Smart Freight Centre

06 August 2026

Charging Needs for Fleet Electrification: Real World Data Perspective on AFIR

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1 Introduction

The transition to zero emission road freight requires coordinated action across vehicle supply, charging infrastructure deployment, policy frameworks and market demand. Through the [Fleet Electrification Coalition (FEC)](), [Smart Freight Centre]() works with freight buyers, fleet operators, infrastructure providers and other industry stakeholders to accelerate the transition by supporting coordinated deployment of zero-emission trucks (ZET) along strategic freight corridors in. FEC drives this transition by generating operational and economic feasibility assessments grounded in real world transport data, enabling logistics actors to commit where a viable business case exists, giving OEMs visibility into demand forecasts, delivering data-driven analysis of charging demand hotspots and infrastructure gaps to guide deployment, and providing policy insights that help bridge the gap between climate ambition and practical, on the ground deployment.

[FEC's EU corridor projects]() are currently active across Poland Germany Corridor, the Western Corridor and the Iberian corridor with additional corridors planned in near term. Through direct engagement with logistics actors within SFC Platform, FEC has collected real world freight movement data, including shipment volumes, lane characteristics, and operational requirements. The resulting dataset represents approximately **5.5+ million annual truckloads across 25+ shippers and 40+ countries,** including EU Member States and the UK as shown in Figure 1. Notably, the data collected extends beyond the geographic scope of our current corridor projects, a deliberate approach to enable the identification of additional high potential freight corridors where the FEC approach can be applied to support coordinated deployment of ZETs.

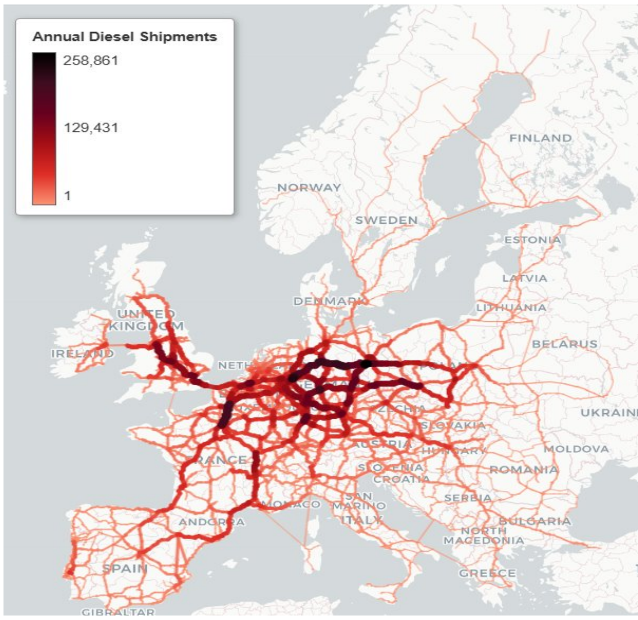


Figure 1: Geographic Coverage of FEC's Dataset Across Europe (Source: SFC)

A critical enabler for scaling long haul electric trucking is the availability of reliable and strategically located charging infrastructure. The road freight sector needs clearly defined ZET corridors that provide confidence to both shippers and carriers that ZETs can meet operational requirements while remaining commercially competitive. Public and semi-public charging infrastructure, strategically located along major freight routes and highways, will play a central role in enabling these corridors. This is where the **Alternative Fuels Infrastructure Regulation (AFIR)** becomes a key policy instrument. By setting requirements for the deployment of charging infrastructure along the Trans-European Transport Network (TEN-T), AFIR establishes an important foundation for zero-emission freight transport. However, infrastructure availability alone will not determine adoption, charging locations, power capacity, pricing, and alignment with real-world freight demand will ultimately influence whether ZETs can be deployed at scale.

