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Charging infrastructure needs for battery electric trucks in the European Union by 2030

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EXECUTIVE SUMMARY

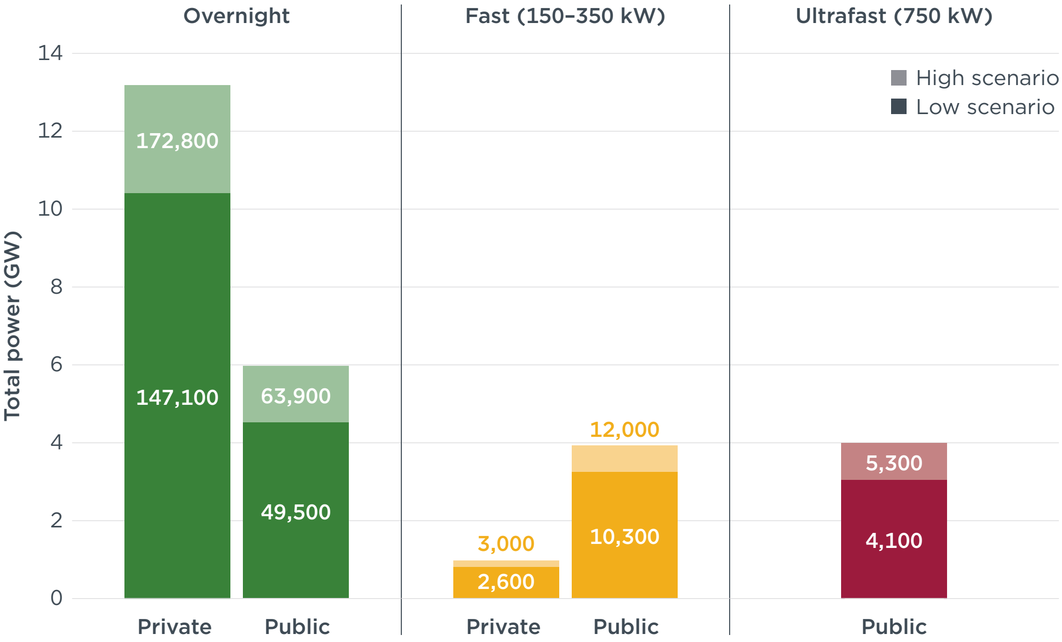
Sales of battery electric trucks (BETs) in the European Union (EU) have steadily increased over the past few years. Uptake has increased across all truck segments and trucking applications, especially among light- and medium-duty trucks below 12 tonnes. This trend is expected to accelerate over the next 5 years as truck manufacturers need to ramp up BET sales to comply with the EU carbon dioxide (CO_2) reduction targets for heavy-duty vehicles (HDVs). This growing BET fleet will require an extensive network of truck-dedicated charging infrastructure to cover the trucks' energy needs. In 2023, the EU adopted the Alternative Fuels Infrastructure Regulation (AFIR), which aims to ensure minimum infrastructure support for alternative fuel vehicles, including BETs, by establishing mandatory targets for public electric vehicle charger deployment across the EU.

This paper quantifies BET charging needs in the 27 EU Member States (EU-27) in 2030. We use a modeling approach to estimate the stock of BETs in EU-27; we then estimate the charging demands of this fleet, considering the energy consumption, driving patterns, and charging behavior of most truck classes and applications in the EU. This analysis supports the following conclusions:

- **The expected BET fleet in the EU-27 by 2030 will require between 22 GW and 28 GW of installed charging power capacity.** This projected capacity is split almost equally between public and private chargers. This translates to 150,000–175,000 private chargers and 60,000–80,000 public chargers. The top 5 Member States in terms of BET charging demands—Germany, Poland, France, Spain, and Italy—are expected to account for more than 70% of the total charging needs in the EU-27, given their high shares of the overall BET stock and traffic activity in the region (Figure ES1).
- **Overnight charging is expected to be the primary charging mode, while between 4,000 and 5,300 megawatt (MW) chargers are projected to be needed by 2030.** MW chargers comprise almost 15% of the projected installed charging power needs but only 2% of the total number of chargers. Lower-power chargers, such as 350 kW chargers, can cover more than half of the public fast charging needs for long-haul trucks. In addition, if long-haul trucks are equipped with larger batteries in the future (720 kWh, relative to 600 kWh today), the need for MW chargers can be reduced by 40%, significantly reducing these trucks' reliance on public ultrafast charging (Figure ES1).

Figure ES1

Total charging power needs in 2030 in Low and High BET uptake scenarios



Note: Data labels indicate the total number of chargers in each scenario.

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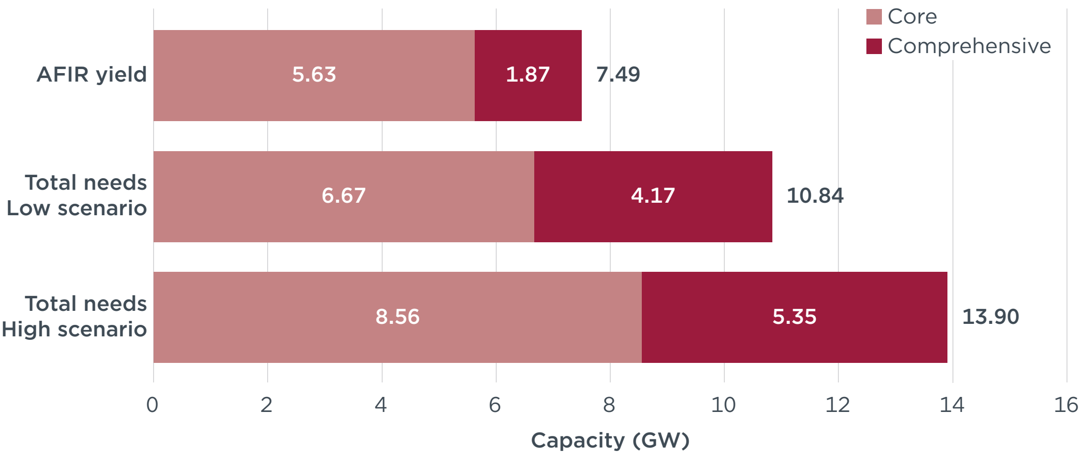
» **The AFIR is expected to cover between 50% and 70% of public charging needs in the EU-27 by 2030**. Across the core road network, AFIR targets are expected to cover between 65% and 85% of total charging needs, while across the comprehensive road network, coverage drops to 35%–45% (Figure ES2). At the Member State level, AFIR targets only cover 30% to 50% of the expected public charging needs in half of Member States, including the Netherlands and Belgium. This is because AFIR distance-based targets do not precisely reflect actual traffic activity, which results in a large gap between the AFIR targets and the actual charging needs for countries that host a high share of trucking activity but a low share of the road network. The opposite is true for countries like Romania, where the AFIR target is twice as high as the expected charging needs.

Figure ES2

Total installed charger power covered under the AFIR versus expected public charging needs under Low and High BET uptake scenarios



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While AFIR targets may not cover the entirety of projected public charging needs in 2030, the regulation, if fully implemented, will ensure basic coverage and help facilitate the deployment of additional charging infrastructure through market forces. However, the scale of the required charging infrastructure will pose challenges for local grids, especially at high-power charging sites across the Trans-European Transport Network (TEN-T). In addition to grid congestion, lengthy permitting procedures and investment hurdles may delay the timely deployment of the infrastructure. Many of those challenges could be addressed in the review of the AFIR and other complementary policies on grid planning, permitting, and investment.

This analysis supports the following policy options and considerations:

- **Promote initiatives that focus on the deployment of HDV-specific charging infrastructure across key transport corridors in the EU.** Such initiatives notably include the Clean Transport Corridor Initiative. This will accelerate charging deployment in key corridors of the TEN-T network and enable the application of best practices to fast-track and streamline the infrastructure build-out across other corridors.
- **Accelerate and streamline the charging infrastructure deployment and grid permitting processes.** Categorizing HDV charging stations and their connection to the grid as projects of overriding public interest can help accelerate permitting procedures. In addition, streamlining the process across the EU can reduce the burden on charge point operators and support more efficient planning.
- **Empower grid operators to make anticipatory investments.** The existing demand-driven, reactive approach to grid planning can significantly delay grid upgrades. Proactive grid planning is essential to ensure that charging infrastructure is deployed in a timely manner. National energy regulators can support such investments through proper regulatory frameworks.
- **Promote transparency in grid hosting capacities and streamline the type and format of reported data.** Such maps can help charge point operators and depot owners carry out self-assessments of grid connection feasibility in locations of interest, enabling faster investment decisions, shortening the grid connection time, and reducing the burden on local grid operators.

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INTRODUCTION

Decarbonizing the European Union (EU) road freight sector will require a significant share of zero-emission trucks (ZETs)[1] covering a broad spectrum of trucking applications, from last-mile delivery to long-haul cross-border shipping. In 2024, over 14,000 ZETs were registered in the EU. Of these, 3,400 were heavy-duty trucks with a gross vehicle weight (GVW) above 12 tonnes, representing 1.2% of heavy truck sales. Light- and medium-duty trucks below 12 tonnes recorded a 10% ZET market share in 2024, a significant increase from the 6% share in 2023 (Mulholland & Ragon, 2025).

This increase in ZET sales has largely been driven by EU heavy-duty vehicle (HDV) carbon dioxide (CO_2) standards (Regulation (EU) 2024/1610, 2024). After the most recent review of the standards in May 2024, manufacturers must reduce their fleet-wide CO_2 emissions by 45% by 2030 relative to 2019. Manufacturers may pursue two main pathways to comply with this target: improving the efficiency of their conventional diesel and natural gas vehicles, or increasing their sales shares of ZETs. Manufacturers are expected to pursue a strategy combining both options. The stringency of the targets is well beyond the CO_2 reduction potential of diesel engine technology (Basma & Rodríguez, 2023), implying that manufacturers can only comply by ramping up their sales of ZETs.

Battery electric trucks (BETs) are expected to dominate the sales of ZETs due to their technological maturity and superior economic performance (Basma & Rodríguez, 2023). The expected BET fleet will require an extensive public charging infrastructure network to cover its energy needs. To this end, the EU issued the Alternative Fuels Infrastructure Regulation (AFIR; Regulation (EU) 2023/1804, 2023), which aims to ensure minimum public infrastructure support for alternative fuel vehicles by setting targets for public EV charger deployment throughout the EU.[2] The AFIR is expected to be reviewed before the end of 2026, providing an opportunity to assess whether such targets are sufficient to accommodate the expected BET fleet by 2030.

This study estimates the amount and type of charging infrastructure needed to meet BET demand in the EU by 2030. The analysis mainly relies on the ICCT's Roadmap model (ICCT, n.d.) and HDV CHARGE models to quantify vehicle stocks, energy needs, and charging infrastructure requirements, as explained in the methodology section. The results are then compared to the AFIR minimum targets.

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[1] ZETs, as defined by Regulation (EU) 2024/1610, include battery electric, hydrogen fuel-cell, and hydrogen combustion trucks that emit less than 3 g CO_2/tonne-km.

[2] Regulation (EU) 2023/1804 defines alternative fuels as "fuels or power sources which serve, at least partly, as a substitute for fossil oil sources in the energy used for transport and which have the potential to contribute to its decarbonisation and enhance the environmental performance of the transport sector."

POLICY BACKGROUND

The AFIR was first proposed by the European Commission in 2021 as part of the "Fit for 55" package of climate-related legislative measures (European Commission, 2021b) and was ultimately passed in 2023 (Regulation (EU) 2023/1804, 2023). The regulation sets binding targets for EU Member States to deploy alternative fuel infrastructure, mainly charging and hydrogen refueling stations, for several transport sectors, including road transport. Concerning HDVs, the regulation includes three types of targets regarding infrastructure deployment:

- **Distance-based** targets along the Trans-European Transport Network (TEN-T);
- Targets at **urban nodes**, such as major ports, rails, and road terminals; and
- Targets at **safe and secure parking areas**, referring to parking areas accessible to drivers engaged in the carriage of goods or passengers.

Table 1 summarizes the AFIR targets for HDVs between 2025 and 2030. By the end of 2025, EU Member States are required to deploy at least one public recharging pool with a minimum total aggregated power of 1,400 kW every 120 km in each direction of travel over 15% of the core and comprehensive TEN-T. For future years, the minimum total power increases and the distance separating two recharging pools decreases, implying a denser public charging infrastructure network. Regarding urban nodes, the AFIR mandates a minimum total aggregated power of 900 kW in 2025, which increases up to 1,800 kW by 2030. As for the safe and secure parking areas, the target is to have at least two 100 kW charging stations by 2027 and four by 2030. More details on these requirements can be found in Bernard (2023). Regulation (EU) 2023/1804 (2023) states that these targets, among other AFIR components, will be reviewed by December 2026 and every 5 years thereafter.

