BRIEFING - June 2024

How to credit renewable electricity for private HDV charging under the RED III

1. Context

The recent revision of the Renewable Energy Directive (RED III) obliges EU member states to introduce a credit mechanism to allow charging point operators (CPOs) of public charging infrastructure to sell credits for the renewable electricity consumed by battery electric vehicles (BEVs) to fuel suppliers. This obligation applies to public charging of both light-duty vehicles (LDVs) as well as heavy-duty vehicles (HDVs) such as trucks and buses. While there is no obligation on member states to also credit private charging, we strongly recommend doing so as explained in this document. We have outlined our key recommendations and best practices on how member states can best implement such a credit mechanism in more general terms here.

Crediting private HDV charging in addition to public charging is one of the most effective support schemes which member states can put in place to help improve the economic viability of early-stage private charging operations by transport companies. It is widely accepted that private recharging will be responsible for the majority of electricity supplied to HDVs. We estimate that around 70% of the total energy consumption from battery-powered trucks will be recharged at private and destination charging locations which is the commonly accepted ballpark figure also in the industry.

It is therefore essential for private charging to be included in the new credit mechanisms that will be implemented at national level as part of the transposition of the revised directive. As many of such private charging events will take place 'behind the meter', authorities will need to make a number of assumptions, such as the mileage factor and the average energy consumption depending on the heavy-duty vehicle type and application. Based on these assumptions, member states would set 'fixed values' which transport operators can then use to generate credits. We propose to use the established mileage factors and vehicle categories under the EU CO2 standards for HDVs for that purpose, as further explained below.

2. Proposed methodology

The HDV CO2 standards are regulating a manufacturer's average CO2 emissions from their new vehicle sales. To account for the difference in their emissions intensity, new vehicle sales have to contribute to the targets based on a weighting for their respective vehicle type, application, payload and mileage. The mileage factors included in the regulation serve as an estimate for the average annual mileage over the lifetime of a vehicle. For example, a 40/44-tonne tractor-trailer over a long-haul cycle (the most common truck type operating in the EU) is subject to a higher mileage factor than a 7.5-tonne rigid urban delivery truck (see Table 1 below).

The mileage factors as determined in the CO2 standards are the result of a multi-year development process of the so-called Vehicle Energy Consumption Calculation Tool (VECTO) led by the European Commission. The mileage factors have been validated in collaboration with

vehicle manufacturers and other industry stakeholders, including through accurate vehicle telematics data. This means that they are widely accepted to be sufficiently accurate compared to real world data to serve as the basis for EU regulatory compliance.

HDVs, which are newly registered in the EU from 2019, are subject to the HDV certification regulation and are obliged to have their energy consumption and CO2 emissions certified and simulated under VECTO. This also applies to zero-emission vehicles such as electric trucks and buses. For the purpose of the CO2 standards, certified vehicles are then allocated to so-called 'vehicle sub-groups' based on their vehicle characteristics, such as gross vehicle weight (GVW) and axle configuration.

Certified vehicle, energy consumption and emissions data are included in the so-called Customer Information File (CIF) which is provided to the customer. This means that a transport operator has full access to such vehicle information already today. It is already common practice for operators to use such data, for example when determining the CO2 emission class of their vehicle for the purpose of CO2-differentiated tolling systems in Europe. Using the vehicle sub-group and the respective mileage factor for the purpose of crediting privately charged renewable electricity would therefore be straightforward for both operators and national authorities.

Table 1 - 2 lists the proposed values, including the mileage factor for each vehicle sub-group under the recently revised HDV CO2 standards.

3. Additional assumptions

As these mileage factors refer to the total annual activity, they need to be multiplied with a correction factor to determine the mileage which relies on privately recharged electricity. We propose a correction factor of 0.7 in line with the industry consensus that around 70% of the delivered electricity can be expected to be recharged at private locations (see above). We consider this a reasonable mean value for all heavy-duty trucks as well as coaches. For urban and interurban buses we assume 100% private depot charging as they will in most cases not rely on public locations at all.

We further suggest assuming an average energy consumption (grid-to-wheel, i.e. including charger losses) based on road load calculations for equivalent vehicle types and applications as further outlined in this publication. Alternatively, this could also be averaged from the official vehicle certification data as monitored and reported annually by vehicle manufacturers and member states.

