B2B transporters (36% for light e-vans, 40% for heavy e-vans), and 31% for B2C transporters (29% for light e-vans, 33% for heavy e-vans).

Insurance costs generally make up between 9% and 11% of TCO for diesel vans, and between 11% and 14% of pre-subsidy TCO for electric vans. Overall, the share of insurance costs in TCO is 2–4 percentage points for e-vans than for diesel vans. This is because insurance premiums are proportional to pre-tax vehicle price, and e-vans in 2022 are still more expensive than diesel vans before taxes and subsidies. Maintenance costs make up 11%–16% of TCO for diesel vans, and 10%–15% of pre-subsidy TCO for electric vans. The share of TCO represented by maintenance and repair costs is generally 0–2 percentage points lower for electric vans than for diesel vans, as maintenance costs per kilometre alre 12% lower for light e-vans and 19% lower for heavy e-vans.

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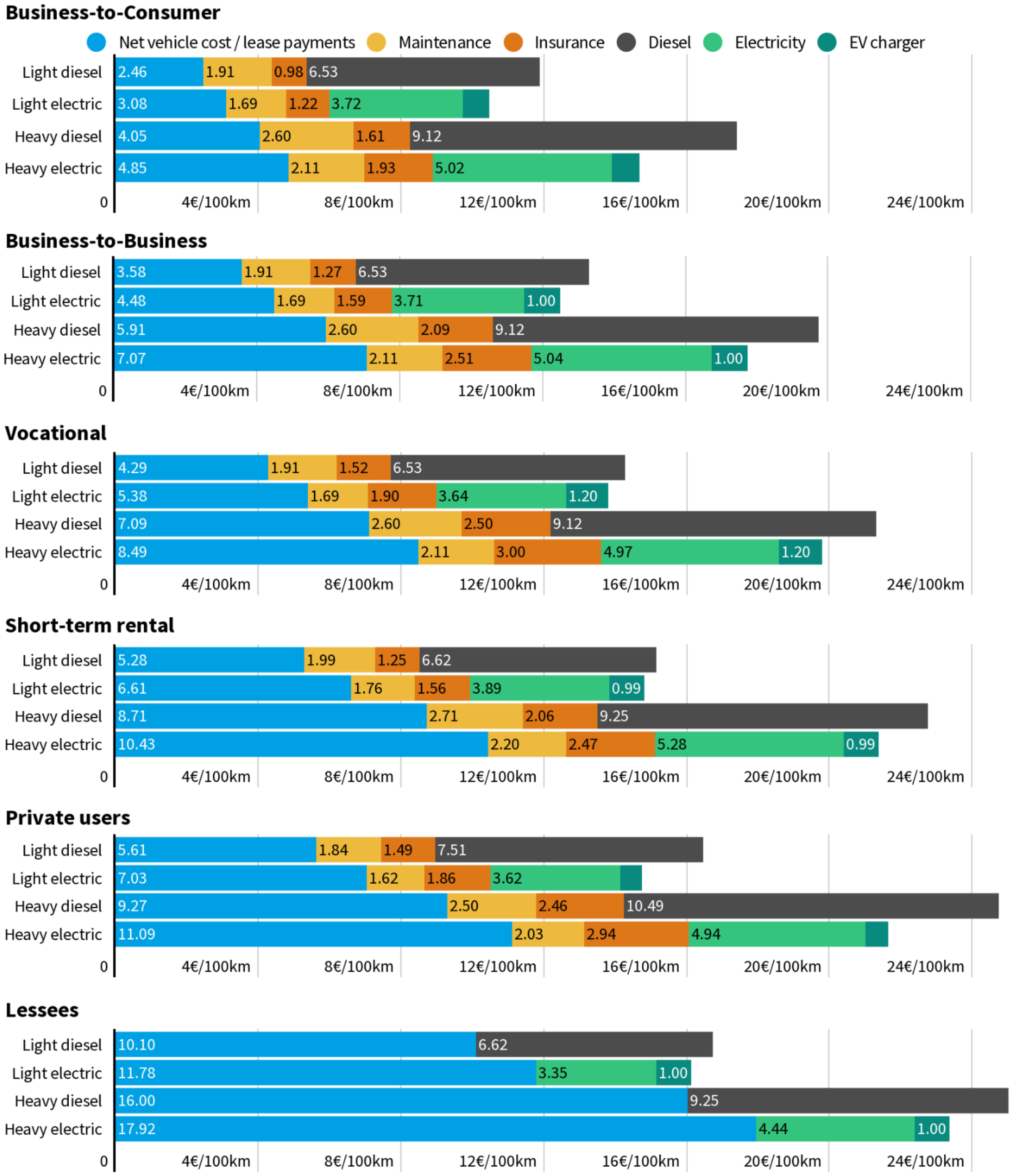
[34] Note that this also impacts insurance costs, as they are directly proportional to vehicle price.
[35] For lessees, lease payments cover maintenance and insurance costs, on top of vehicle price. As a result, they represent a larger share of the TCO than energy costs.