Table 1

Summary of the AFIR targets for HDVs between 2025 and 2030

Target type	Date	Requirement
Distance-based	2025	One recharging pool with a minimum total aggregated power of **1,400 kW** every **120 km** in each direction of travel over **15%** of the **core** and **comprehensive** TEN-T, with at least one **350 kW** charging point.
	2027	One recharging pool with a minimum total aggregated power of **2,800 kW** every **120 km** in each direction of travel over **50%** of the **core** and **comprehensive** TEN-T, with at least one **350 kW** charging point.
	2030	One recharging pool with a minimum total aggregated power of **3,600 kW** every **60 km** in each direction of travel over the **core** TEN-T, with at least one **350 kW** charging point.
		One recharging pool with a minimum total aggregated power of **1,500 kW** every **100 km** in each direction of travel over the **comprehensive** TEN-T, with at least one **350 kW** charging point.
Urban nodes	2025	One recharging pool with a minimum total aggregated power of **900 kW,** with at least one **150 kW** charging point.
	2030	One recharging pool with a minimum total aggregated power of **1,800 kW**, with at least one **150 kW** charging point.
Safe and secure parking areas	2027	At least **two 100 kW** charging stations.
	2030	At least **four 100 kW** charging stations.

Note: According to the AFIR, a recharging point is "a fixed or mobile, on-grid or off-grid interface that allows for the transfer of electricity to an electric vehicle, which, while it may have one or several connectors to accommodate different connector types, is capable of recharging only one electric vehicle at a time, and excludes devices with a power output less than or equal to 3.7 kW the primary purpose of which is not recharging electric vehicles." A recharging pool refers to "one or more recharging stations at a specific location," while a recharging station refers to a "physical installation at a specific location, consisting of one or more recharging points."

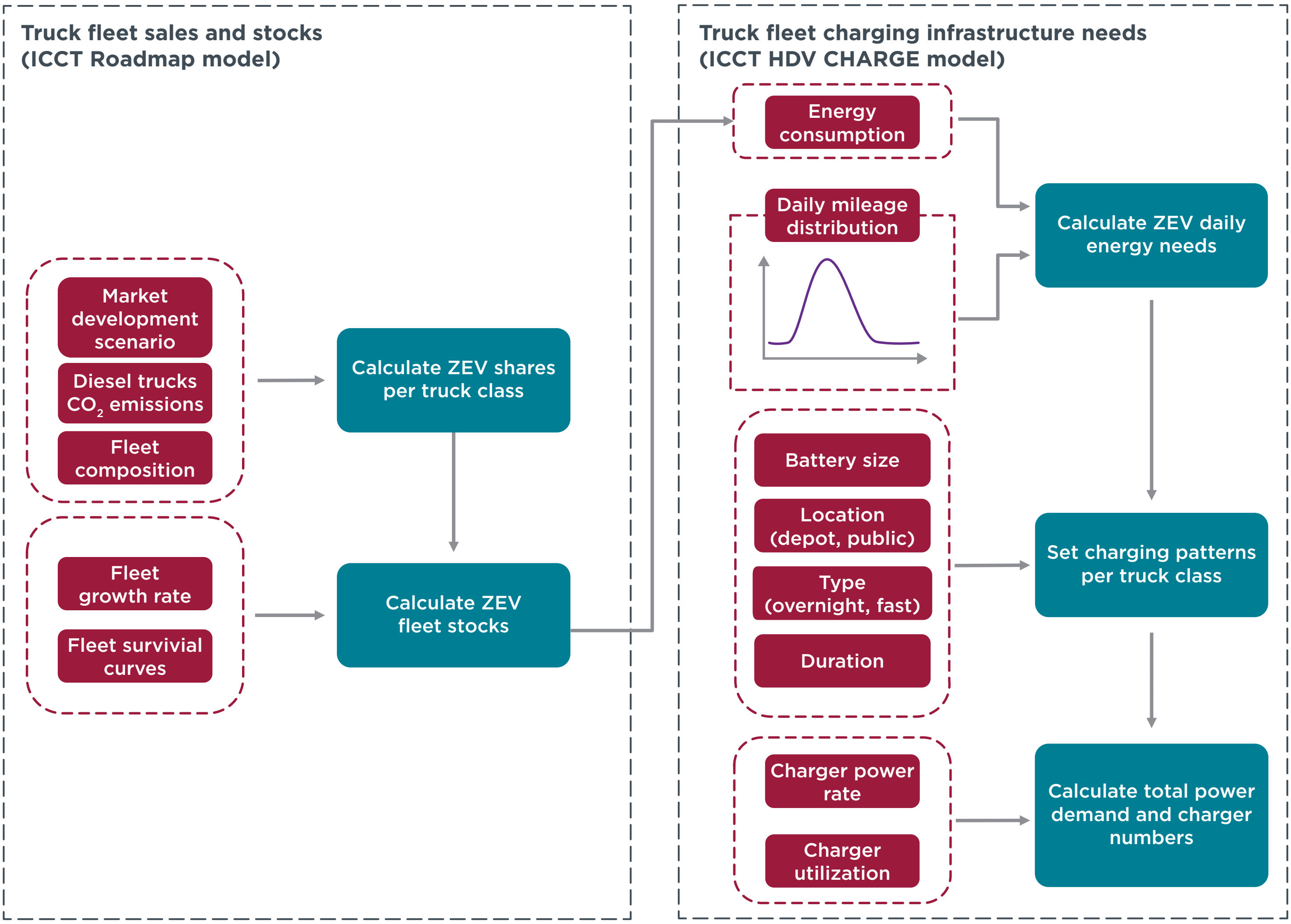
METHODOLOGY

This section presents the methodology used to quantify the charging infrastructure needs for heavy-duty electric trucks. This methodology comprises two main parts:

1. **Truck fleet sales and stocks.** Total annual sales and stocks of electric trucks are calculated using the ICCT's Roadmap model (ICCT, n.d.), considering two scenarios for the pace of truck electrification.
2. **Truck charging infrastructure needs.** Charging infrastructure needs are estimated using the ICCT's HDV CHARGE model (Schmidt et al., 2024), quantifying the energy demands associated with the projected truck fleet considering truck charging patterns and infrastructure utilization.

This two-part methodology is illustrated in Figure 1 and explained in greater detail below.

Figure 1
Schematic of the methodology employed to quantify the charging infrastructure needs



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The magnitude, type, and location of charging infrastructure for BETs in the EU will mainly be dictated by the total number of BETs, considering differences in application that impact charging patterns. As shown in Table 2, this analysis considers the main regulated Vehicle Energy Consumption calculation TOol (VECTO) groups and excludes buses and coaches.[3] For simplicity, the different truck groups considered in this analysis are further clustered into four categories: long-haul heavy trucks, regional heavy trucks, light and medium trucks, and vocational trucks. Together, the VECTO groups covered in this study represented 86% of all truck sales in the EU in 2024. Table A4 in the appendix summarizes the main attributes of these groups.

Table 2
VECTO groups considered and categories used in this analysis

Category	VECTO groups
Long-haul heavy trucks	4-LH, 5-LH, 9-LH, and 10-LH
Regional heavy trucks	4-UD, 4-RD, 5-RD, 9-RD, and 10-RD
Light and medium trucks	1, 2, and 3
Vocational trucks	11, 12, and 16

TRUCK FLEET SALES AND STOCKS

First, electric truck shares in a given year were estimated based on two scenarios of BET uptake by 2030:

1. **Low scenario:** This scenario considers the minimum shares of ZETs needed for European truck manufacturers to meet the 45% CO_2 reduction target by 2030.
2. **High scenario:** This scenario models faster BET uptake, based on the expected shares of BETs in 2030 according to confidential consultations between truck manufacturers and the German government undertaken in 2024 (Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie [NOW GmbH], 2024).

Sales and stocks were then calculated based on the expected growth in fleet activity over time and the vehicle survival rate, among other variables, using the ICCT Roadmap model (ICCT, n.d.).

Estimating electric truck sales shares

Low scenario

Under the Low scenario, shares of ZETs required for manufacturer compliance by 2030 will heavily depend on the CO_2 emissions of diesel trucks—which, in turn, hinge on the extent to which diesel truck technology has improved relative to the 2019 reporting period.[4] Shares of ZETs required for compliance by the 2030 reporting period will also depend on any credits generated by truck manufacturers between 2026 and 2029. Manufacturers can generate credits if they manage to reduce their emissions below the emission trajectory line, a straight line drawn between the 2025 and 2030 CO_2 reduction targets. This analysis does not consider credits to present an upper-end estimate of BET sales shares needed under this scenario.

Based on European Environment Agency (EEA) data, diesel trucks' CO_2 emissions, expressed in g CO_2/tonne-km, slowly declined between the 2019 and 2022 reporting periods, by an annual rate of roughly 1% (EEA, n.d.). This reduction was mainly due to improvements in truck aerodynamics, energy efficiency, and tire rolling resistance, as highlighted in a previous ICCT publication (Musa et al., 2024).

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[3] VECTO is a simulation tool that is used to certify the CO_2 emissions from HDVs.

[4] For the purpose of emissions reporting, EU reporting periods run from July 1 to June 30 of the following year; for instance, the 2019 reporting year runs from July 1, 2019, to June 30, 2020.

Diesel technology is expected to improve further between 2022 and 2030. Potential advancements include reductions in aerodynamic drag through better cab designs, the achievement of lower rolling resistance through the use of more efficient tires, and engine efficiency improvements. All major truck manufacturers operating in the EU announced new truck models between 2023 and 2025, with vehicle-level fuel savings ranging between 5% and 15% compared with 2022 models depending on their technology packages. A summary of those technology packages is included in a previous ICCT publication (Mulholland & Ragon, 2025).

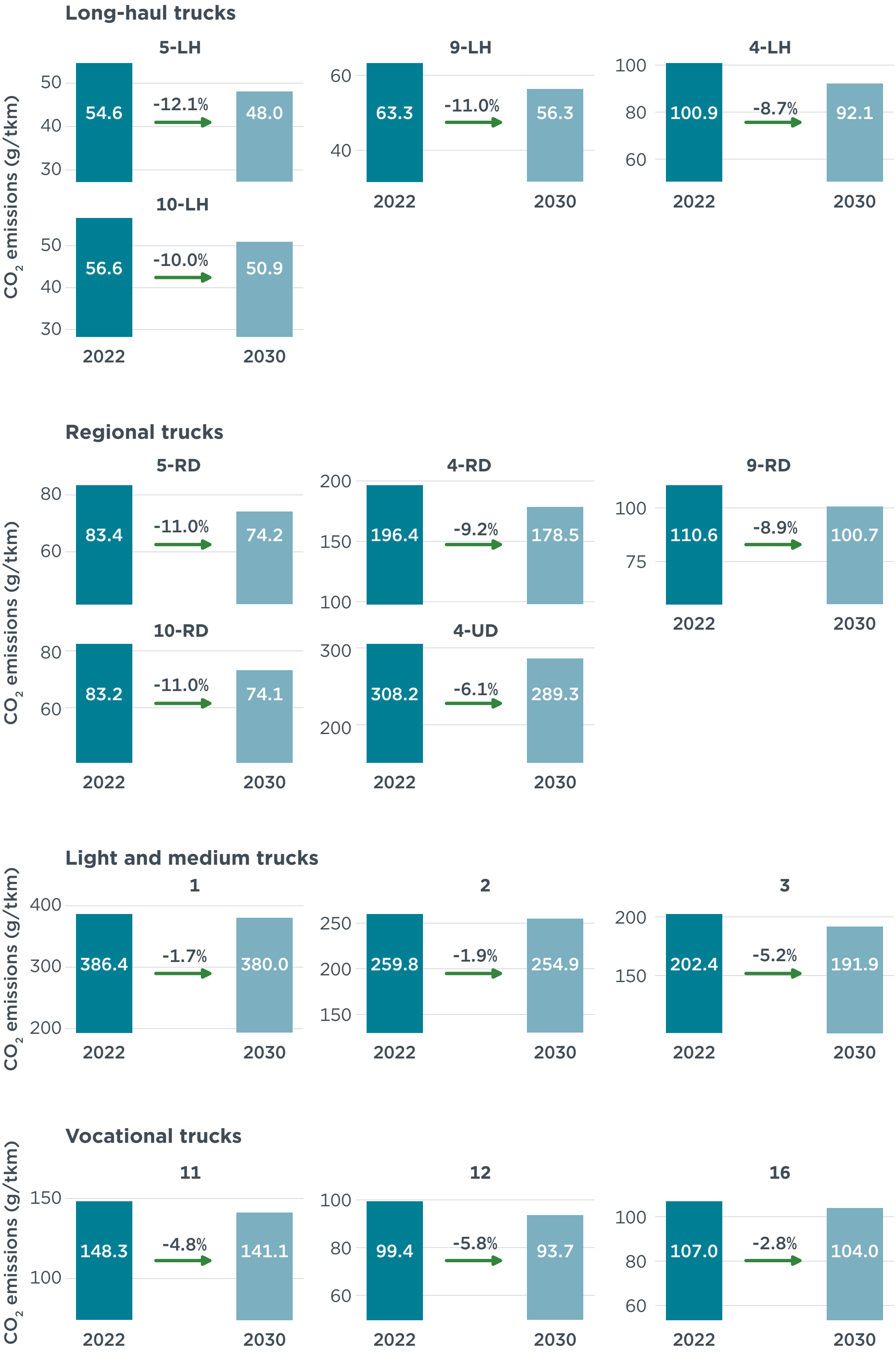
To project diesel truck CO_2 emissions and technology development in 2030, we developed regression models based on 2022 emissions data from EEA (n.d.). The CO_2 emissions of trucks belonging to the same VECTO group can vary widely depending on the technology packages deployed in each model. The regression models established relations between truck CO_2 emissions and primary technology metrics, namely aerodynamic air drag, rolling resistance coefficient, and engine average efficiency over the World Harmonized Truck Cycle (WHTC), all of which are reported in the EEA database. We developed a separate regression model for each VECTO group.