This document builds on evidence collected and analyzed through data collected from FEC's real-world deployment projects. While the broader FEC dataset covers a wide range of geographies and freight operations, the analysis presented in this document focuses on a subset of data i.e. ~4.5million truckloads covering only EU27 countries, to provide recommendations on how AFIR implementation can better support the transition to ZETs. By linking infrastructure requirements with actual freight operations, the analysis assesses the availability and spatial coverage of charging infrastructure (based on publicly available infrastructure dataset) along freight corridors within AFIR's scope. It aims to identify where additional measures may be required to ensure that Europe's charging network enables commercially viable long-haul electric trucking and supports the EU's Green Deal ambitions. This approach reflects infrastructure sufficiency from a network coverage perspective and does not explicitly model capacity constraints at individual charging locations.

2 Scope and Feasibility of Electrification on and off the TEN-T Network

2.1 Network coverage

AFIR's mandatory targets are anchored to the TEN-T network. Our data shows this scope captures the large majority of the network relevant to the real-world operations based on transport data we analysed as shown in Figure 2

- **~83%** of our total lanes fall on the TEN-T network, accounting for **~73%** of total truckloads
- **~17%** of our lanes fall entirely outside TEN-T network, accounting for **~27%** of total truckloads

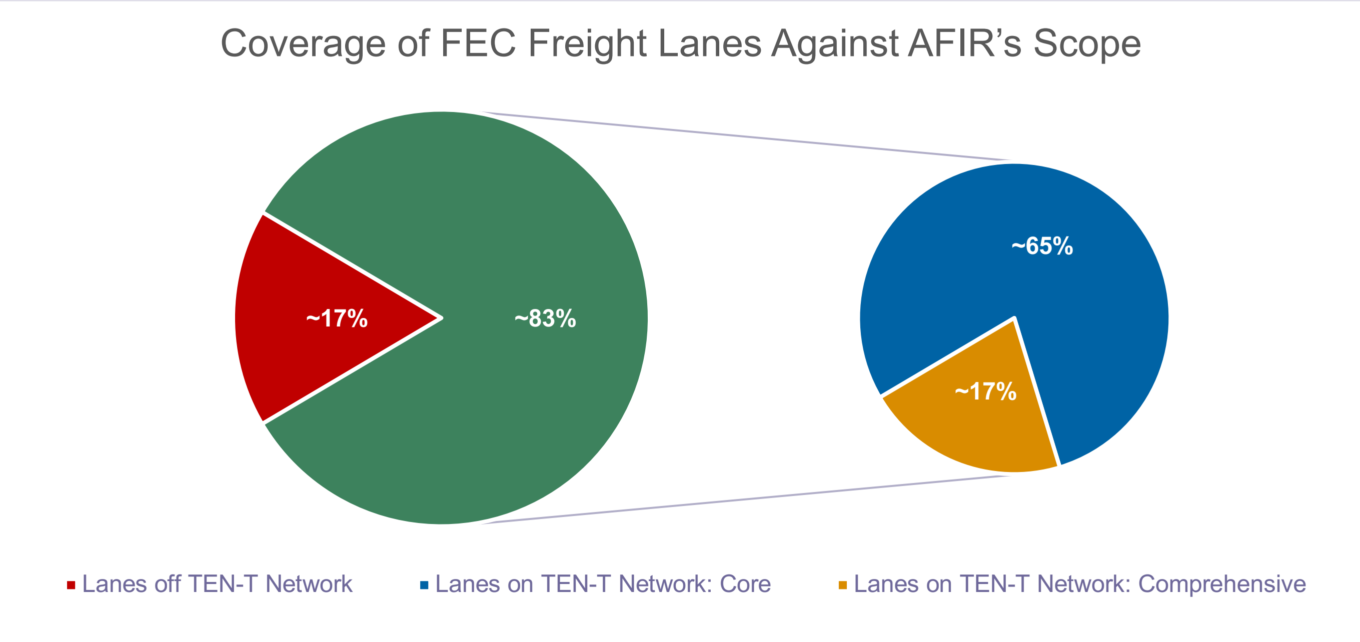


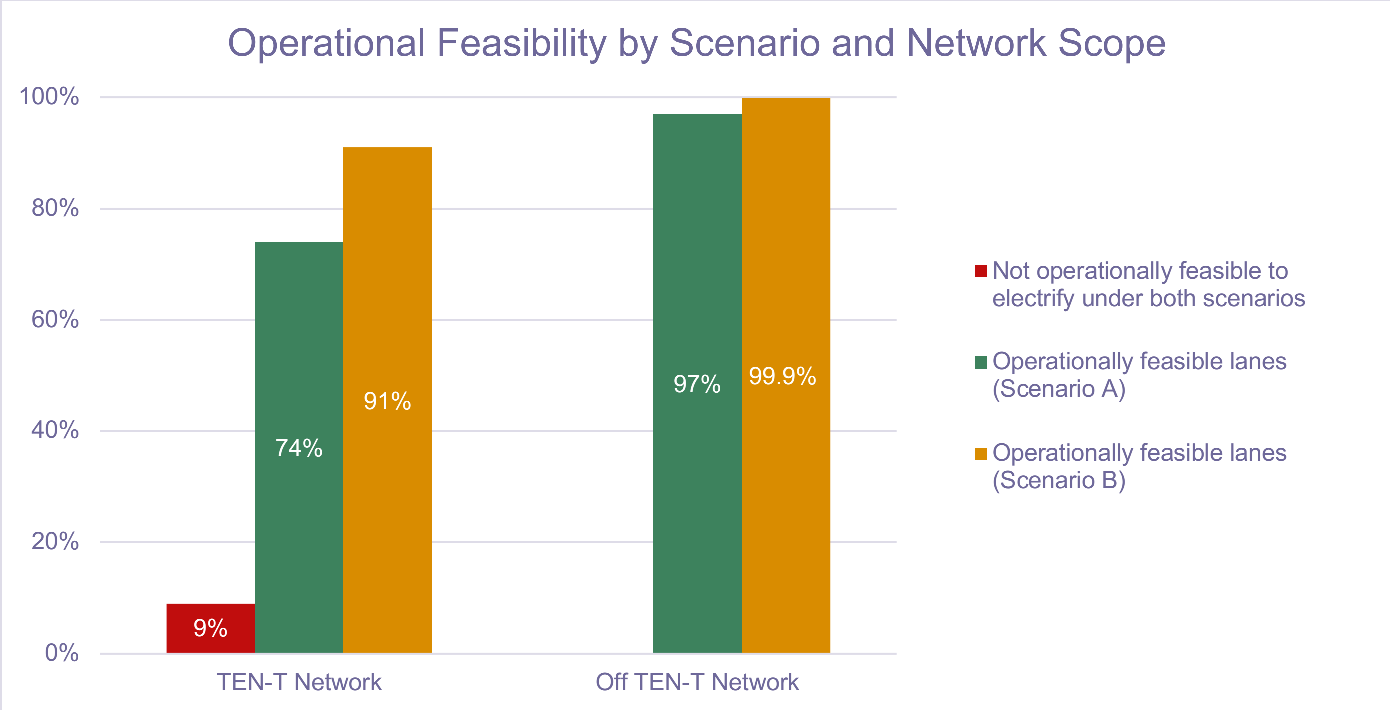
Figure 2: Coverage of FEC Freight Lanes Against AFIR's Scope (Source: SFC)

2.2 Electrification Feasibility on and off the TEN-T Network

Figure 3 below depicts the lane distribution and operational feasibility across network categories under two infrastructure scenarios:

- **Scenario A** (existing/planned public charging infrastructure only, no depot charging)
- **Scenario B** (public infrastructure including depot charging availability).

Scenario A reflects the infrastructure environment directly governed by AFIR currently, while Scenario B adds depot charging to test its incremental impact, together allowing us to attribute feasibility gains specifically to each infrastructure type rather than to infrastructure availability in general.