Notes: Total cost of ownership in the EU in 2022, assuming no purchase subsidies, forecasted diesel prices, and ETS2 from 2026 onwards. Ownership period is 4 years for lessees and short-term rental and 5 years for other users.

Figure 27: Breakdown of pre-subsidy TCO in the EU in 2022

4.3. Sensitivity analysis

This subsection looks at the impact of deviating from the central scenario on the year pre-subsidy TCO parity is achieved in the EU. First, three changes to diesel prices are considered in separate analyses:

1. constant diesel prices, set at 2021 level;
2. no extension of EU ETS to road transport;
3. no fuel excise duty rebates for some users in France and Spain.

Second, two sensitivity analyses regarding battery costs are conducted:

1. increasing battery capacity;
2. higher battery prices.

Lastly, the impact on pre-subsidy TCO of assuming vans are owned for only a single year is considered.

4.3.1. Diesel prices

As shown on Figure 28, for average EU van users, constant diesel prices, staying at their level observed in 2021, would delay pre-subsidy TCO parity to 2023 for light vans owned by vocational users and short-term rental services. For given countries, assuming constant diesel prices delays pre-subsidy TCO parity by one year in a few situations. For light vans, it is delayed to 2023 for lessees in Germany and Poland, short-term rental services in Italy, B2B transporters in Germany and Poland, and vocational users in Poland. It is also delayed to 2024 for Spanish B2C transporters and to 2025 for Spanish short-term rental services, vocational users, and B2B transporters. For heavy vans, pre-subsidy TCO parity is delayed to 2023 for Spanish B2B and vocational users.