The models allowed us to quantify the CO_2 emissions of each VECTO group if a certain improvement were realized in these technology metrics. For this analysis, we assumed that, by 2030, all technology metrics would converge to the top 20th percentile for every manufacturer, given the state of the technology in the 2022 reporting period. This represents a moderate assumption, implying that truck manufacturers will sell more of their better-performing trucks in terms of CO_2 emissions, but not necessarily their best-in-class models. More details on the formulation of the regression models can be found in another ICCT publication (Mulholland et al., 2025).

Figure 2 shows the 2022 CO_2 emissions and our modeled 2030 emissions for every VECTO group. In general, the projected CO_2 reduction in 2030 relative to 2022 ranges from 2% to 12%. The most important groups by share of sales and emissions, groups 5-LH and 9-LH, are expected to record a CO_2 emissions reduction above 10%, based on the diesel technology that was available during the 2022 reporting period.

Figure 2

2022 and projected 2030 emissions for conventional trucks, by VECTO group



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Based on the modeled diesel truck CO_2 emissions in 2030, we calculated the shares of ZETs needed for each manufacturer to comply with the 45% CO_2 reduction target by 2030 by scaling up existing ZET sales based on 2024 sales data. We assumed the following:

- Each manufacturer's share of total HDV sales in the EU remains the same from 2024 to 2030;
- All ZETs in 2030 will be BETs, as other zero-emission technologies have not yet reached commercial maturity;
- Relative to long-haul trucks, light- and medium-duty trucks are electrified 3 times faster, regional delivery trucks are electrified 50% faster, and vocational trucks are electrified 50% slower; and
- Every manufacturer will offer ZET models for all considered VECTO subgroups.

The shape of the market diffusion curve of electric trucks between 2024 and 2030 will have a significant impact on the sales shares in the intervening years (2025 to 2029) and on the total stock (and charging needs) of electric trucks by 2030. We used data from a NOW GmbH (2024) report on confidential "cleanroom" talks with European truck manufacturers (discussed below), projecting a simple S-curve for ZET diffusion based on truck manufacturers' market forecasting. Manufacturer-specific sales shares were then aggregated to calculate fleet-wide shares.

High scenario

Between April and May 2024, the German Federal Ministry for Digital and Transport held its second cleanroom talks with the most important truck manufacturers in the EU, comprising more than 95% of the region's HDV market. An ensuing report published manufacturers' expected sales of different powertrain technologies between 2025 and 2030 (NOW GmbH, 2024). The manufacturers' forecasts described fleet-wide sales and did not distinguish between different VECTO groups. We converted these forecasts into sales shares and assumed that the same shares would apply to all VECTO groups. These sales shares are summarized in Table 3.

Table 3
Sales shares of BET under the High scenario

Year	2024	2025	2026	2027	2028	2029	2030
Sales shares	2.00%	4.90%	7.50%	13.90%	21.10%	34.50%	48.50%

Electric truck stocks

We used the ICCT Roadmap model (ICCT, n.d.) to convert the annual truck sales shares across different segments into yearly stocks. The model considers the fleet growth between 2025 and 2030 and the survival rate of the vehicles as a function of their years in service. Based on trends from the EU Reference Scenario 2020 (European Commission, 2021a), our modeling calculated a fleet growth of 1.3% for all truck stock between 2025 and 2030. Figure 3 shows the modeled sales and stock of BETs in the EU between 2025 and 2030 under the Low scenario. By 2030, we estimated that there would be nearly 290,000 BETs in the EU in 2030, of which 190,000 (66%) would be long-haul.

Figure 3
Modeled BET sales and stocks between 2025 and 2030 under the Low scenario

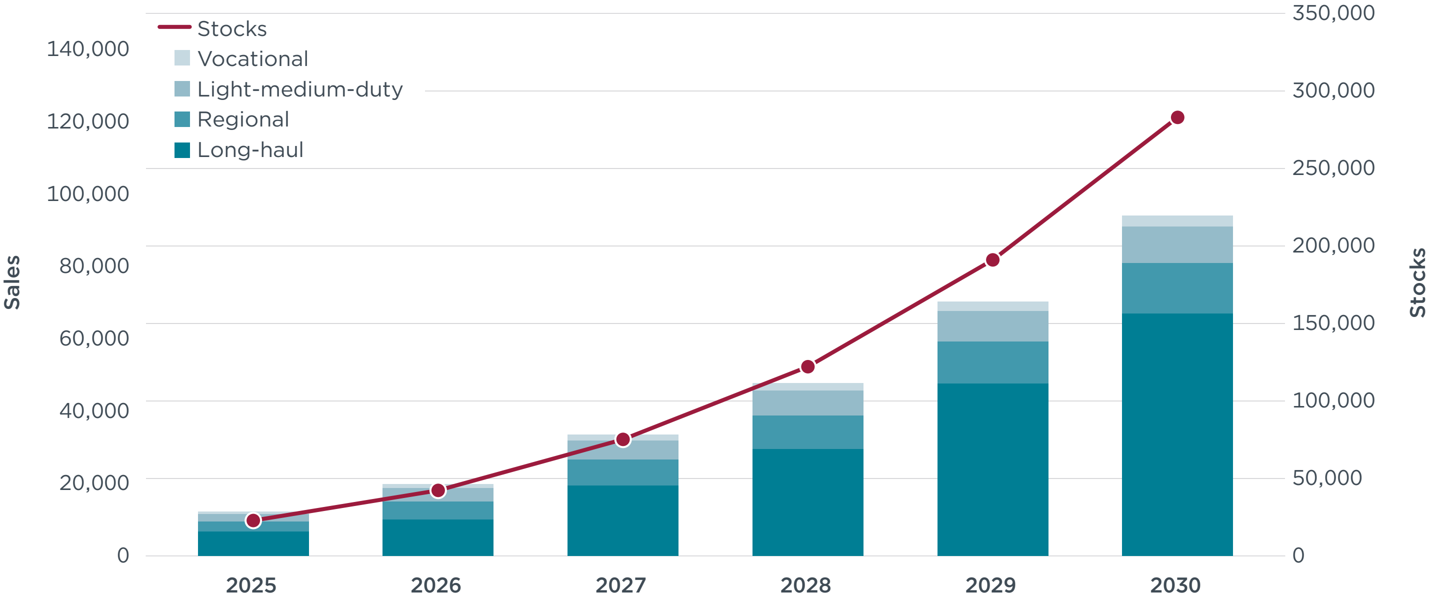

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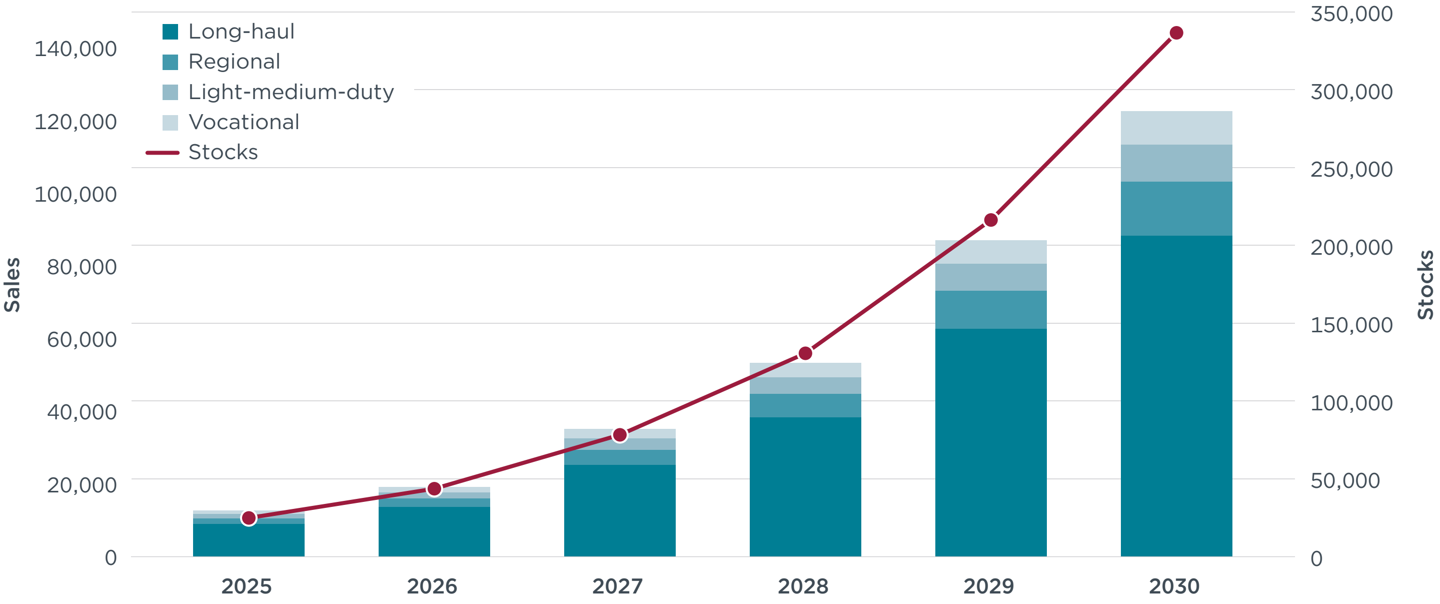
Figure 4 shows the stocks under the High scenario. This scenario shows a higher total BET stock, reaching 340,000 vehicles by 2030, of which 250,000 (73%) are long-haul trucks.

Figure 4
Modeled BET sales and stocks between 2025 and 2030 under the High scenario



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TRUCK FLEET CHARGING INFRASTRUCTURE NEEDS

Based on the projections of total electric truck stock, the trucks' daily energy needs were assessed considering their traffic activity and energy consumption, among other variables. Energy needs were then converted into charging infrastructure needs based on assumptions related to charging patterns and infrastructure utilization using the ICCT's HDV CHARGE model (Schmidt et al., 2024).

Electric truck daily energy needs

Electric trucks' charging energy and power needs depend on their energy efficiency, mileage, and battery size. Table 4 summarizes the energy consumption, daily and annual mileage, and battery size of the VECTO groups assessed in this study in 2030. The following paragraphs explain how these values were calculated.