Category	Operationally feasible lanes of lanes within this category (Scenario A)	Operationally feasible lanes of lanes within this category (Scenario B)
TEN-T Network	74%	91%
Off TEN-T network	97%	99.9%

Figure 3: Operational Feasibility by Charging Scenario and Network Scope (Source: SFC)

Figure 4 shows the share of lanes and truckloads that are operationally feasible and at/near TCO parity (Green Premium ≤ 5%) under two infrastructure scenarios mentioned above.

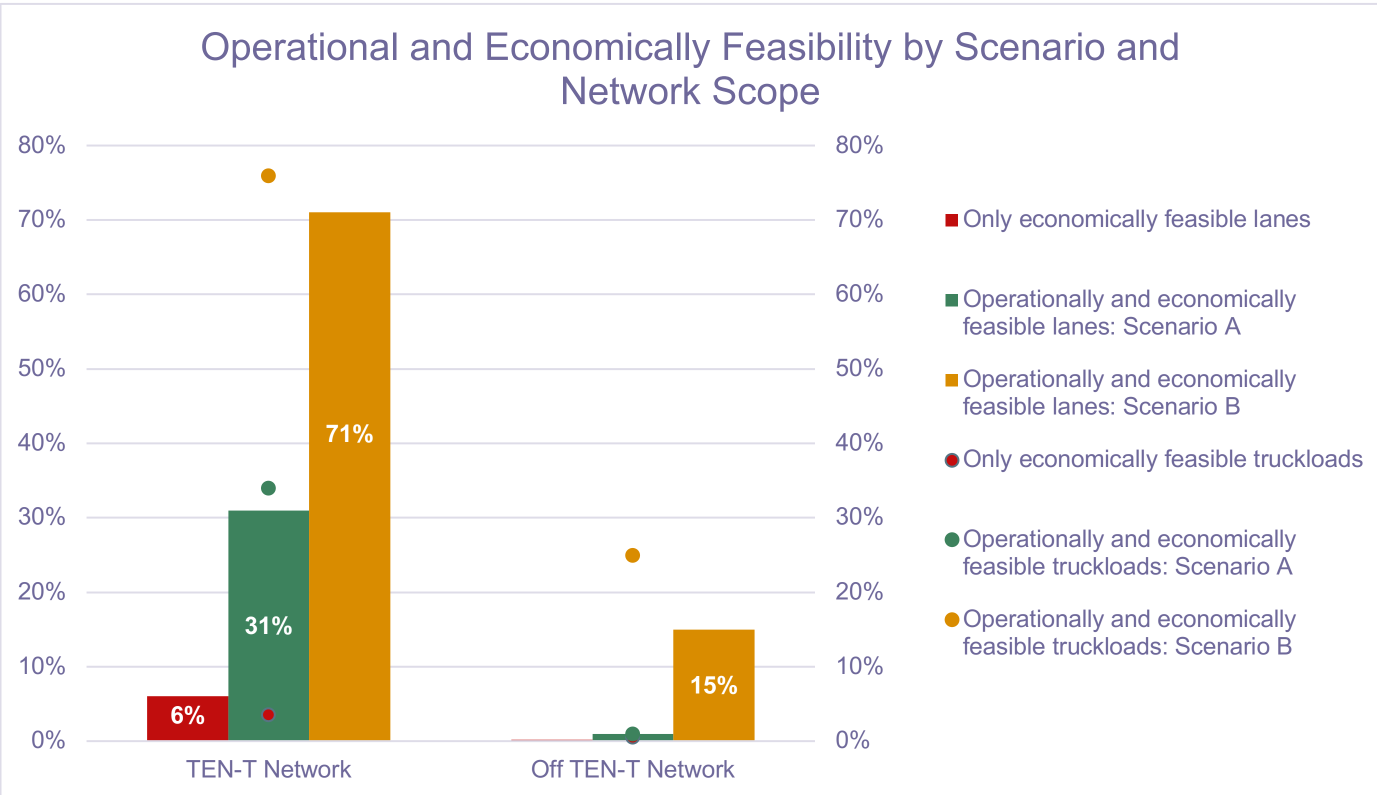


Figure 4: Economic and Operational Feasibility by Scenario and Network Scope (Source: SFC)

2.2.1 On TEN-T Network

- Of all the lanes on TEN-T network as shown in Figure 2, we see **~74%** are currently operationally feasible to electrify based on the existing or already planned infrastructure, assuming no depot charging exist (see Figure 3).

