Written feedback from Transport & Environment to the Commission on battery CF rules

During the meeting of the Expert Group on Batteries and Waste Batteries on 6 July 2023, participants were invited to send written feedback to the Commission on the draft report of the JRC that was presented during the meeting. The following input from Transport & Environment makes recommendations to improve the draft delegated act establishing the methodology for calculation and verification of the carbon footprint of electric vehicle batteries and builds on our previous position which can be found here.

Transport & Environment is Europe's leading clean transport campaign group whose vision is a zero-emission mobility system that is affordable and has minimal impacts on our health, climate and environment.

The EU has made a clear commitment to green batteries under the recently published new Battery Regulation, however, the devil remains in the detail of how the carbon emissions of batteries will be calculated. The ongoing work by the JRC and European Commission to prepare the upcoming delegated act on the methodology for calculation and verification of the battery carbon footprint is of vital importance and must ensure a framework consistent with the objectives of the Battery Regulation and that does not incentivise greenwashing.

T&E would like to highlight three areas of concern raised by the latest draft report of the JRC on battery carbon footprint calculation rules.

1. ***The Functional Unit - the Commission must drop the application-based approach (linked to the vehicle), which will favour more inefficient cars, and use a battery-based approach instead.***

Under the Battery Regulation, it is established that the Functional Unit is the total energy provided by the battery over its expected service life measured in kWh. Thereby, the total energy is obtained from the number of cycles multiplied by the amount of delivered energy over each cycle.

The regulation does not establish, however, how the battery service life is to be defined and calculated. There are two possible approaches: an application-specific (application determines service life) and battery-specific approach (battery lifetime determines service life).

The latest draft report of the JRC proposes to use the application-specific approach by linking the energy provided over the service life of the battery to the 'energy consumption of the vehicle'. This clearly goes beyond the political mandate given to the Commission under Article 7 and Annex II of the new Battery Regulation, which makes no reference at all to linking or

calculating the battery carbon footprint to the application in which it is used and refers to "battery's service life" not the vehicle's service life.
The application-specific approach will incentivise the production of high energy consuming vehicles, which will show a lower carbon footprint (as the vehicle efficiency is the denominator, not the numerator). Not only is this at odds with the environmental intentions of the Battery Regulation, but it will undermine and confuse the performance classification and maximum thresholds for the battery carbon footprint.

Carbon footprint (CF) metric as proposed by JRC:

$$CF\ (gCO2/kWh)\ = total\ battery\ CF\ (gCO2)/\ Quantity\ of\ vehicle\ FU\ (kWh)$$

$$CF\ (gCO2/kWh)\ = total\ battery\ CF\ (gCO2)/\ (EV\ efficiency\ (kWh/km)\ *\ EV\ lifetime\ (km))$$

Under the metric proposed by JRC, the more energy inefficient the EV, the better the carbon footprint for the battery. Figure 1 below shows how the carbon footprint is lower (or better) for EVs with higher energy consumption per km. This illustrative example is based on a car with a fixed total battery carbon footprint (4 tonnes of CO2e[1]) and a fixed EV lifetime of 160,000 km.

[1] 50 kWh battery with a carbon footprint from production of 80 kgCO2/kWh per battery capacity