Table 4
Energy consumption, annual and daily mileage, and battery size of model year 2030 trucks

VECTO group	Average energy consumption (kWh/km)	Annual mileage (km)	Average daily mileage (km)	Average battery size (kWh)
4-LH	0.94	98,000	377	450
4-RD	0.72	78,000	300	270
4-UD	0.66	60,000	231	200
5-LH	1.02	116,000	446	600
5-RD	0.94	78,000	300	360
9-LH	0.95	108,000	415	500
9-RD	0.77	73,000	281	280
10-LH	1.07	107,000	412	600
10-RD	0.99	68,000	262	330
1	0.53	58,000	223	150
2	0.55	60,000	231	160
3	0.67	60,000	231	200
11	0.8	65,000	250	250
12	0.8	67,000	258	320
16	0.8	60,000	231	240

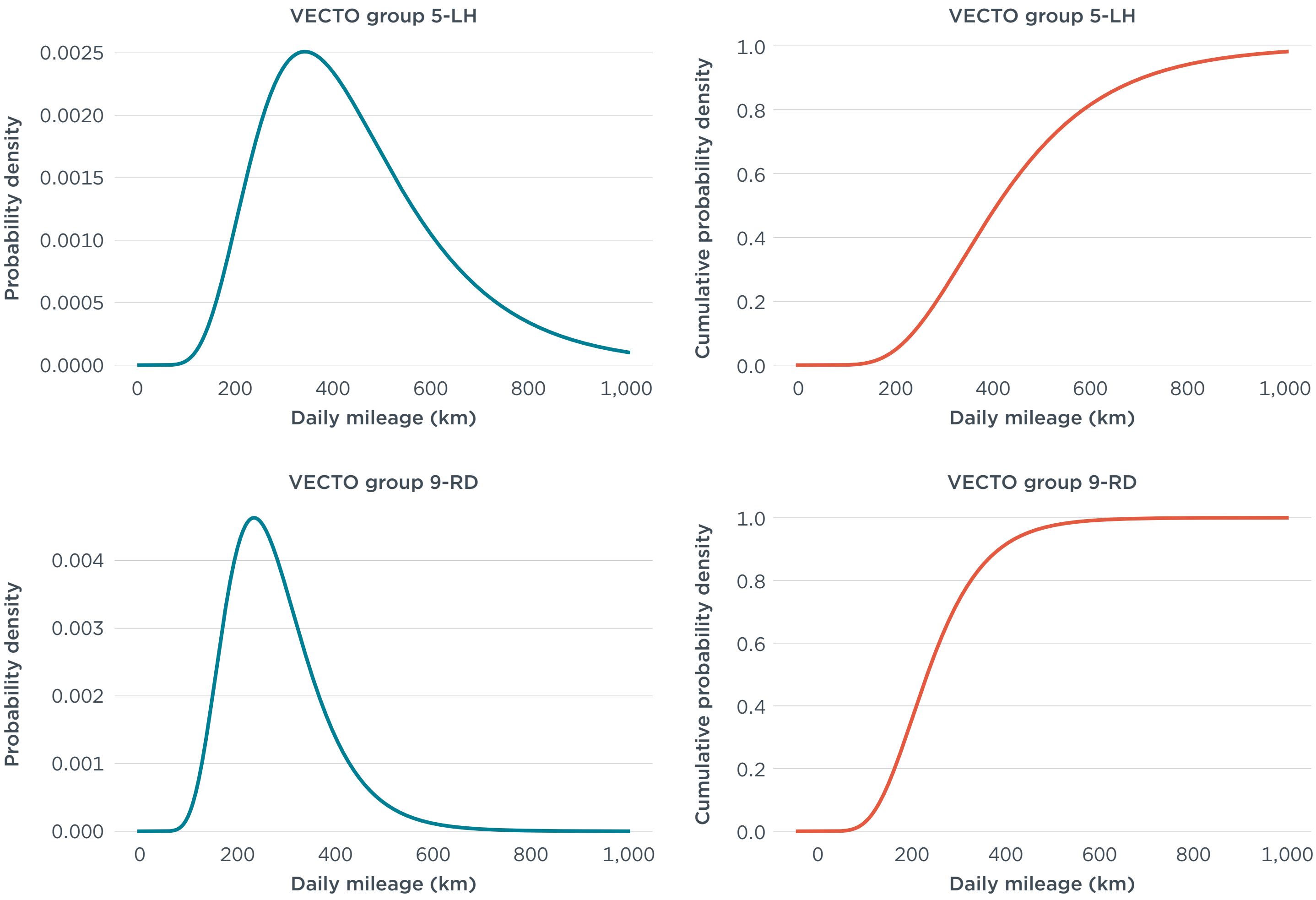
The energy consumption of trucks was modeled in a previous ICCT study (Basma & Rodríguez, 2023) based on the different driving cycles and payloads per VECTO group, averaged based on the weights defined in Regulation (EU) 2024/1610 (2024). The annual mileage per VECTO group was also based on Regulation (EU) 2024/1610. The average daily mileage per VECTO group was calculated by dividing the yearly mileage by an assumed average of 260 days of operation per year drawn from the CNR (n.d.).

The average battery size for each VECTO group was estimated based on the capacity required to meet the average daily mileage, considering the truck's energy consumption and usable battery state-of-charge of 80%. While this approach fits the purpose of this analysis, we expect variations from one fleet to another based on their specific mission profiles. The resulting battery sizes were cross-checked with existing BET model offerings for each VECTO group and sized accordingly. For long-haul trucks, the battery size was capped at 600 kWh based on the current models in the market. However, this could increase with battery technology developments; some manufacturers have already announced plans to deploy 720 kWh batteries for some long-haul truck models. Changes in battery size are further examined in the sensitivity analysis section.

To capture variations in mission profile within the same VECTO group, we defined each group's daily mileage as a lognormal distribution based on mileage data for trucks operating in Germany (Speth & Plötz, 2024), considering the average daily mileage presented in Table 4 as the distribution mean. Figure 5 shows the probability density function of daily mileage for selected VECTO groups. Complete data are available in Table A1 in the appendix.

Figure 5

Probability density function of trucks' daily mileage for selected VECTO groups



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Charging patterns

Different trucks will employ different charging technologies depending on their energy needs, charging location, and available charging time. Truck charging is categorized into overnight charging and opportunity charging during daily operations. For overnight charging, we considered that trucks would charge for a maximum of 8 hours. We calculated trucks' minimum needed charging power based on their battery size and daily energy needs, as presented in Table 5. All long-haul trucks were assumed to use 100 kW direct current (DC) chargers for overnight charging. We assumed that regional heavy trucks and vocational trucks would use slower 50 kW DC chargers, while light and medium trucks would rely on 22 kW alternating current (AC) chargers, given their lower energy needs.

Table 5
Nominal charging rates for different charging technologies, by VECTO group

Category	Overnight charging (kW)	Fast charging (kW)	Ultrafast charging (kW)
Long-haul heavy trucks	100	350	750
Regional heavy trucks	50	350	750
Light and medium trucks	22	150	NA
Vocational trucks	50	350	NA

Opportunity charging can take various forms. We considered two main charging technologies: (1) fast charging with either 150 kW or 350 kW chargers under the Combined Charging System (CCS) standard, and (2) ultrafast charging under the Megawatt Charging System (MCS) standard, with a nominal rate of 750 kW.[5] Opportunity charging can occur at private depots and warehouses or public charging stations.

Fleets' daily charging patterns vary depending on their operation schedules. In general, overnight charging at private depots or public charging stations is expected to be cheaper than opportunity fast and ultrafast charging during the day. In this context, we made the following assumptions regarding trucks' charging patterns:

- Fleet operators will maximize the overnight charging share for their trucks' energy needs, implying that trucks will start their daily operation with a fully charged battery;
- Truckers spend 45 minutes daily charging at public fast charging stations or private depots or warehouses;
- Truckers prioritize one fast charging event during the day, and if more energy is required, they switch to a single ultrafast charging event;
- In cases where more than one ultrafast charging event is required, truckers rely on two charging sessions during the day: one fast charging event and one ultrafast charging event; and
- Truckers rely on two ultrafast charging events if more energy is required.

Figure 6 shows an example of a long-haul truck's daily energy needs and charging patterns.

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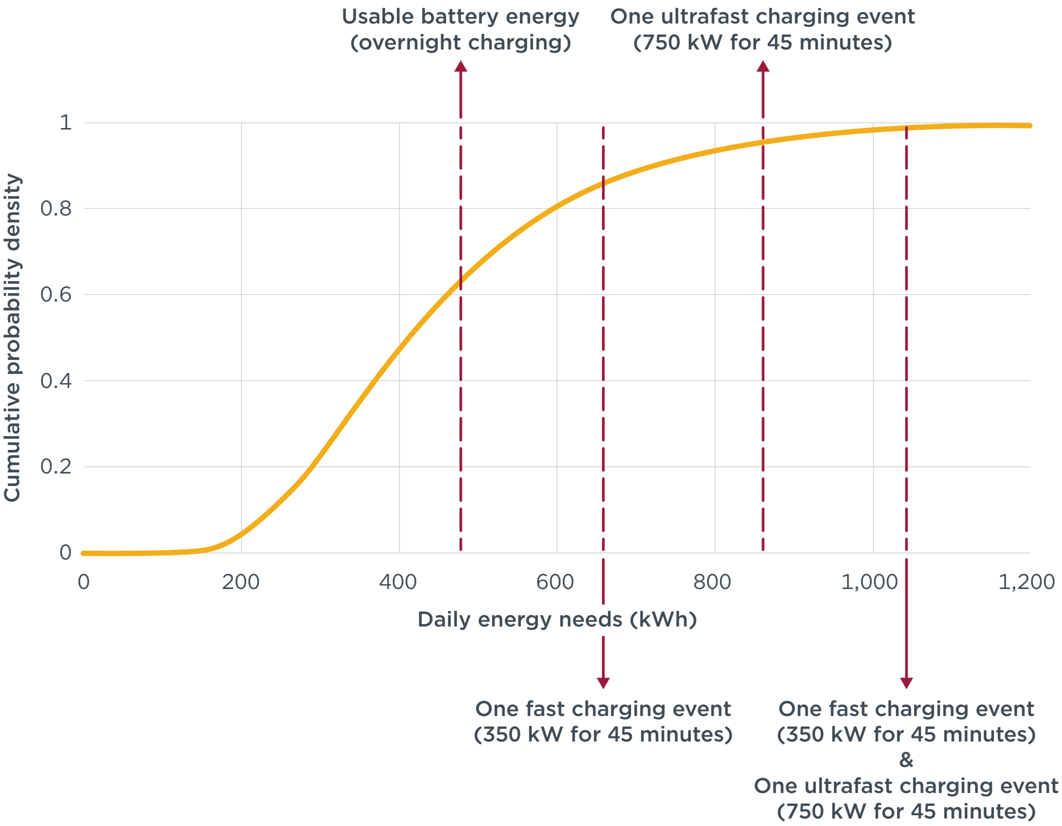
[5] Chargers under the MCS should be able to charge between 440 kW and 3.75 MW.

Figure 6

Distribution of daily energy needs and charging pattern for a long-haul (VECTO group 5-LH) truck



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Charger utilization and location

The magnitude of HDV charging infrastructure deployment is shaped by charger utilization, meaning the amount of time a charger is being occupied by a truck.[6] Utilization is expected to vary for different charging technologies and locations.

Overnight charging

We assumed that trucks spend 8 hours parked overnight and that each overnight charger will be used up to 8 hours daily. This translates to an average time-based utilization of 33%. However, the average charging efficiency during a charging session is close to 85%; moreover, the average effective charging power during the session is also around 85% of the nominal capacity of the charger (Verbeek et al., 2025). This implies that the energy-based utilization rate is lower than the time-based utilization rate—in this case, close to 24%.

Depending on the mission profile of the truck, overnight charging can occur at private depots or public overnight truck stop stations. While there is no EU-wide database estimating the number of trucks that return to their depots daily, we consulted several truck manufacturers and fleets in the EU to generate assumptions on the share of public versus private overnight stays. In general, respondents highlighted that vocational and light and medium trucks usually return to their base every day; conversely, a reported 10% of regional heavy trucks and 35% of long-haul trucks do not

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[6] Specifically, utilization can be expressed as the ratio of energy volume dispensed into batteries divided by the maximum theoretical volume of energy that can be dispensed in a given period.

return to their base daily. Table 6 summarizes our assumptions on the shares of private and public overnight charging for each truck category. Given the high uncertainty of these assumptions, we later conduct a sensitivity analysis with different shares of public and private overnight charging.