- However, only **~31%** of the total TEN-T lanes that are operationally feasible solely based on existing or planned infrastructure, are at or near parity accounting for upto only **~34%** of total truckloads on TEN-T lanes (see Figure 4).
- If depot charging is made available on TEN-T lanes, nearly **twice** as many lanes and truckloads can be electrified operationally and at/near parity (see Figure 4).
- Availability of depot charging in this case can have a significant impact especially on mid and long-haul segment (>400km) wherein additional **~23%** truckloads can be operationally and at/near parity be electrified (based on our analysis not presented here).
- A remaining of **~9%** of all TEN-T lanes are infeasible even with depot charging assumed available (as seen in Figure 3). However, as seen in Figure 4, **~6%** of all TEN-T lanes that are infeasible even with depot charging assumed are at/near parity (modelled assuming both public and private infra exist) and can be electrified provided public infrastructure is deployed.

2.2.2 Off TEN-T Network

- Of all the operationally feasible lanes off TEN-T network, we see **majority of these lanes** are currently operationally feasible to electrify based on the existing or already planned infrastructure, assuming no depot charging exist (see Figure 3).
- However, only **1%** of these lanes off TEN-T network that are operationally feasible solely based on existing or planned infrastructure, are at or near parity accounting for upto only **~1%** of total truckloads on non-TEN-T lanes as shown in table (see Figure 4).
- **~97%** of lanes off TEN-T network fall within <200km distance bands wherein the availability of depot charging plays a significant role (based on our analysis not presented here).
- As seen in Figure 4, there's significant increases in number of truckloads and lanes that can be electrified at or near parity if depot charging is made available.

The data supports the conclusions that,

- **The TEN-T-anchored scope captures the majority of real-world freight activity** (83% of lanes, 73% of truckloads based on our data), supporting the basis for AFIR's mandatory targets. However, the off-network 17% of lanes carries a disproportionate 27% of truckloads.

- **Depot charging is essential to operationally enable cross-border e-trucking, even though it sits off the TEN-T corridor itself** as it's seen to increase operational feasibility lanes from 74% to 91% of TENT lanes once depot charging is available alongside public infrastructure. A meaningful share of lanes that remain out of reach under a public-infrastructure-only model become electrifiable once depot access is accounted for.

- **Depot charging drives economic, not just operational feasibility.** The share of TEN-T lanes at or near TCO parity more than doubles, once depot charging is included. Depot charging therefore does two things simultaneously: it makes more lanes operationally drivable and it makes a larger share of those lanes financially feasible to electrify due to reduced prices as compared to public charging prices. A framework that accounts for feasibility alone, without this price effect, would understate how much of the network is genuinely ready for electrification.

3 Pricing of Public Charging Infrastructure

Beyond infrastructure coverage, public charging price levels significantly affect how many lanes and truckloads can be electrified at/near cost parity today provided infrastructure exist. As shown in the previous section, even where charging infrastructure is available, a significant share of lanes remains economically challenging to electrify. On the TEN-T network, 74% of lanes are operationally feasible to electrify without depot charging, but only 31% are also economically feasible, indicating that the majority of lanes that are technically suitable for electrification are not yet commercially viable.

However, the feasibility-to-parity gap significantly closes when lower charging prices (depot charging is considered) are considered highlighting charging costs as a major driver of the current economic barrier. This points to **public charging price levels as a critical and currently under-addressed factor within AFIR's framework**.