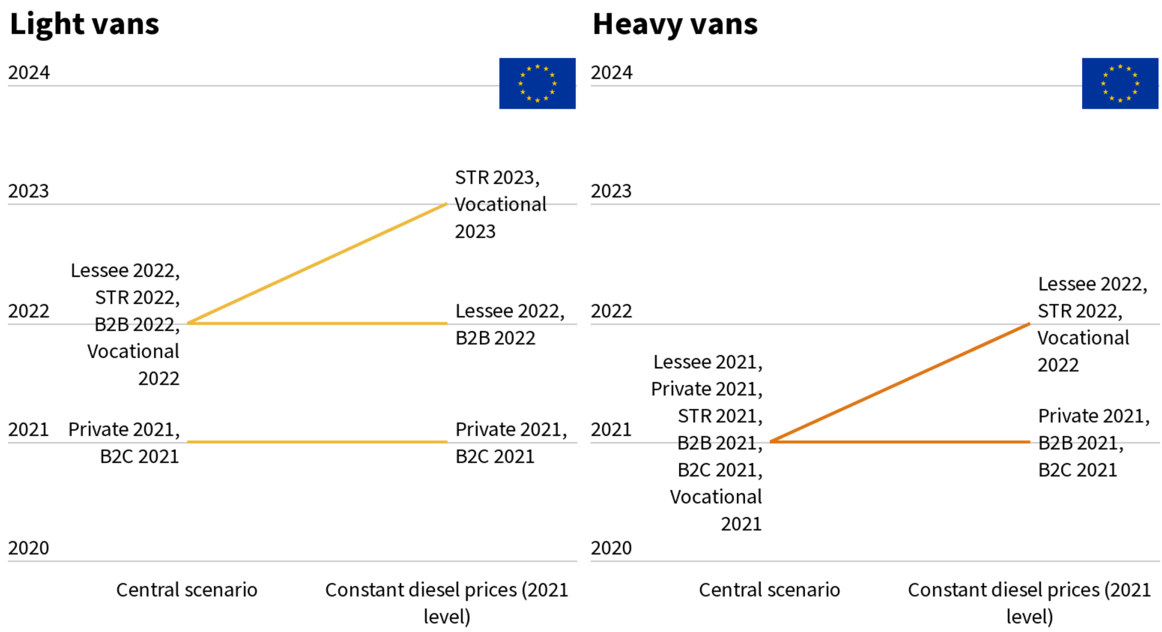


Figure 28: Impact of assuming constant diesel prices (at 2021 levels) on pre-subsidy TCO parity year

Assuming the EU ETS is not extended to road transport does not delay pre-subsidy TCO parity at the EU level. It does delay it by one year in a few cases: to 2023 for light e-vans owned by Polish vocational users, to 2024 for light vans owned by Spanish B2C transporters, and to 2023 for heavy e-vans operated by Spanish vocational users.

As mentioned above, Spain levies a Special Tax on Fuel sales to Private Consumers, from which commercial users are exempt. Extending the Special Tax to commercial van operators advances pre-subsidy TCO parity by several years, bringing it in line with other countries (Figure 29).

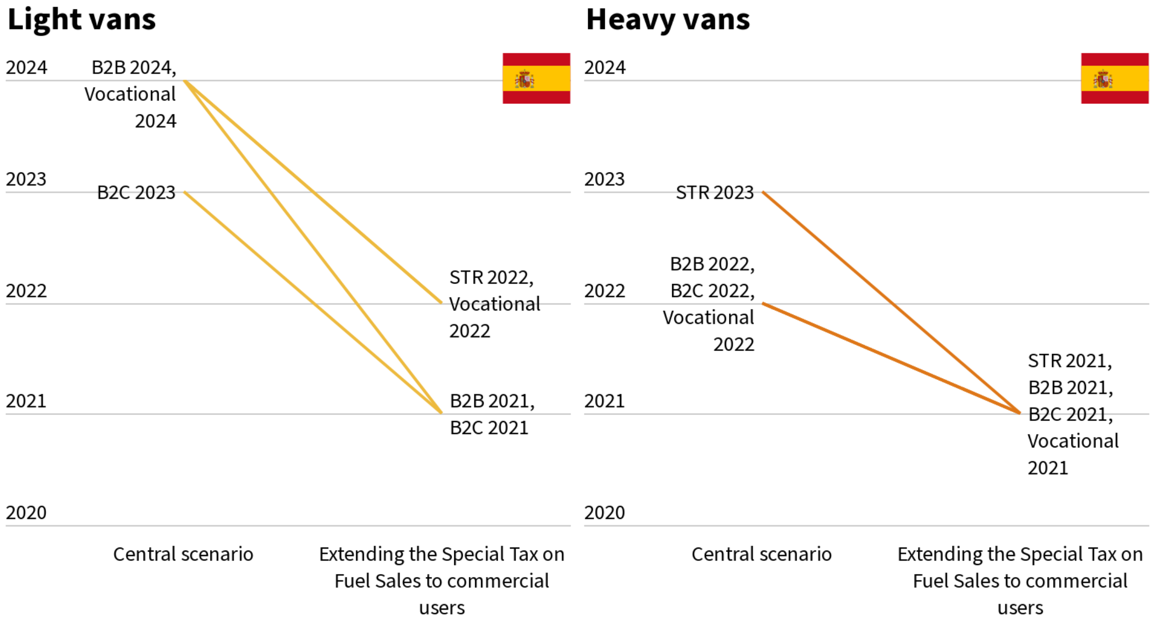


Figure 29: Impact of assuming the “Special Tax on fuel sales to private users” is extended to commercial users on pre-subsidy TCO parity year

B2B and B2C transporters in France can also benefit from a partial recovery of excise duty. Removing this rebate brings forward TCO parity from 2022 to 2021 for light e-vans owned by such users.