Table 6
Share of public and private overnight charging for different truck categories

Category	Share of private overnight charging	Share of public overnight charging
Long-haul heavy trucks	65%	35%
Regional heavy trucks	90%	10%
Light and medium trucks	100%	0%
Vocational trucks	100%	0%

Opportunity charging

The utilization of public fast charging stations will be mainly driven by traffic activity, arrival times to the stop station, and the service rate the charging station is designed to fulfill. Few studies have tried to quantify the expected utilization rates for long-haul trucks. Bennett et al. (2022) conducted a traffic flow analysis in California focusing on Class 8 long-haul trucks and estimated that long-term utilization rates between 10% and 20% are possible for public fast and ultrafast charging stations, depending on the market uptake of electric trucks. Karlsson and Grauers (2023) employed an agent-based simulation approach and concluded that charging stations dedicated to long-haul trucks can reach a 30% utilization rate in Sweden, considering reasonable queuing times. Shoman et al. (2023) conducted an EU-wide analysis quantifying the public charging needs for trucks, estimating that utilization could reach 40% in countries with large volumes of electric trucks.

Since this analysis focuses on charging infrastructure needs in 2030, we conservatively assumed a 15% utilization rate for public fast and ultrafast chargers. The impact of this assumption on the results is evaluated in the sensitivity analysis section. We assumed similar utilization rates for the fast chargers in depots or warehouses, though in practice their utilization could be higher if these chargers are also used for overnight charging.

RESULTS

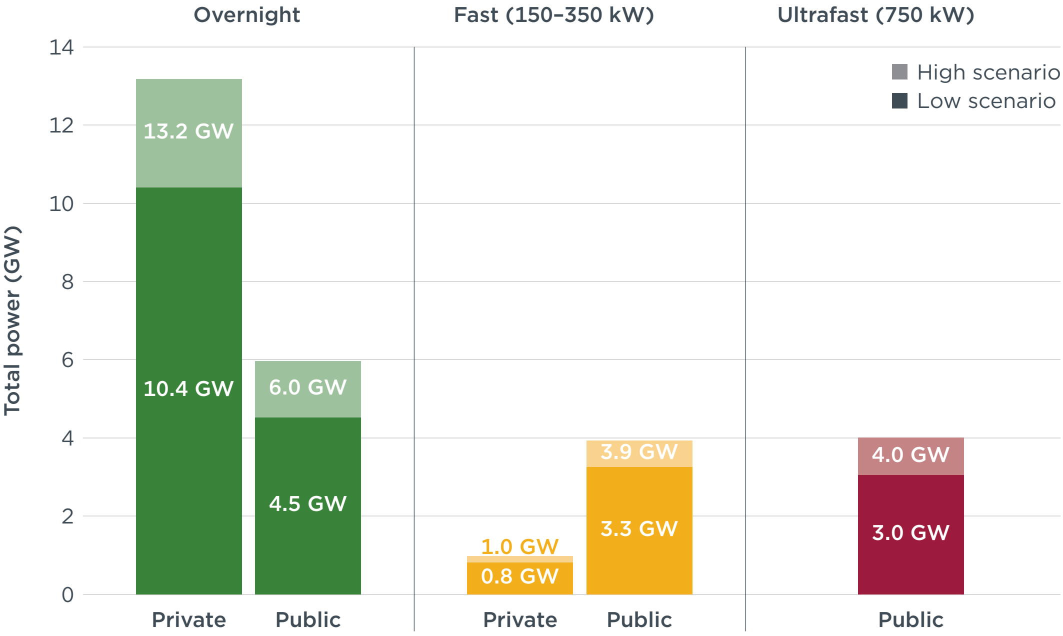
We begin by presenting the results of our assessment of charging needs in 2030. The next subsection compares these projected needs with the AFIR targets for charging infrastructure deployment in 2030, and the following subsection analyses charging needs at the EU Member State level. We conclude with a sensitivity analysis of some of the main assumptions used to quantify charging needs.

PROJECTED CHARGING NEEDS IN 2030

We estimated the total required installed charging capacity by 2030 to be between 22 and 28 GW depending on the BET uptake scenario, as shown in Figure 7. The projected split between public and private installed capacity is almost equal in both uptake scenarios. This highlights the critical role of public chargers in enabling the electrification of the road freight sector in the EU.

Figure 7

Total charging capacity needs for different charging locations and technologies by 2030 in the Low and High scenarios



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Overnight charging, including both public and private chargers, is expected to account for more than two-thirds of the total installed power needs: between 15 and 19 GW, depending on the BET market uptake scenario. Private chargers at depots will cover close to 70% of the overnight chargers' total installed power needs, while public overnight chargers will cover 30%. Public overnight chargers are expected to mainly serve long-haul trucks that do not return to their depots daily. This is directly related to our assumptions concerning public and private overnight charging shares, which we further evaluate in the sensitivity analysis section.

The installed power needs of public fast (150–350 kW) and ultrafast (750 kW) chargers are estimated to be between 6.3 and 7.9 GW. By 2030, they are projected to account for approximately 29% of total installed capacity, mainly serving long-haul trucks traveling long distances.

When comparing the two BET market uptake scenarios, the High scenario generally results in 20%–25% higher charging needs than the Low scenario across all charging types and locations, except in the case of ultrafast public charging, for which the increase is 33.3%. This is due to the higher share of long-haul BETs in the High scenario, augmenting the fleet's reliance on ultrafast charging technologies.

Table 7 quantifies the number of chargers needed under the Low scenario by location and technology. More than 213,000 chargers are projected to be required to power the BET fleet by 2030, of which close to 150,000 are private and 63,000 are public. Among overnight chargers, approximately 80% have a power rating of 50 kW or 100 kW, while almost 20% are 22 kW AC chargers used by light and medium trucks.

In terms of opportunity charging, close to 8,500 fast (150–350 kW) and 4,000 ultrafast (750 kW) chargers will be needed. Despite representing only 6% of the total number of chargers needed by 2030, these chargers account for 28% of the total installed power needs, given their higher charging rates relative to overnight chargers.

Table 7
Total number of chargers needed by 2030 in the Low scenario, by location and technology

Power rating	Overnight			Fast		Ultrafast	Total
	22 kW	50 kW	100 kW	150 kW	350 kW	750 kW	
Private	27,165	43,717	76,242	439	2,143	0	149,706
Public	0	8,439	41,053	1,756	8,572	4,061	63,882
Total	27,165	52,156	117,295	2,195	10,715	4,061	213,588

Table 8 shows the total number of chargers needed under the High BET market uptake scenario. Close to 260,000 chargers are required in this scenario, almost a 20% increase relative to the Low scenario. This notably includes more than 5,300 public ultrafast chargers, around 31% more than the roughly 4,000 chargers required in the Low scenario. In addition, significantly more public and private 100 kW overnight chargers are required to serve the higher number of long-haul BETs in this case.

Table 8
Total number of chargers needed by 2030 in the High scenario, by location and technology

Power rating	Overnight			Fast		Ultrafast	Total
	22 kW	50 kW	100 kW	150 kW	350 kW	750 kW	
Private	21,843	47,906	103,090	353	2,659	0	175,852
Public	0	8,362	55,510	1,413	10,635	5,335	81,255
Total	21,843	56,269	158,600	1,766	13,294	5,335	257,107

COMPARING PUBLIC CHARGING NEEDS WITH AFIR TARGETS

This section compares projected charging needs to AFIR targets for charging infrastructure deployment. We translate the distance-based AFIR targets across the core and comprehensive road networks in the EU by considering the length of the network. Based on the most recent data shared by the European Commission (n.d.), the length of the comprehensive road network in 2024 was 109,181 km; of this, 46,878 km was part of the core road network. Safe and secure parking areas are excluded from this analysis, as few such areas have been certified to date (European Commission, 2025a).

Figure 8 compares the AFIR targets for charging deployment in the 27 EU Member States (EU-27) against total projected charging power needs by 2030. The AFIR targets will result in approximately 7.5 GW of total installed public charging power in the EU-27. Under the Low and High scenarios, we estimated the total charging needs to range between 10.8 and 13.9 GW. This implies that the AFIR targets cover between 53% and 69% of the total public charging needs by 2030, depending on the market uptake scenario for BETs.

Figure 8

Comparison of total installed charger power under AFIR targets with projected charging needs in the Low and High scenarios

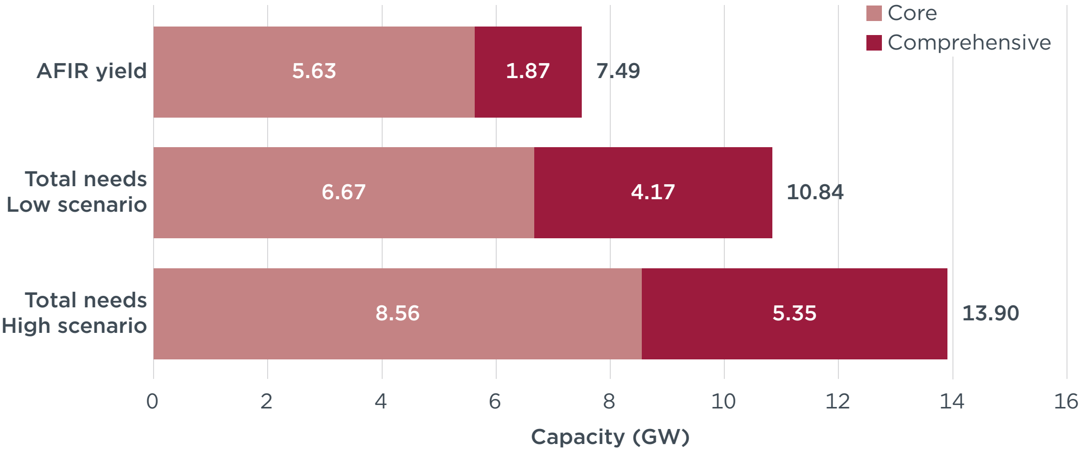

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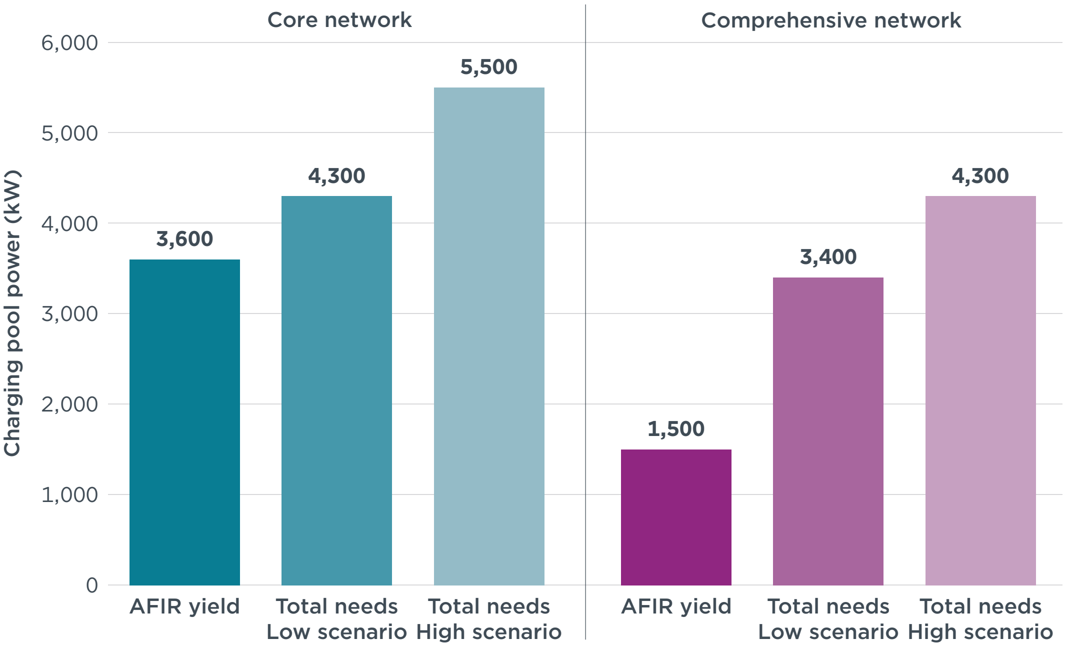
Figure 8 also disaggregates the total public charging needs between the core and comprehensive road networks, considering their respective shares of truck activity as highlighted in a previous ICCT publication (Ragon et al., 2022). The AFIR targets cover between 65% and 85% of public charging needs along the core road network, but only 35% to 45% of needs along the comprehensive network.

Another way of comparing the AFIR targets to projected public charging needs is to quantify the minimum charging power per pool assuming the same spatial density—that is, one charging station every 60 km in both directions along the core road network and every 100 km along the comprehensive network. The results of this comparison are shown in Figure 9.