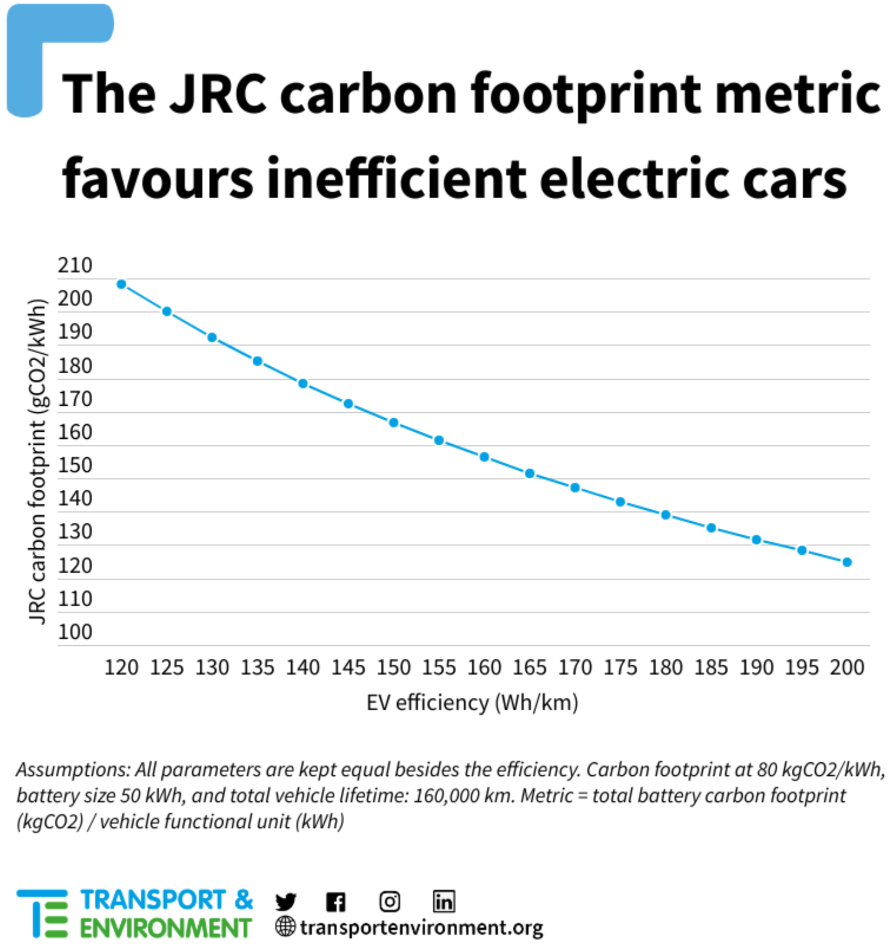

Figure 1: Carbon footprint as proposed by JRC as a function of EV efficiency

In a second example (see Figure 2 below), we model the outcome of the JRC battery carbon footprint approach on 4 different EVs using two different sized batteries (a smaller 50kWh and one larger 70kWh) in a more efficient and more inefficient model for each battery size. This approach accounts for the fact that EVs with bigger batteries are also usually less efficient. In this example it appears clearly again that, for a given battery size, inefficient vehicles are favoured (with a lower carbon footprint) over efficient ones, but also that in some situations an efficient EV with a small battery can have the same carbon footprint as an inefficient EV with a large battery.

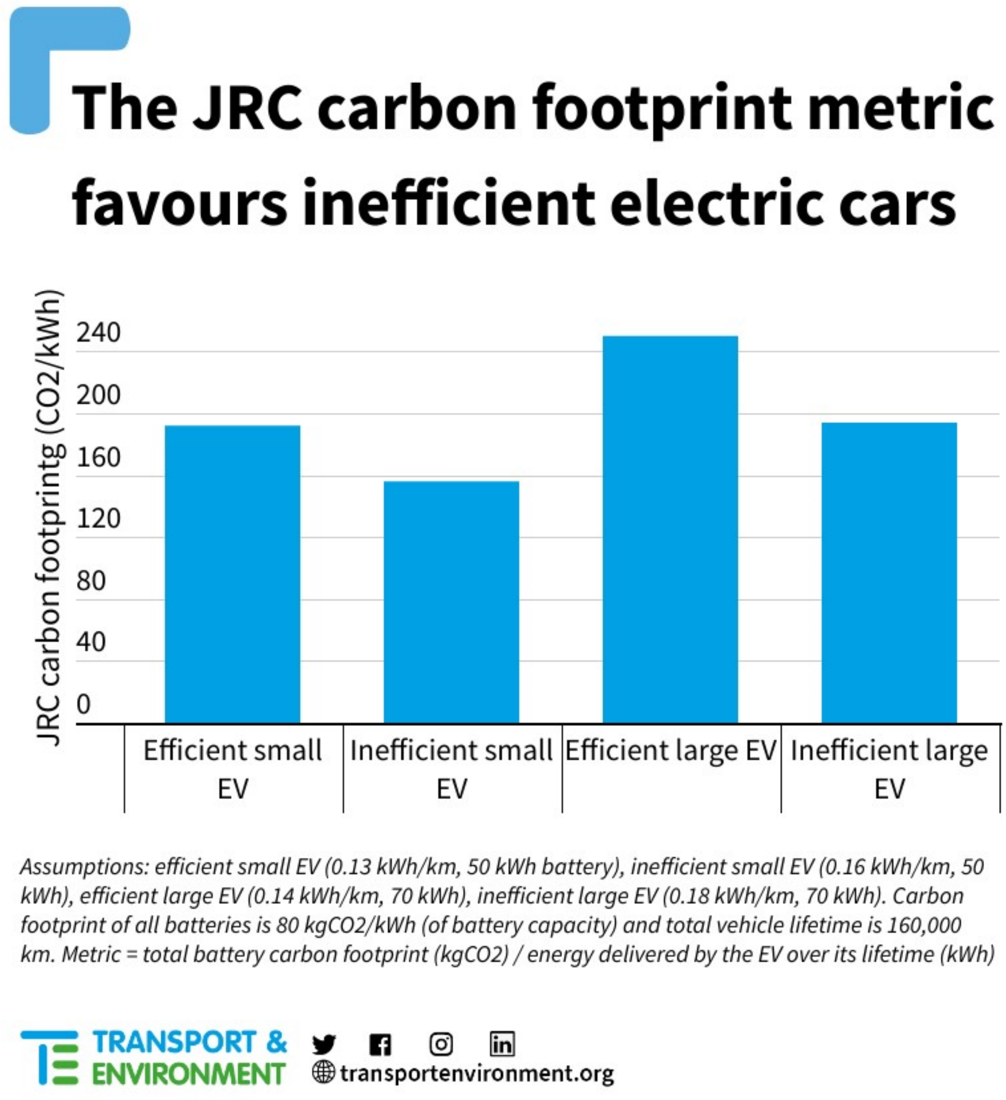

Figure 2: Carbon footprint as proposed by JRC illustrated by 4 EVs

The **JRC's application-specific approach is not acceptable as it would lead to carmakers prioritising the production of less efficient, heavier electric cars** which are more expensive for consumers and less resource efficient[2]. This would obstruct and potentially delay the development of a market for small, affordable electric cars in Europe.