4.3.2. Battery costs

Increasing battery capacity so that electric vans have a range of 425 km, as described in Section 4.1.1.1 (Figure 16), delays pre-subsidy TCO parity to 2023 for light vans operated by average EU lessees and short-term rental services (Figure 30).

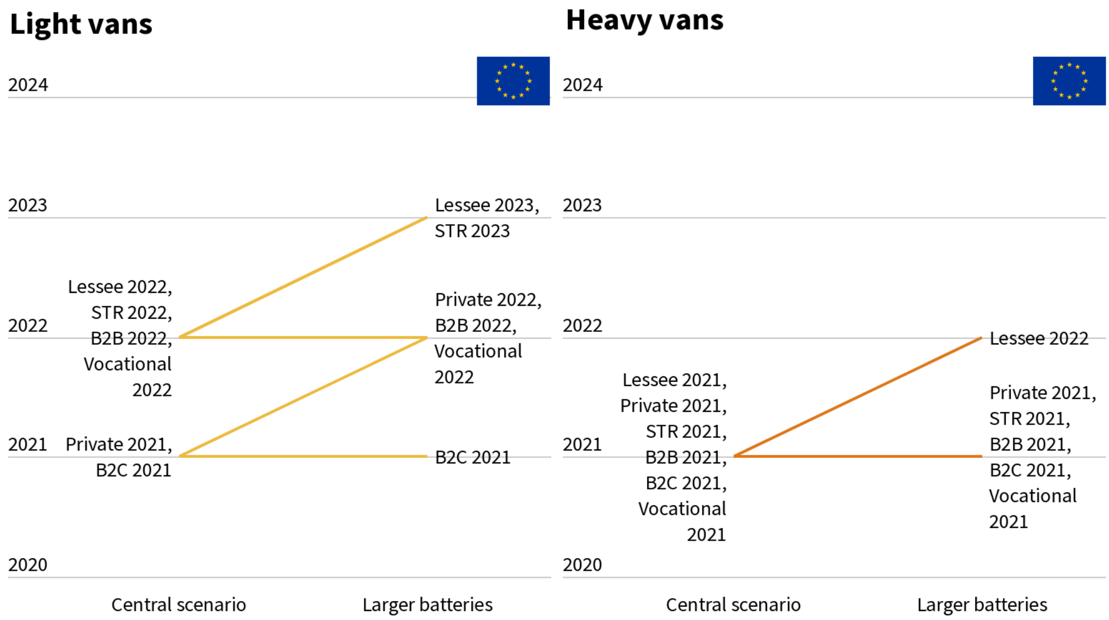


Figure 30: Impact of assuming larger batteries on pre-subsidy TCO parity year

Assuming higher battery prices—+25% in $/kWh compared to the central scenario, as described in Section 4.1.1.1 (Figure 15)—does not delay pre-subsidy TCO parity at the EU level or in given countries. While higher battery prices impact pre-tax vehicle price, this impact is limited: an increase of less than 1% through 2027.

4.3.3. One-year ownership period

For users who own their vans for only a single year—rather than four in the case of short- and long-term rental services, and five in the case of private, vocational, B2B, and B2C users—pre-subsidy TCO parity is delayed by several years, as can be seen on Figure 31. At the EU level, private users who own light vans for only one year are the last group to reach pre-subsidy TCO parity, in 2025. At the country level, all user categories reach pre-subsidy TCO parity in 2024 at the latest for commercial users, and in 2025 at the latest for private users. This means that by 2025, electric vans will be cheaper than diesel vans on a pre-subsidy TCO basis for all user groups, regardless of ownership period.

