

Power2Drive Europe

ACCELERATING THE TRANSITION TO CLEAN FLEETS: THE ROLE OF HEAVY-DUTY VEHICLES AND CORPORATE FLEETS IN THE CLEAN ENERGY TRANSITION

Heavy-duty vehicles (HDVs) account for a quarter of road transport greenhouse gas emissions in the European Union, contributing around 6% of total EU emissions. While emissions in other sectors have declined, road transport emissions have continued to rise since 1990. To address this, the EU has set ambitious targets, including a 45% CO₂ reduction for new HDVs by 2030, 90% by 2040, and a complete transition to zero-emission urban buses by 2030.

Smart electrification of transports for a seamless integration in the energy system

Electrification of transport is essential to achieving these targets, but its progress must accelerate. Manufacturers are forecasting 600,000 electric trucks by 2030¹—representing half of all new truck sales, however, the increasing number of electrified assets is straining Europe's already congested power grids. As mentioned in [smartEn's position paper](#), in countries like the Netherlands and Poland, up to 80% of new electricity connections are denied due to grid constraints. To avoid exacerbating this issue, electrification must be smart. By 2030, electric HDVs could account for up to 30% of the total energy demand from electrified road transport and require as much as 20 GW of peak power². Intelligent integration through smart and bidirectional charging for HDVs and corporate fleets will be key to accelerate electrification without causing grid disruptions, driving decarbonisation, and creating new economic opportunities.

Grid-integrated electric buses and trucks: Heavy on the road, easy on the load

[Grid-integrated HDVs offer a unique opportunity to accelerate decarbonisation, enhance grid stability, and reduce costs.](#) Smart and bidirectional charging optimises renewable energy integration by ensuring HDVs charge when clean energy is most abundant—for example, a waste truck with a predictable daily route could charge in the afternoon when solar energy peaks. Given that a single truck consumes as much energy as 50 cars, leveraging HDVs for renewable integration can significantly accelerate the decarbonisation of the road transport sector.

Beyond decarbonisation, HDVs can act as flexible storage assets, helping to reduce grid congestion by absorbing excess renewable generation and discharging energy when needed. The EU's Electricity Market Design already supports decentralised flexibility, and accelerating national implementation would allow HDVs to participate in electricity markets, balance the grid, and manage congestion.

For fleet managers, the declining Total Cost of Ownership (TCO) of electric trucks, combined with smart and bidirectional charging, offers significant financial benefits. Optimising charging strategies could save up to €15,000 annually for a fleet of ten trucks and enable new revenue streams through grid services³. By setting the right incentives and regulatory framework, policymakers can unlock the full potential of HDVs as energy assets, transforming them from a potential grid burden into key drivers of a smarter, cleaner energy system.

Grid-integrated corporate fleets: Making electric vehicles work overtime

¹ Truck electrification — Profit booster or white elephant? Available at:

<https://www.adlittle.com/en/insights/viewpoints/truck-electrification-profit-booster-or-white-elephant>

² ENTSO-E, 'Deployment of Heavy-Duty Electric Vehicles and their Impact on the Power System', 2023.

³ RAP & ICCT, 'Electrifying EU City Logistics: An analysis of energy demand and charging costs', 2020.

Another key lever for the transition of the transport sector are light- and heavy duty corporate fleets. Corporate fleets account for 60% of new car sales in the EU⁴, making them a key driver of transport electrification. Additionally, their frequent replacement cycles—every 2-3 years—expand the second-hand business EV market, accelerating adoption among private consumers.

The European Commission's upcoming proposal on the Decarbonisation of Corporate Fleets⁵ offers a prime opportunity to maximise this potential by mandating fleet electrification, ensuring European carmakers can ramp up their production to meet a guaranteed demand.

Unlike private cars, corporate fleets often follow centralised charging patterns in depots or parking lots, making them ideal candidates for rapid smart and bidirectional charging deployment. Large-scale fleet integration would drive economies of scale, reducing infrastructure costs and encouraging broader adoption. Fleet managers, in the meantime, could profit from using their vehicles as not only a transport, but also an energy storage asset, opening new revenue streams.

The challenge of securing adequate grid capacity

Grid constraints are emerging as one of the biggest roadblocks to electrifying HDVs. While investment is frequently mentioned as a challenge, the more pressing issue is the long wait times for grid connections and limited available capacity. For instance, a bus depot with 200 electric buses may require a 10 MW connection, but many operators struggle to secure the necessary power. Recharging hubs along highways face similar delays, with infrastructure projects delayed by slow permitting processes and grid congestion. While buffer storage options and onsite generation can provide a degree of relief for specific locations, the rollout of electric HDVs could stall before it even gets off the ground without urgent action to streamline grid connections and expand capacity.

Unlocking the full potential of flexible charging

Smart charging is emerging as a game-changer for fleet electrification, providing real-time control over electricity flow. Meanwhile, bidirectional charging (Vehicle-to-Everything or V2X) enables vehicles to return power to the grid or other assets. V2X is gaining momentum as major automakers roll out compatible vehicles and policymakers introduce supportive measures.

By enabling EVs to charge when renewable energy is abundant and feed electricity back when supply is tight, smart & bidirectional charging reduces reliance on fossil fuels, maximises the share of low-carbon energy in the energy system, and strengthens grid stability. It also helps balance local grids, reduces peak demand, and minimises the need for costly infrastructure upgrades. For fleet operators, the benefits go even further—managing charging across entire fleets rather than individual vehicles unlocks cost savings and new revenue streams, making electrification not just a necessity, but a financial advantage.

EU policy is evolving, but gaps remain

Smart electrification is essential to meet climate targets and to ensure an efficient, cost-effective, and clean energy transition.

⁴ Transport & Environment: 'Briefing on Corporate Fleets', 2023. Available at: <https://www.transportenvironment.org/uploads/files/Briefing-on-Fleets-Regulation-3.pdf>

⁵ Expected in early 2026, as per the Clean Industrial Deal Communication: https://commission.europa.eu/document/download/9db1c5c8-9e82-467b-ab6a-905feeb4b6b0_en?filename=Communication%20-%20Clean%20Industrial%20Deal_en.pdf

While current EU policies such as AFIR, EPBD, and RED⁶ include key supportive provisions, gaps remain in policies when it comes to supporting smart and bidirectional charging. [The EU needs to implement clear incentives to fully unlock the potential of clean fleets](#). This includes smart charging integration in fleet electrification mandates, prioritising public infrastructure investments, and urging national governments to swiftly implement the Electricity Market Design reforms, so that HDVs and corporate fleets can provide grid services.

HDVs and corporate fleets offer a major opportunity to drive transport decarbonisation, improve grid stability, and reduce operational costs. With smart and bidirectional charging, they can transform from a potential burden on the grid into valuable energy assets. Policymakers must provide the right regulatory framework and incentives to make fleet-wide electrification and grid integration a reality. Now is the time to act!

⁶ Alternative Fuels Infrastructure Regulation (AFIR), Energy Performance of Buildings Directive (EPBD) and Renewable Energy Directive (RED).