Given this, it is essential to consider a price ceiling, or other pricing intervention should apply to charging stations within scope of AFIR. To assess the scale of this effect, we modelled TCO outcomes across a range of charging price scenarios, testing how sensitive lane and truckload electrification potential is to changes in charging price alone, holding infrastructure availability constant. While lane results shown in Figure 5 show the geographical extent of feasible electrification opportunities at/near parity today (Green Premium ≤ 5%), truckload level results highlight the impact on actual freight activity.

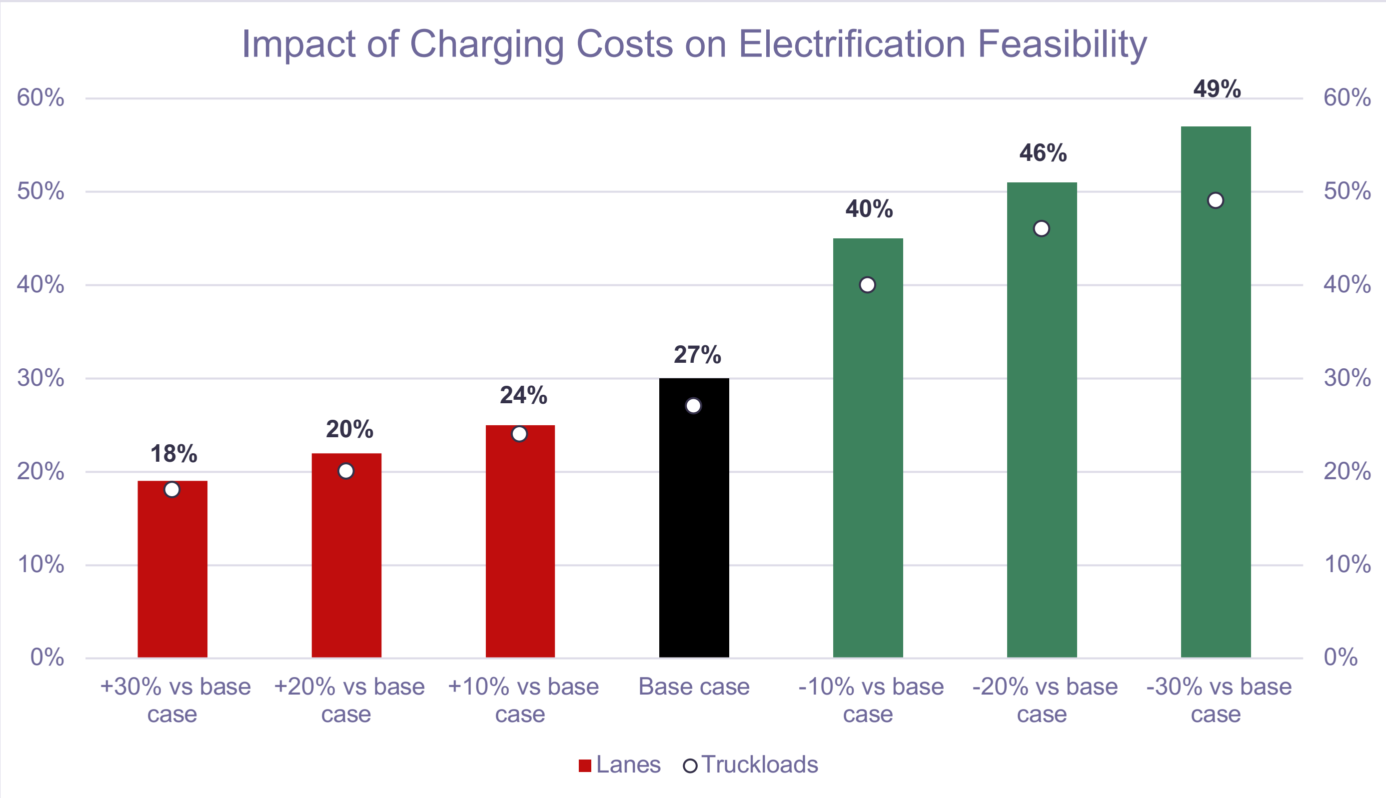


Figure 5: Sensitivity of Lane Electrification Feasibility (operational and economical) to Public Charging Prices (Source: SFC)
Note: Base case: €0.40/kWh as public charging prices; and no depot charging scenario