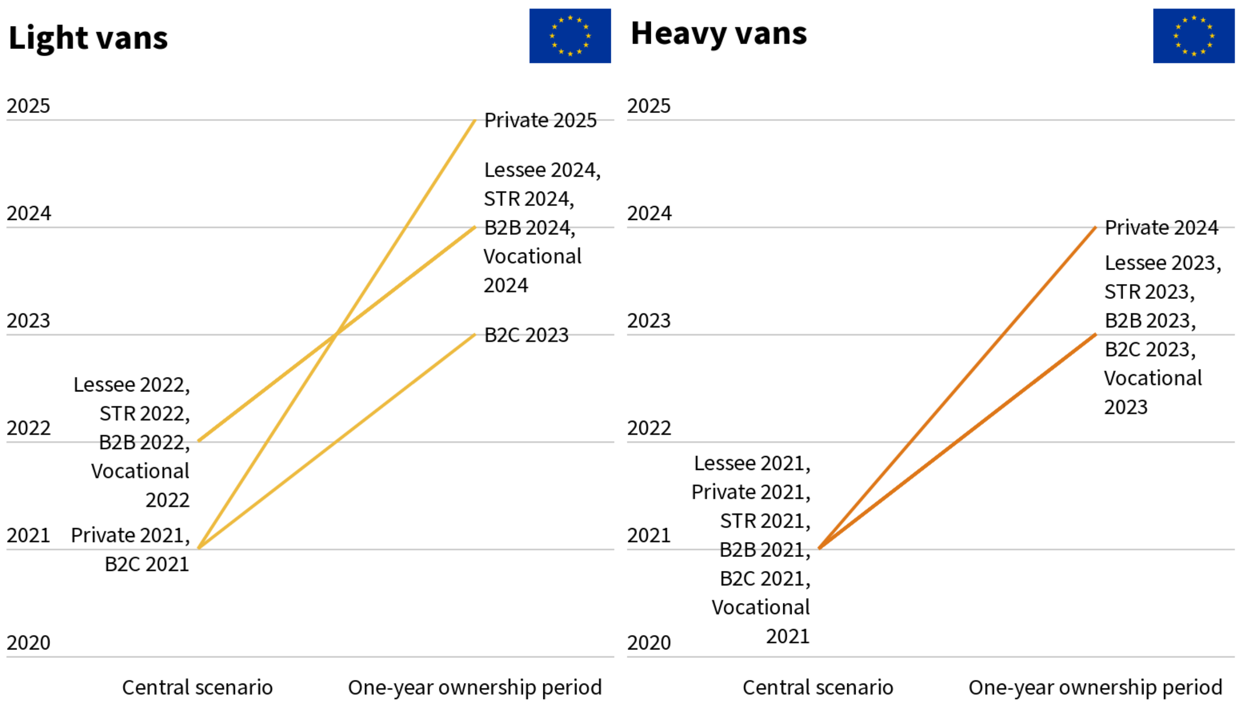


Figure 31: Impact of an ownership period of one year on pre-subsidy TCO parity year

5. Discussion

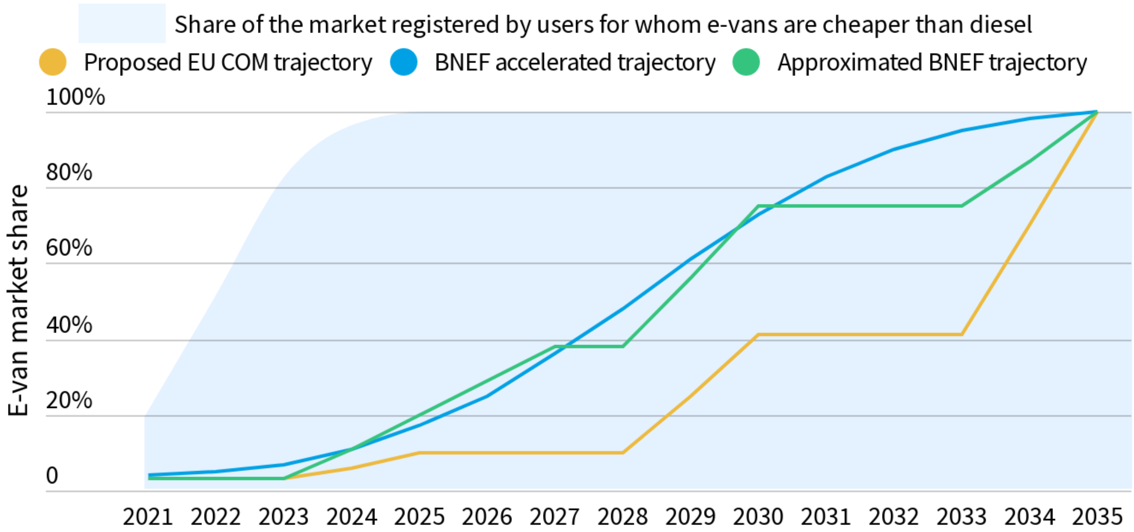
As seen in Section 3, van users who buy electric vans do so primarily for environmental and economic reasons, while users who do not yet own a van or intend on buying this year mainly cite operational challenges for their decision. Section 4 finds that e-vans are indeed already the cheapest option on a TCO basis for all user groups when purchase subsidies for electric vehicles and chargers are taken into account. This is observed for all countries analysed here, representing 76% of the EU+UK van market. Thanks to an increasing number of electric vans available on the market, we can conclude that the market and technology is ready today for a wide and rapid transition to electric vans.