Germany's approach to private charging
Germany pioneered the approach of using 'fixed values' for private charging. Germany started with a fixed value of private charging for electric vehicles of 2 mWh per year. This value of 2 mWh is a realistic estimate of the yearly private charging on the basis of the average mileage of an average electric car in Germany. Later on, German authorities introduced values for other vehicle categories, using the UNECE standards. Private charging for vans (vehicle category N1) was estimated to be 3.5 mWh. Buses (vehicle category M3) were estimated to charge 87 mWh per year at a private charger.

A last addition was made in August 2023 for trucks (communication by German Environment Ministry). Fixed values for private charging were introduced for two types of truck categories. Smaller trucks up to 12 tonnes (vehicle category N2) are awarded 20.6 mWh of annual private charging and bigger trucks exceeding 12 tonnes (vehicle category N3) are awarded 33.4 mWh.

T&E strongly supports the overall approach and the values adopted, with 1 caveat. As detailed in table 1 below, the fixed value of 33.4 mWh for the bigger electric trucks do not reflect a realistic assessment of their 'real world' electricity consumption for the bigger trucks. As an alternative and to avoid a potential proliferation of different values for many types of HDVs across the EU - with uneven support for freight fleet electrification as a result -, T&E proposes to use the established mileage factors and vehicle categories under the EU CO2 standards for HDVs, based on the Vehicle Energy Consumption Calculation Tool.

Further information

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Table 1. Proposed values for heavy-duty trucks

Vehicle sub-group (GVW)		Mileage factor (km/a)		Energy consumption (kWh/km)	Privately charged energy (kWh/a)
		Total	Privately charged		
Medium trucks (5 - 7.4 t)	53, 53v	58,000	40,600	0.62	25,172
	54	58,000	40,600	0.62	25,172
Heavy trucks (7.4 - 16 t)	1s, 1sv	58,000	40,600	0.62	25,172
	1, 1v	58,000	40,600	0.62	25,172
	2, 2v	60,000	42,000	0.62	26,040
	3, 3v	60,000	42,000	0.62	26,040
Heavy trucks (> 16 t)	4-UD	60,000	42,000	0.62	26,040
	4-RD	78,000	54,600	1.17	63,882
	4-LH	98,000	68,600	1.29	88,494
	4v	60,000	42,000	1.41	59,220
	5-RD	78,000	54,600	1.17	63,882
	5-LH	116,000	81,200	1.29	104,748
	5v	60,000	42,000	1.41	59,220
	9-RD	73,000	51,100	1.17	59,787
	9-LH	108,000	75,600	1.29	97,524
	9v	60,000	42,000	1.41	59,220
	10-RD	68,000	47,600	1.17	55,692

	10-LH	107,000	74,900	1.29	96,621
	10v	60,000	42,000	1.41	59,220
Heavy trucks with special axle combinations (all weights)	11	65,000	45,500	1.29	58,695
	11v	60,000	42,000	1.41	59,220
	12	67,000	46,900	1.29	60,501
	12v	60,000	42,000	1.41	59,220
	16, 16v	60,000	42,000	1.41	59,220

Table 2. Proposed values for heavy-duty buses and coaches

Vehicle sub-group (GVW)		Mileage factor (km/a)		Energy consumption (kWh/km)	Privately charged energy (kWh/a)
		Total	Privately charged		
Urban buses	31-LF	60,000	60,000 [1]	1.43	85,800
	31-L1	60,000	60,000 [1]	1.43	85,800
Interurban buses	31-L2	60,000	60,000 [1]	1.31	78,600
Urban buses	31-DD	60,000	60,000 [1]	1.43	85,800
Coaches	32-C2	96,000	67,200	1.31	88,032
	32-C3	96,000	67,200	1.31	88,032
	32-DD	96,000	67,200	1.31	88,032
Urban buses	33-LF	60,000	60,000 [1]	1.43	85,800
	33-L1	60,000	60,000 [1]	1.43	85,800
Interurban buses	33-L2	60,000	60,000 [1]	1.31	78,600
Urban buses	33-DD	60,000	60,000 [1]	1.43	85,800
Coaches	34-C2	96,000	67,200	1.31	88,032
	34-C3	96,000	67,200	1.31	88,032
	34-DD	96,000	67,200	1.31	88,032
Urban buses	35-FE	60,000	60,000 [1]	1.43	85,800
	39-FE	60,000	60,000 [1]	1.43	85,800

[1] Assuming 100% of total energy is recharged privately.