The results above demonstrate how charging prices influence the number of routes that become economically viable for electrification. However, not all lanes represent the same level of freight activity. Therefore, the analysis also considers the corresponding share of truckloads to assess the impact on real-world freight demand. The modelling results highlight a clear, steep sensitivity. Our analysis shows that,

- A 20% reduction in public charging prices nearly **doubles** the share of truckloads reaching or achieving TCO parity, increasing from ~27% to ~46%. This demonstrates that competitive charging prices can unlock significant additional freight demand for electrification without changes to vehicle prices or infrastructure availability.
- Conversely, an increase in charging prices significantly reduces electrification potential by **~35%** (27% to 18%) significantly delaying adoption by limiting the business case for operators to transition.

The data supports the conclusion that,

- **Price, not just availability, is a binding constraint on AFIR's objective.** AFIR's infrastructure targets solve for coverage and power output, but if pricing at those stations remains high or opaque, the regulation's own goal to enable fleet electrification especially in long haul trucking where pricing makes a significant difference is undermined regardless of no of charge points.

- **The current price environment leaves the majority of freight lanes uneconomical resulting in large amounts of truckloads not electrifiable.** At ~€0.40/kWh public charging price, 70% of lanes remain above TCO parity, accounting for upto 73% of total truckloads. In such cases, most operators lack near term financial case to electrify, even where chargers are physically available.

- **Because the sensitivity is this steep, moderate price movements have outsized effects on fleet electrification decisions.** This is not a marginal factor operators can absorb but close to the deciding variable in the purchase decision.

4 Recommendation

Depot charging targets should be formally recognized within the scope of AFIR: Depot charging not only increases the operational feasibility of lanes but also enables cheaper charging improving the business case for fleet operators. This is critical to achieving the 2030 CO_2 reduction targets for HDVs. Failure to recognize depot charging within AFIR risks underestimating a key driver of market adoption and slowing progress towards climate objectives.

Public charging price transparency should be ensured within AFIR: AFIR should require real time, standardized price disclosure in €/kWh across all publicly accessible charging infrastructure within its scope. This must include both ad hoc and contract-based pricing, presented in a consistent and comparable format. Charging costs are a decisive factor in the economic feasibility of electric freight operations. Without transparent and reliable pricing information, fleet operators cannot effectively plan routes, forecast costs, or optimize operations. A binding transparency requirement is therefore essential to enable informed decision-making and to support efficient market functioning.

Implement provisions in AFIR to ensure competitive public charging prices: While direct regulation of charging prices may risk distorting competition and deterring investment in charging infrastructure, AFIR should establish clear safeguards to ensure that charging prices remain competitive and transparent. This should include,

a) framework to track price trends against a reference benchmark, particularly on high traffic corridors where price effects on electrification potential are most consequential.
b) targeted interventions in strategic locations where limited competition may result in persistently high charging prices.

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Smart Freight Centre (SFC) is a globally active non-profit organization for climate action in the freight sector. Our goal is to mobilize the global logistics ecosystem, in particular our members and partners, in tracking and reducing its greenhouse gas emissions. We accelerate the reduction of logistics emissions to achieve a zero-emission global logistics sector by 2050 or earlier, consistent with 1.5° pathways.

Contact
Smart Freight Centre
Keizersgracht 572, 1017 EM, Amsterdam, Netherlands
P.O. Box 11772, 1001 GT, Amsterdam, Netherlands
www.smartfreightcentre.org
info@smartfreightcentre.org