By 2025, electric vans will also be cheaper to own for all user groups without subsidies even when owned for a single year. In other words, by the time the next EU CO_2 emissions target enters into force, electric vans will already be the cheapest option for all. The only major obstacle to pre-subsidy TCO parity found here is posed by tax rebates on diesel fuel for commercial users (e.g. in Spain). By subsidising fossil fuels, countries can prolong the economic attractiveness of polluting vans, and delay the transition to cleaner, cheaper, and more efficient powertrains.

Despite being environmentally and economically advantageous, e-vans are not yet on EU roads in any significant way. In the short-term, the main barriers to reaping climate and economic benefits are operational on the one hand (e.g. lack of range or charging stations), and a lack of supply on the other. Setting a clear decarbonisation path ahead would solve such issues. Mass production would bring economies of scale and lower e-van prices, which would further enhance the economic attractiveness of e-vans. Already, transport operators are calling for more supply of electric vans [61, 62]. Because of the low supply and availability of electric vans, Europeans are missing out on economic, energy security, climate and health benefits which are well within reach.

In its 2021 EV price parity study, BNEF modelled an optimal techno-economic trajectory for e-van uptake [21], which is far more ambitious than what the EU targets proposed by the Commission would require (Figure 32). Based on the Commission's proposal, zero-emission vans could remain below 10% of new sales through the 2020s. There would only be 0.9 million electric vans on EU roads in 2027, and 2 million in 2030. Following BNEF's optimal trajectory, there would be 1.8 million EU e-vans in 2027, and 4.5 million in 2030. In a scenario where all van users switch to electric vans as soon as they become cheaper than diesel on a TCO basis, an even more rapid e-van uptake would be observed, as electric vans become cheaper to own and run for all users as early as 2025. In this case, there would be 8.8 million electric vans in the EU in 2027, and 13.5 million in 2030.