Figure 9

Comparison of minimum charging power per pool under the AFIR targets with projected charging needs in the Low and High scenarios



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Along the core road network, the AFIR targets set a minimum charging power per pool of 3,600 kW, 15% lower than the projected charging need per pool in the Low scenario (4,300 kW) and 35% lower than in the High scenario (5,500 kW). Along the comprehensive road network, the AFIR targets mandate a minimum of 1,500 kW per charging pool, covering 45% of the projected charging need per pool in the Low scenario (3,400 kW) and 35% of the need in the High scenario (4,300 kW).

MEMBER STATE-LEVEL ANALYSIS

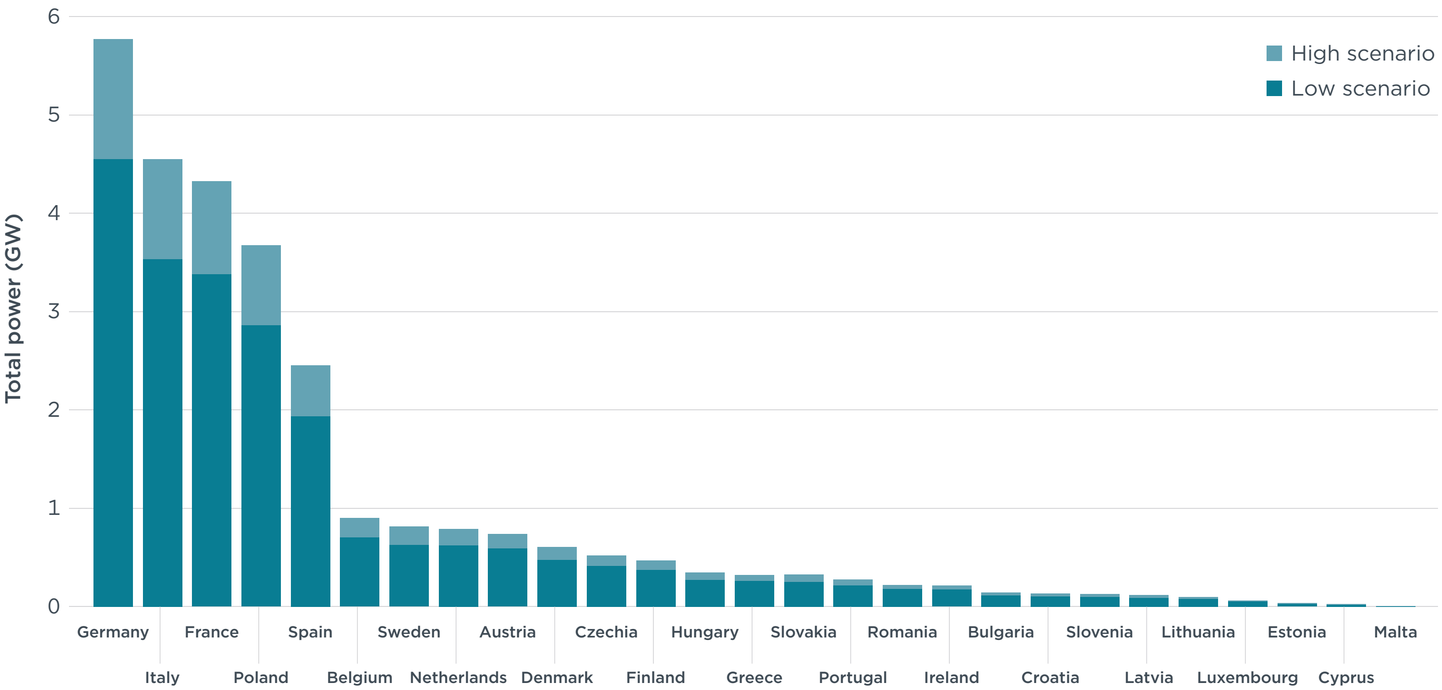
This section quantifies the charging needs at the EU Member State level. As noted above, this analysis assumes that all Member States experience the same diffusion rates of BET technologies by 2030. In reality, technology diffusion is dependent on multiple variables, such as national policies and energy prices and other local economic factors.

Figure 10 shows the total (public and private) installed charging power needs in the EU-27 by 2030 for both BET market uptake scenarios, by country. Member State-specific charging needs were calculated based on the share of their BET stock (see Table A3 in the appendix) and the share of traffic activity on highways passing through the Member State (Table A5). We estimated charging needs for long-haul trucks for each Member State based on their shares of tonne-km activity on highways, as these shares correspond mainly to international long-haul transport, in which a vehicle may not operate in the country where it was registered. We calculated charging needs for all other truck segments based on BET stocks, as those vehicles perform mostly domestic transport.

Under the Low scenario, Germany records the highest charging needs—close to 4.5 GW, comprising 20% of the total installed charging power needs in the EU-27 by 2030. Spain, France, Italy, and Poland follow with estimated charging needs between 2 GW and 3.4 GW. Those five Member States comprise more than 70% of the total charging power needs in the EU-27 by 2030. Similar trends can be observed in the High BET market uptake scenario, though the total charging power needs increase by 20%–25% relative to the Low scenario.

Figure 10

Total private and public installed charging power needs in the EU-27 by 2030, by country



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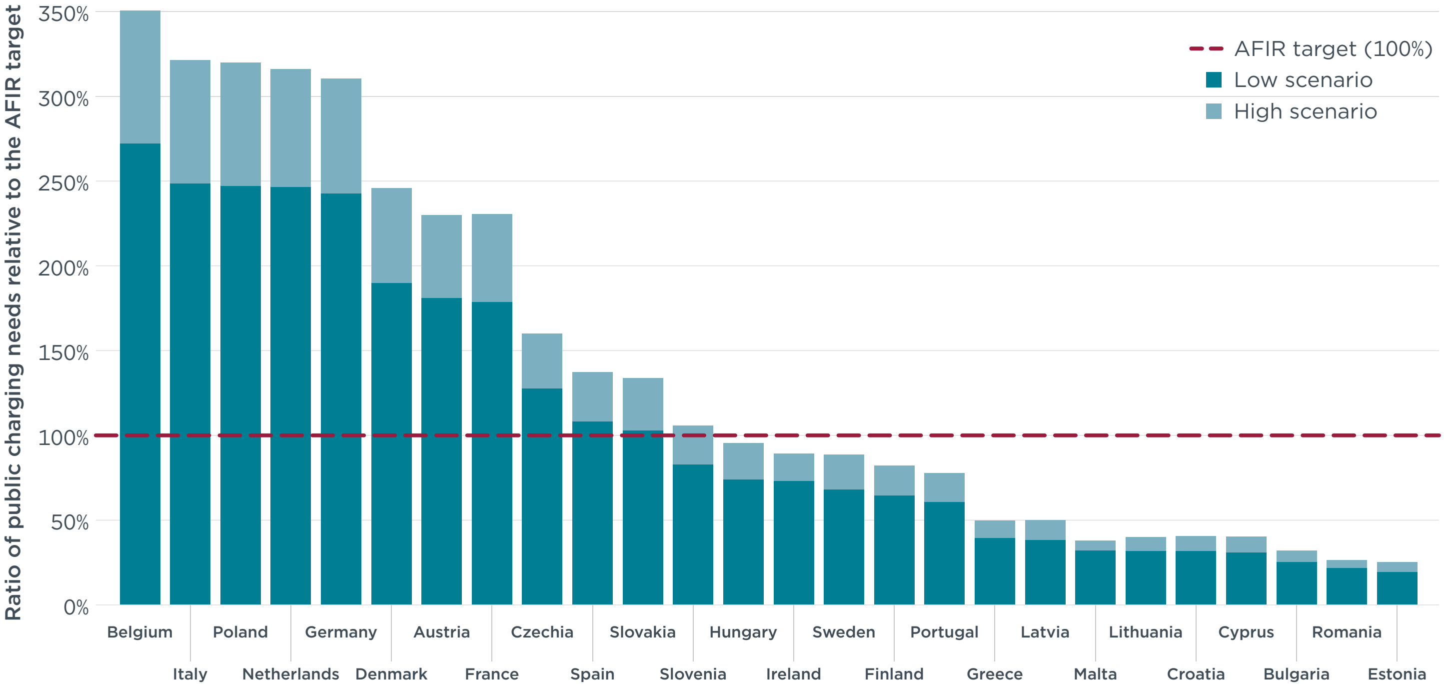
While the AFIR does not specify targets for each Member State, distance-based targets for charging station deployment along the core and comprehensive road networks provide a reasonable approximation of the minimum installed charging power mandated by the AFIR for each Member State based on the length of the TEN-T network within each country (see Table A2). Figure 11 presents these approximations alongside the projected public charging needs by 2030 in each scenario.

Figure 11

Ratio of projected public charging power needs to approximate AFIR targets per Member State in 2030



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For most Member States, the AFIR minimum targets only cover a portion of their charging needs by 2030. This is most evident in Belgium, Italy, Poland, the Netherlands, and Germany, as BETs operating in these countries will have between 2.5 and 3.5 times higher charging needs than their approximate targets under the AFIR according to the length of the TEN-T network in each country. Denmark, Austria, and France have projected charging needs between 1.5 and 2.5 times higher than the implied AFIR targets. Meanwhile, the AFIR targets more closely match projected needs in a middle group of countries (spanning from Spain to Portugal in Figure 12), while for countries like Greece, Croatia, Bulgaria, and Romania, the AFIR targets are in some cases twice (or more) the projected charging need in 2030.

SENSITIVITY ANALYSIS

Impact of public fast and ultrafast charger utilization rates

The utilization rate of fast and ultrafast chargers is a key input to assessing the fleet's total charging needs. As discussed above, real-world data regarding utilization rates are scarce, and our assumptions relied on fleet driving pattern simulations based on the public literature. The baseline analysis above assumed a utilization rate of 15%. Here, we consider a scenario with a low rate of 10% and another with a high rate of 20%, as shown in Table 9.

Table 9

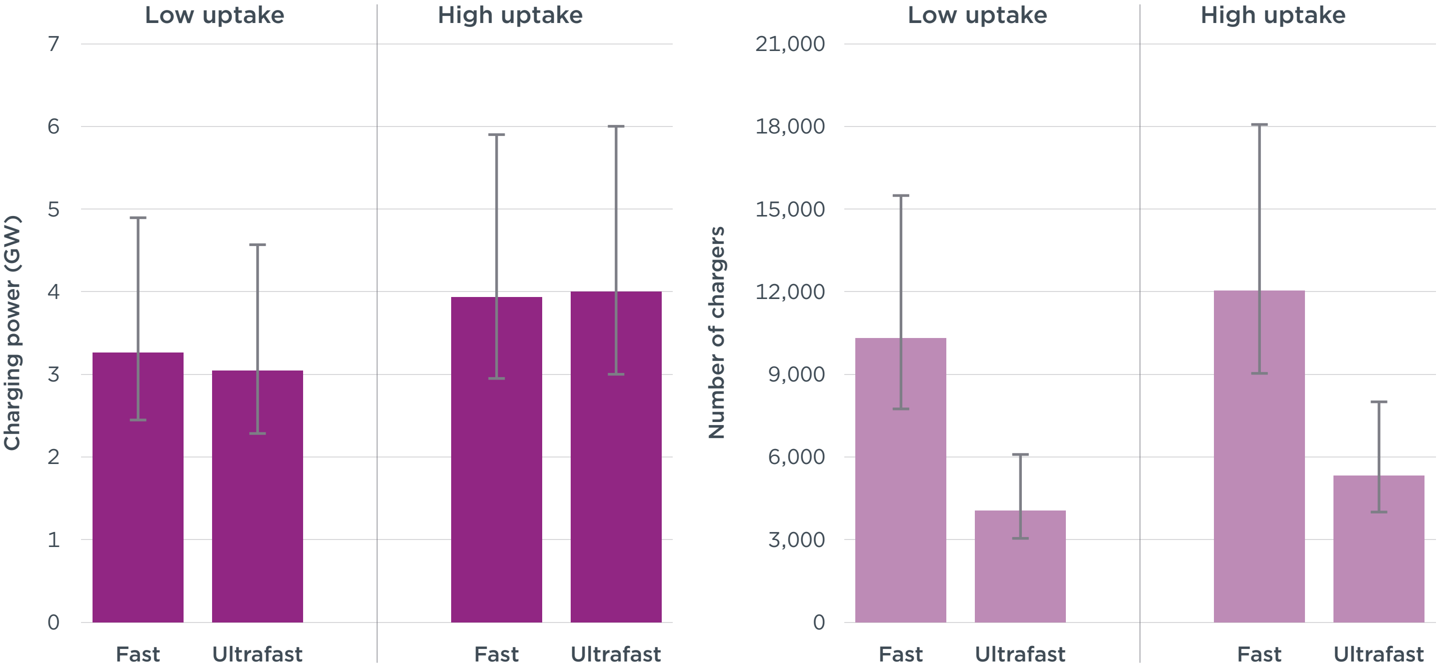
Alternative fast and ultrafast charging utilization rate assumptions

Variable	Baseline	Low	High
Utilization rate	15%	10%	20%

Figure 12 shows the impact of the assumed utilization rates for fast and ultrafast chargers on the total public fast and ultrafast charging power needs and the number of chargers for both BET market uptake scenarios. The bars correspond to the baseline scenario, and the error bars correspond to the sensitivity analysis range, wherein the lower ends reflect the high utilization (20%) scenario, and the higher ends reflect the low utilization (10%) scenario. The total installed charging power needs are up to 50% higher in the low utilization scenario relative to the baseline, ranging between 5 and 6 GW for fast chargers and 4.5 and 6 GW for ultrafast chargers, depending on the BET market uptake. The high utilization scenario results in a 25% reduction in both fast and ultrafast chargers across both BET uptake scenarios.