Electric van market share in the EU



Number of battery-electric vans on EU roads

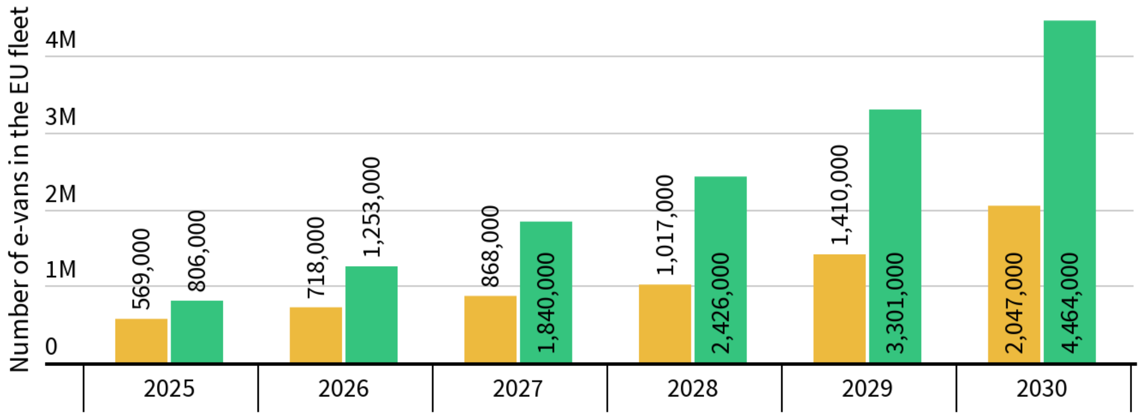


Figure 32: E-van uptake in the Commission's proposal and in optimal trajectories

Given the currently proposed EU targets fall short of the cost optimal electric van uptake trajectory, EU van users end up paying more compared to a scenario with higher electric van adoption. Because of this suboptimal electric van uptake, EU van users could miss out on 13.1 billion euros in TCO savings between 2025–2030 if the EC proposal were adopted instead of targets approximating BNEF's accelerated trajectory.

Adopting BNEF's optimal trajectory instead of the Commission's proposal would further reduce emissions from EU vans by 1.4 $MtCO_2$ in 2025, by 5.6 $MtCO_2$ in 2027—i.e. more than the emissions from all Spanish vans in 2019—and by 12.8 $MtCO_2$ in 2030—equivalent to the emissions of all German and Slovakian vans in 2019 [63]. Cumulatively, 10 $MtCO_2$ would be saved between 2025 and 2027, and 42 $MtCO_2$ between 2025 and 2030.

Such a trajectory would also reduce EU oil dependency. In 2019, EU vans consumed 210 million barrels of oil. In comparison with the Commission's proposed targets, BNEF's trajectory would save an additional 4 million barrels in 2025, 14 million barrels in 2027, and 31 million barrels in 2030. Cumulatively, 101 million barrels of diesel would be saved between 2025 and 2030. In percentage terms, EU vans would consume 2% less oil in 2025, 7% less in 2027, and 17% less in 2030, when compared with the Commission's proposal.

For cars, the 2020/21 CO_2 standards have kickstarted the transition to electric mobility and made electric cars widely available. Vans have missed that opportunity, but they can catch up. The following Section presents T&E recommendations to finally set vans on a zero-emission course.

6. Policy recommendations

Battery-electric vans today are the best environmental and economic choice for European van users. But ambitious van CO_2 standards are necessary to boost supply, transition to mass production, and bring further down e-van prices while improving their range.

Unless the Commission's proposal is enhanced, zero-emission vans could remain below 10% of new sales as late as 2029. This proposal falls short of what's needed to reduce CO2 emissions in the next decade as well as the techno-economic potential for electric van uptake (17% in 2025, 36% in 2027 and 73% in 2030, according to BloombergNEF). T&E therefore urges policymakers to:

- Raise the ambition level of the 2025 target to -25% (up from -15%) to ensure early action,
- Set a new 2027 target of -45% to deliver momentum in the second half of the decade,
- Increase the 2030 target to -80% (compared to the -50% target proposed by the Commission for 2030), and
- Safeguard the 2035 100% reduction target

Such targets would lead to an e-van uptake approximating BNEF's optimal techno-economic trajectory, and would yield the cost, emissions, and oil savings described in Section 5, and summarised in Figure 33.