Figure 12

Impact of utilization rates on public fast and ultrafast charging needs in the Low and High market uptake scenarios



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Similarly, the total number of chargers increases by 50% in the low utilization scenario and decreases by 25% in the high utilization scenario. The total number of ultrafast MW chargers ranges between 3,000 and 8,000, depending on the utilization rate and the BET market uptake scenario. As for fast chargers, the range is between 7,500 and 18,000 chargers.

Impact of public and private overnight charging shares

Based on industry consultations, in our baseline scenario, we assumed a 35% share of public overnight charging out of total overnight charging for long-haul trucks. In this sensitivity analysis, we modify that assumption to consider scenarios in which long-haul trucks meet less (20%) and more (50%) of their charging needs through public overnight charging. Likewise, from a baseline assumption that regional heavy trucks meet 10% of their charging needs through public overnight charging, we consider alternate scenarios in which regional trucks satisfy a lower (0%) and higher (20%) share of their charging needs through public overnight charging. Table 10 summarizes these alternative assumptions.

Table 10

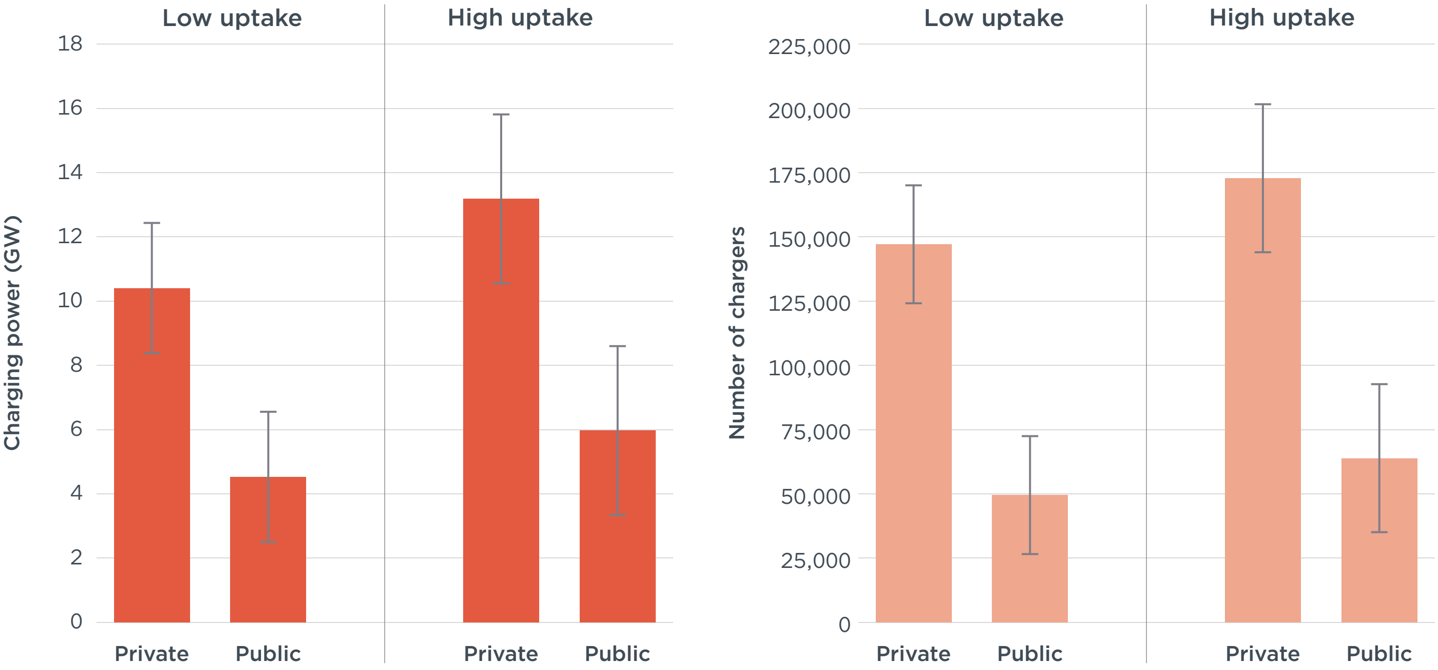
Alternative public and private overnight charging rate assumptions

Variable	Baseline	Low	High
Public share (long-haul)	35%	20%	50%
Private share (long-haul)	65%	80%	50%
Public share (regional)	10%	0%	20%
Private share (regional)	90%	100%	80%

Figure 13 shows the impact of these assumptions on public and private overnight charging needs. While the total overnight charging needs remain the same, public and private overnight charging needs can vary significantly, ranging between 8.3 and 15.8 GW for private overnight charging and 2.4 and 8.6 GW for public overnight charging, depending on the assumed shares and market uptake scenario. This represents between 125,000 and 200,000 private overnight chargers and between 25,000 and 90,000 public overnight chargers.

Figure 13

Impact of public vs. private overnight charging shares on overnight charging needs



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Impact of battery size on public fast and ultrafast chargers

A truck's battery size can significantly impact its daily charging patterns and energy needs. Our modeling assumed that all trucks start their daily operation with a full battery, maximizing the use of cheaper overnight charging. This section focuses on the battery size of long-haul tractor-trailers, which account for most of the BET fleet's public fast and ultrafast charging needs. As shown in Table 11, the baseline scenario assumed a 600 kWh battery size, aligned with the existing models in the market today. However, as battery packs get cheaper and lighter in the future, BET models could be equipped with larger batteries, providing truck operators with greater driving range and flexibility. Truck manufacturers also expect truck battery sizes to increase in the future, exceeding 700 kWh (NOW GmbH, 2024). This analysis thus considers a large battery scenario of 720 kW for long-haul tractor-trailers.

Table 11

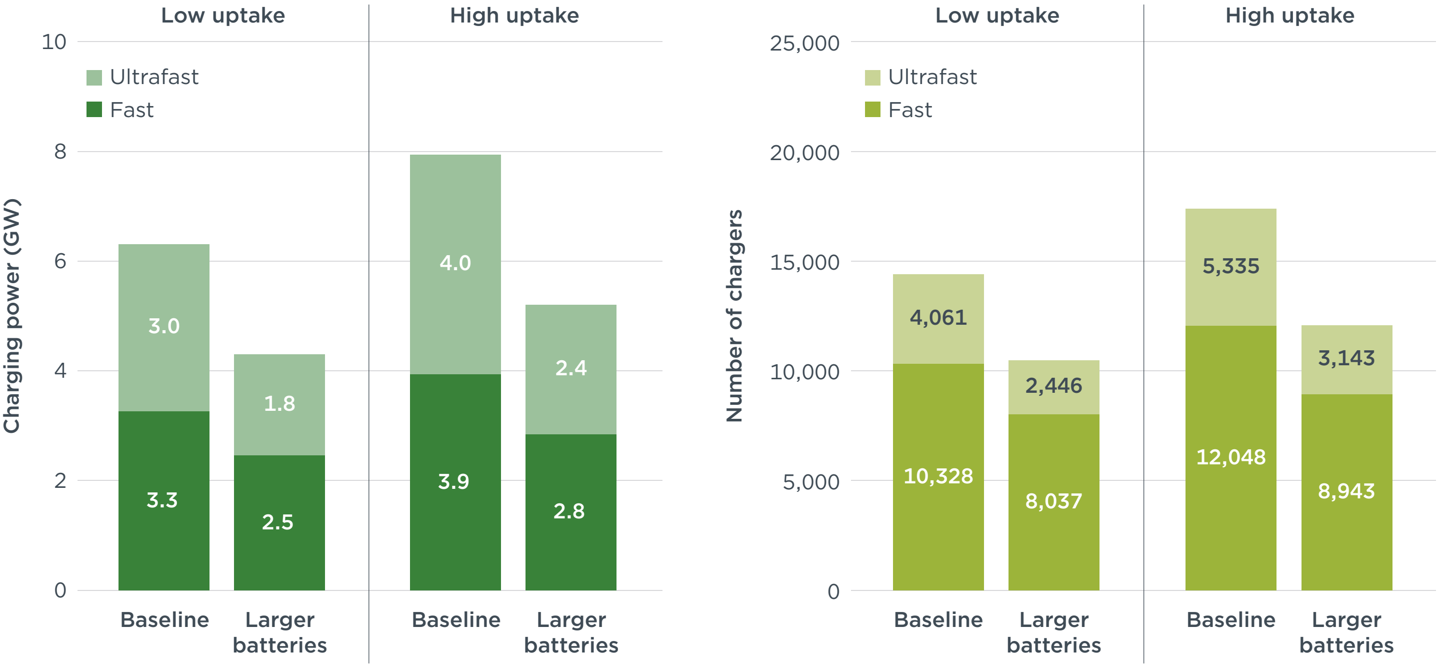
Alternative long-haul tractor-trailer battery size assumption

Variable	Baseline	Large
5-LH	600 kWh	720 kWh
10-LH	600 kWh	720 kWh

Figure 14 shows the impact of battery size on the fast and ultrafast public charging needs for the two BET market uptake scenarios. Larger batteries reduce the fast charging needs by almost 25% and the ultrafast charging needs by 40%. The larger battery covers more of the trucks' daily energy needs on a single charge, reducing the trucks' reliance on public fast and ultrafast charging. In this case, fewer than 2,500 chargers would be needed for MW ultrafast chargers to supply the public charging needs of long-haul trucks in the EU for the low BET uptake scenario.

Figure 14

Impact of battery size on public fast and ultrafast charging needs



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DISCUSSION

AFIR TARGETS AND PROJECTED PUBLIC CHARGING NEEDS

Our analysis found that, depending on the BET market uptake scenario, the AFIR targets cover between 50% and 70% of projected public charging needs in the EU-27 by 2030—a significant share. As stated by the European Commission (2025b), the AFIR's targets are intended to kickstart the HDV charging infrastructure market, providing basic charging infrastructure coverage across the main EU road network, while facilitating the deployment of additional charging infrastructure by the private sector.

AFIR coverage across the EU road network is not homogeneous, as the regulation sets different minimum charging infrastructure deployment targets across the core and comprehensive road networks. Our analysis shows that coverage may range between 65% and 85% across the core network but between 35% and 45% across the comprehensive network. This implies that the charger deployment envisioned by AFIR targets is disproportionately concentrated along the core network, even considering the more limited trucking activity across the comprehensive road network relative to the core road network.

OVERNIGHT, FAST, AND ULTRAFAST (MW) CHARGING

Megawatt charging will be essential to electrifying long-distance road freight in the EU. Nonetheless, overnight charging is expected to play a much bigger role in the near and medium term, as it is significantly cheaper than fast and ultrafast charging. Our analysis found that, depending on the BET market uptake scenario, between 4,000 and 5,300 ultrafast MW-capable chargers would be needed by 2030, mainly serving long-haul trucks. In general, overnight charging coupled with fast charging at 350 kW can cover most of the long-haul trucks' energy needs.