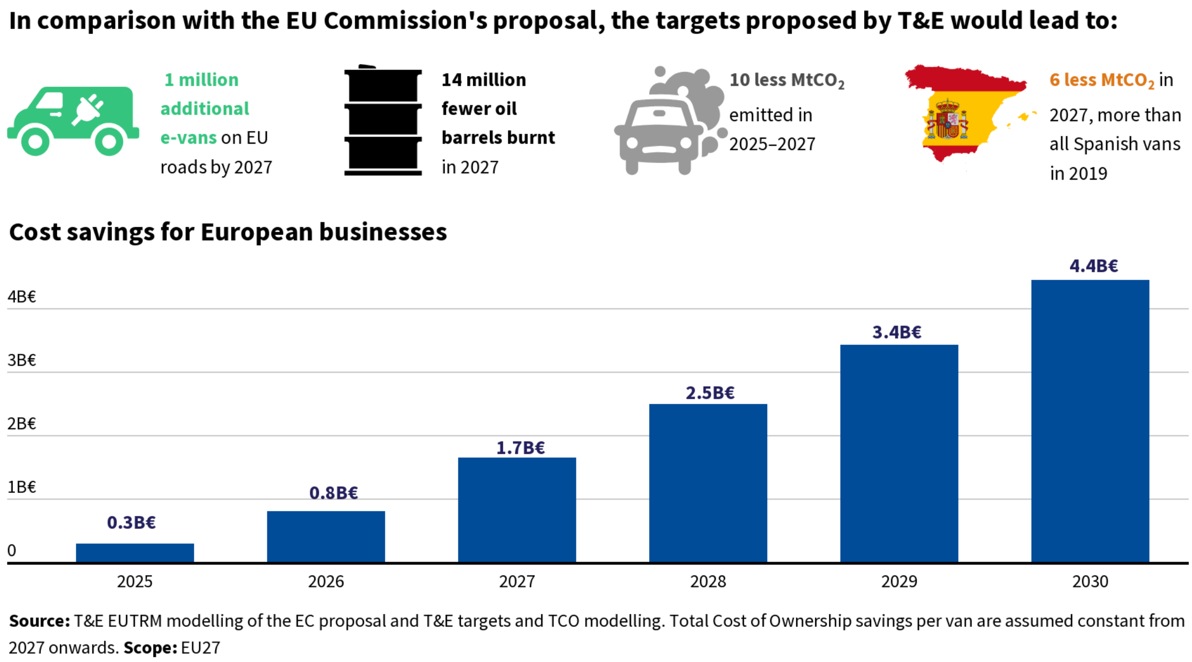


Figure 33: Cost, emissions, and oil savings from adopting T&E's recommended targets instead of the Commission's proposed targets

With regard to regulatory modalities, legislators must ensure the regulation does not promote plug-in hybrid vans. For cars, plug-in hybrids emit on average two to four times more on the road than in official laboratory tests. The removal of the benchmark for zero- and low-emission vehicles from 2030 is welcome, but important reforms are needed in the 2020s: counting only zero-emission vans, raising the benchmark's level to 20%–25% from 2025, and removing the benchmark as soon as zero-emission vans make up 25% of new sales. These are the most effective steps decision makers can take to boost zero-emission vans, while avoiding incentivising plug-in hybrids.

Moreover, the mass adjustment factor effectively incentivises heavier vans, as CO_2 targets are relaxed for vans which weigh more. While the Commission proposes some changes on this issue, it does not effectively tackle this perverse incentive. To address this, T&E proposes removing the mass adjustment factor, and instead splitting vans into two categories—above and below 1.76 tonnes—and applying the emissions reduction standards separately within each of these two categories. This would encourage lightweighting and stop ever-heavier vans from continuing to weaken the targets.

Finally, the extra weight allowance for zero-emission vans starting from 2025 is a welcome measure to facilitate their adoption. However, this measure should be phased out in 2030–2035 so as to avoid creating market distortion in favour of very heavy vans which outcompete light trucks in the 2030s.

7. Annex

7.1 Characteristics of top 15 e-van models registered in H1 2021

	Model	Category	Registrations in H1 2021	Real range (km)	Real efficiency (kWh/100km)	Pre-tax price (€)
1	Renault Kangoo	Light	5606	168	19.2	28444
2	Nissan eNV200	Light	2899	154	20.0	33138
3	Opel Vivaro	Light	2389	255	29.0	33720
4	StreetScooter Work	Light	2000	93	21.4	42750
5	Toyota Proace	Light	1808	255	24.4	38083
6	Peugeot Expert	Light	1781	255	24.4	39539
7	Citroen Jumpy	Light	1506	255	24.4	39988
8	StreetScooter Work L	Heavy	882	154	25.9	54086
9	Mercedes Vito	Heavy	823	134	27.3	49160
10	Maxus e-Deliver 3	Light	798	219	24.0	34843
11	Mercedes Sprinter	Heavy	784	129	38.4	59208
12	VW Transporter	Heavy	549	126	29.7	44900
13	Goupil G4	Light	457	70	20.1	27778
14	MAN TGE	Heavy	442	125	27.0	54690
15	VW Crafter	Heavy	389	105	26.0	54880

Source: Dataforce (2021) LCV registrations in H1 2021. T&E market monitoring.

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