As the MCS is being finalized, all future truck models will be MW-charging compatible, enabling a more flexible charging schedule due to quicker recharging times. Eventually, we may see a faster rollout of MW chargers, leading to the replacement of fast 350 kW chargers if the charging prices are comparable. This could result in an approximate doubling of the MW chargers needed, to between 8,000 (Low scenario) and 10,000 (High scenario) by 2030. On the other hand, as shown in our sensitivity analysis, if long-haul trucks are equipped with larger batteries, their reliance on public MW chargers will decrease, resulting in 2,500 to 3,000 MW chargers in terms of charging needs.

MEMBER STATES' CHARGING NEEDS AND THE AFIR TARGETS

While the AFIR does not set Member State-specific targets for public infrastructure deployment, for most countries, approximate targets based on the length of the TEN-T network in each Member State fall short of projected needs. Meanwhile, for a few Member States, the approximate AFIR targets are sufficient or higher than projected needs. The main difference between the yield of the AFIR targets and our charging needs estimates comes from the different methodologies employed. As mentioned earlier, the AFIR sets distance-based targets for Member States along the TEN-T network. This means that Member States hosting relatively larger shares of the EU's road network, measured in total length, will need to deploy more charging infrastructure. Conversely, we estimated the charging needs of each Member State based on the expected BET stocks in each country and the truck traffic intensity on the road network in each country.

This explains why we project that countries like the Netherlands and Belgium would need significantly more charging power than the approximate AFIR targets, as shown in Figure 12. While these countries are geographically small—hosting only 1.9% and

1.7% of the total TEN-T road network, respectively—they are freight-intensive: the Netherlands and Belgium are expected to host around 5% and 3.5% of the total BET fleet in the EU-27, respectively, and 3% and 4% of trucks' total traveled tonne-kilometers. The other extreme would be Romania, where our analysis shows that approximate AFIR targets are 4 times higher than projected public charging needs. This is due to Romania's large area, covering almost 5% of the TEN-T road network, relative to its small share of regional freight operations, making up 0.7% of the expected BET stocks and 0.6% of long-haul trucking activity by 2030.

CONCLUSIONS AND POLICY CONSIDERATIONS

The wide deployment of truck-dedicated charging infrastructure in the EU is a key lever for decarbonizing the road freight sector. This study modeled expected charging needs by 2030 associated with the growing fleet of BETs in the EU-27. It also compared these public charging needs to the targets set in the Alternative Fuels Infrastructure Regulation. We arrive at the following key findings:

- **To power the expected BET fleet by 2030, a total installed charging capacity between 22 and 28 GW will be needed.** This range reflects different scenarios for market uptake of BETs in the EU-27. These charging needs are split almost equally between public and private chargers, underscoring the key role of public charging infrastructure in electrifying road freight. In terms of the number of chargers, this translates into 150,000–175,000 private chargers and 60,000–80,000 public chargers, with power ratings ranging between 22 kW AC and 750 kW ultrafast chargers.
- **Overnight charging, including both private and public charging sites, is expected to comprise more than two-thirds of the total installed power capacity.** Public overnight chargers are expected to mainly serve long-haul trucks that do not return to their depots at the end of their daily operation. We estimate that between 50,000 and 63,000 public overnight chargers, with power ratings between 50 and 100 kW, will be needed in the EU-27.
- **Megawatt charging needs by 2030 are estimated to be between 4,000 and 5,300 chargers, mainly serving long-haul trucks.** This comprises almost 15% of the total installed charging power needs and only 2% of the total number of chargers. While MW chargers are essential for long-distance trucking electrification, lower-power chargers, such as 350 kW chargers, can cover more than half the public fast charging needs for those trucks. In addition, if long-haul trucks are equipped with larger batteries, the need for MW chargers can be reduced by 40%, significantly reducing the trucks' reliance on public ultrafast charging.
- **The AFIR is expected to cover between 50% and 70% of the public charging needs in the EU-27 by 2030.** This range reflects different scenarios for BET market uptake. This coverage varies considerably between the EU's core and the comprehensive road networks: the AFIR targets cover between 65% and 85% of the projected public charging needs across the core network, but only 35% to 45% of the needs across the comprehensive network.
- **Germany is expected to host nearly 20% of total charging needs by 2030.** This is due to its large share of the region's overall truck stock and activity. The top 5 Member States—Germany, Poland, France, Spain, and Italy—are expected to account for more than 70% of total charging needs.
- **Implied country-specific AFIR targets are 2 to 3 times lower than projected charging needs in half of EU Member States but fully cover charging needs in the other half.** Gaps between approximate targets and projected needs are primarily evident in countries with a high share of road freight traffic but a small share of the TEN-T road network, such as the Netherlands and Belgium. On the other hand, the AFIR target for Romania is twice as high as expected charging needs, due to the country's large share of the road network and relatively low share of freight activity.

Our analysis shows that the current AFIR targets cover a significant portion of the needed HDV public charging infrastructure across the EU-27 by 2030. Meeting these targets will provide much-needed basic coverage and facilitate the deployment of additional charging infrastructure by the private sector. However, the scale of the required charging infrastructure will pose challenges to local grids, especially at high-power charging sites across the TEN-T network. In addition to grid congestion, lengthy permitting procedures and investment hurdles may delay the timely deployment of the infrastructure. Many of these challenges can be addressed in the review of the AFIR and other complementary policies on grid planning, permitting, and investment. In this context, we propose the following policy considerations:

- **Promote initiatives that focus on the deployment of HDV-specific charging infrastructure across key transport corridors in the EU.** Initiatives such as the Clean Transport Corridor Initiative will help accelerate charging deployment in key corridors of the TEN-T network and enable the application of best practices to fast-track and streamline the infrastructure build-out across other corridors. This and other initiatives that combine several EU countries—including their permitting authorities, grid operators, energy regulators, and ministries—are essential to enabling a comprehensive cross-border charging network across the EU.
- **Accelerate and streamline the charging infrastructure deployment process and grid permitting.** Accelerating the deployment of HDV charging infrastructure is critical to ensuring that a robust network of chargers is ready to meet the growing demand from electric trucks. Categorizing HDV charging stations and their connection to the grid as infrastructure in the overriding public interest can enable the fast-tracking of projects in the context of permitting procedures. In addition, streamlining the process across the EU can reduce the burden on charge point operators and ensure a more efficient planning process.
- **Empower grid operators to make proactive, anticipatory investments.** The existing demand-driven, reactive approach to grid planning can result in significant delays in grid upgrades. Given the long lead times for major grid upgrades, which are often not aligned with the much shorter deployment timelines for electric truck fleets, proactive grid planning is essential to ensuring the charging infrastructure is deployed in due time.
- **Promote transparency regarding grid hosting capacities and streamline the type and format of the reported data.** Investment in European grid development and digitalization is a key pillar for economy-wide decarbonization. With grid connection requests expected to massively increase due to soaring demand from several economic sectors, transparent and accurate information on grid hosting capacities can help charge point operators and depot owners carry out their own self-assessments of grid connection feasibility in locations of interest, enabling faster investment decisions, shortening the grid connection time, and reducing the burden on local grid operators.

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APPENDIX

Table A1
Assumptions on annual mileage, mean daily mileage, and standard deviation of the daily mileage per VECTO group

VECTO group	Annual mileage (km)	Mean daily mileage (km)	Standard deviation daily mileage (km)
1	58,000	223	20
2	60,000	231	20
3	60,000	231	20
11	65,000	250	20
12	67,000	258	20
16	60,000	231	20
10-LH	107,000	412	200
10-RD	68,000	262	100
4-LH	98,000	377	200
4-RD	78,000	300	100
4-UD	60,000	231	20
5-LH	116,000	446	200
5-RD	78,000	300	100
9-LH	108,000	415	200
9-RD	73,000	281	100

Table A2

Length of the comprehensive (total) and core road network in the EU-27 Member States

Member State	Total network (km)	Total network (%)	Core network (km)	Core network (%)
Austria	1,827	1.7%	1,101	2.3%
Belgium	1,839	1.7%	804	1.7%
Bulgaria	2,753	2.5%	1,466	3.1%
Croatia	1,968	1.8%	1,138	2.4%
Cyprus	492	0.5%	156	0.3%
Czechia	2,148	2.0%	1,015	2.2%
Denmark	1,664	1.5%	812	1.7%
Estonia	1,344	1.2%	369	0.8%
Finland	6,079	5.6%	1,039	2.2%
France	14,515	13.3%	5,555	11.8%
Germany	11,397	10.4%	6,369	13.6%
Greece	4,799	4.4%	1,760	3.8%
Hungary	2,706	2.5%	1,102	2.4%
Ireland	2,202	2.0%	501	1.1%
Italy	10,732	9.8%	4,317	9.2%
Latvia	1,739	1.6%	718	1.5%
Lithuania	2,059	1.9%	609	1.3%
Luxembourg	90	0.1%	69	0.1%
Malta	126	0.1%	16	0.0%
Netherlands	2,088	1.9%	670	1.4%
Poland	8,079	7.4%	3,702	7.9%
Portugal	2,960	2.7%	946	2.0%
Romania	4,836	4.4%	2,573	5.5%
Slovakia	1,559	1.4%	846	1.8%
Slovenia	603	0.6%	446	1.0%
Spain	12,135	11.1%	5,770	12.3%
Sweden	6,441	5.9%	3,012	6.4%
EU27	109,181	100.0%	46,878	100.0%

Table A3

Battery electric trucks' stock per Member State by 2030 under Low and High market uptake scenarios

Member State	Low scenario		High scenario	
	Stock	Share (%)	Stock	Share (%)
Austria	7,799	2.8%	9,192	2.7%
Belgium	8,260	2.9%	9,804	2.9%
Bulgaria	3,402	1.2%	4,231	1.3%
Cyprus	140	0.0%	140	0.0%
Czechia	9,986	3.5%	11,880	3.5%
Germany	70,511	24.9%	81,834	24.3%
Denmark	4,192	1.5%	5,055	1.5%
Spain	23,294	8.2%	27,903	8.3%
Estonia	852	0.3%	1,044	0.3%
Finland	2,982	1.1%	3,404	1.0%
France	40,589	14.3%	48,673	14.5%
Greece	1,546	0.5%	1,606	0.5%
Croatia	1,446	0.5%	1,717	0.5%
Hungary	4,647	1.6%	5,669	1.7%
Ireland	2,530	0.9%	2,988	0.9%
Italy	24,531	8.7%	29,191	8.7%
Lithuania	5,557	2.0%	6,926	2.1%
Luxembourg	1,446	0.5%	1,775	0.5%
Latvia	1,069	0.4%	1,309	0.4%
Malta	153	0.1%	183	0.1%
Netherlands	12,998	4.6%	15,702	4.7%
Poland	30,808	10.9%	37,005	11.0%
Portugal	5,229	1.8%	6,292	1.9%
Romania	7,931	2.8%	9,756	2.9%
Slovakia	2,762	1.0%	3,339	1.0%
Slovenia	2,104	0.7%	2,588	0.8%
Sweden	6,116	2.2%	7,367	2.2%

Table A4
VECTO groups' main attributes

VECTO group	Axle configuration	Body type	GWVR (t)
1	4x2	Rigid/tractor	7.5–10
2	4x2	Rigid/tractor	>10–12
3	4x2	Rigid/tractor	>12–16
4	4x2	Rigid	>16
5	4x2	Tractor	>16
9	6x2	Rigid	All weights
10	6x2	Tractor	All weights
11	6x4	Rigid	All weights
12	6x4	Tractor	All weights
16	8x4	Rigid	All weights

Table A5
Share of traffic activity in tonne-km across the core and comprehensive networks in EU Member States

Member State	Core (%)	Comprehensive (%)
Austria	2.7%	1.8%
Belgium	3.5%	2.8%
Bulgaria	0.4%	0.5%
Croatia	0.6%	0.3%
Cyprus	0.1%	0.1%
Czechia	1.9%	1.3%
Denmark	2.2%	2.2%
Estonia	0.1%	0.2%
Finland	0.5%	3.3%
France	14.2%	18.0%
Germany	24.1%	14.2%
Greece	0.9%	1.2%
Hungary	1.2%	1.3%
Ireland	0.4%	0.9%
Italy	16.3%	17.7%
Latvia	0.2%	0.8%
Lithuania	0.3%	0.3%
Luxembourg	0.2%	0.0%
Malta	0.0%	0.0%
Netherlands	1.8%	4.3%
Poland	14.3%	12.3%
Portugal	0.8%	1.3%
Romania	0.6%	0.6%
Slovakia	1.0%	1.6%
Slovenia	0.6%	0.2%
Spain	8.3%	9.1%
Sweden	2.9%	3.4%

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