Instead, the **carbon footprint rules should focus on batteries as they are produced and come out of the factory**, without covering parameters and characteristics of the vehicle, which is more simple and would avoid the risks outlined above.

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2 https://www.transportenvironment.org/discover/clean-and-lean-battery-metals-demand-from-electrifying-cars-vans-and-buses/

By relying on the battery function unit instead of the vehicle functional unit as the denominator of the carbon footprint calculations, the battery regulation would effectively push for batteries made with green energy, efficient processes and favours chemistries that use less carbon intensive materials. It avoids any kind of mixing or diluting with other considerations about the EV.

Carbon footprint (CF) metric as proposed by T&E:
$CF\ (gCO2/kWh) = total\ battery\ CF\ (gCO2)/\ Quantity\ of\ battery\ FU\ (kWh)$
$CF\ (gCO2/kWh) = total\ battery\ CF\ (gCO2)/\ (battery\ capacity\ (kWh)\ *\ cycle\ life\ (number\ of\ cycles))$

This battery-specific approach could be complemented by separate environmental rules on EVs, coving vehicle efficiency, as suggested by recital 19 of the car CO2 regulation.

JRC report - CFB-EV (June 2023)	**T&E proposed amendment**
§ 3.1.1 ***For light-duty electric vehicle batteries (vehicles belonging to categories M1 and N1 in the meaning of the Regulation (EU) 2018/8588), the total energy shall be calculated by multiplying (a) the service life (expressed in km) with (b) the energy discharged from the battery per unit of distance driven (expressed in kWh/km) measured during the type approval test.*** ***NOTE: EV batteries installed in the following vehicle types (as defined in UN GTR No. 15, namely Worldwide harmonised Light vehicles Test Procedure or WLTP9) fall under this calculation method: pure electric vehicles (PEVs), off-vehicle charging hybrid electric vehicles (OVC-HEVs, also known as plug-in hybrid electric vehicles), not off-vehicle charging hybrid electric vehicles (NOVC-HEVs, also known as non-plug-in hybrid electric vehicles), and EV batteries installed in fuel cell hybrid***	§ 3.1.1 ***For batteries, the total energy shall be calculated by multiplying (a) the cycle life (expressed in number of cycles) with (b) the battery capacity (expressed in kWh).*** ***The functional unit is defined as one kWh (kilowatt-hour) of the total energy provided by the battery system over the battery's service life, measured in kWh. The total energy is obtained from the number of cycles multiplied by the amount of delivered energy over each cycle.***[3]

[3] From Annex II, Point 3, Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, OJ L 191/1 ("Batteries Regulation")

vehicles (FCHVs) that are used for traction purposes. ***The service life is defined as the number of km driven until the battery reaches a State of Certified Energy (SOCE) equal to 70% for category M1 vehicles and equal to 65% for category N1 vehicles (as specified in the*** ***Annex II of the Commission's Proposal for Euro 710). The SOCE is defined as the percentage of the certified (useable) battery energy remaining at a given point in time, monitored by the Battery Management System (BMS), according to UN GTR No. 22. The default service life is assumed to be 160,000 km, according to the UN*** ***GTR No. 2211 minimum performance requirements (MPRi).***	

2. ***Electricity modelling - rules must incentivise investment in new renewable energy generation to lower the carbon footprint of production, and not greenwashing.***

When calculating the carbon footprint of a battery, manufacturers can choose to use the average grid emissions of the country where their batteries are produced. Alternatively, they can use plant specific values, but the rules of how to calculate these - whether based on a physical connection or some sort of contractual agreement - are crucial to the credibility of those claims.

The current draft JRC report would allow companies to base their green energy claims on the purchase of Guarantees of Origin (GOs) throughout the entire EU market and over a 12-month period. This could be a problem as the current GO system does not account for real time energy sourcing or actual energy feeds between consumption and production and therefore cannot demonstrate cleaner battery production in the real world. Under the proposed rules, there is significant risk that battery makers would set up new production facilities in regions with a carbon intensive energy grid and then simply buy their way to an artificially low carbon footprint through renewable energy certificates with no temporal or geographical link to the production site, instead of incentivising investments in low carbon energy production facilities in those countries.

Furthermore, when producing batteries with renewable energy, competition with decarbonisation of the grid must be avoided, as deviating existing renewable capacity from the grid will lead to indirect emissions by bringing more fossil generators in to fill the gap. Therefore it is important that battery producers claiming green energy are bringing additional renewables onto the system. However, as the sale price of GOs is not guaranteed, and there is no direct link between the market value of GOs and the revenue required to make investments in renewable power attractive, requiring GO purchases as proof of renewability will do nothing to bring additional renewable electricity capacity to the system.

The JRC's draft rules on electricity modelling would open the door to significant greenwashing by battery makers who would be able to offset their real world emissions by reporting and claiming renewable energy use via the purchase of GOs, with no link to the real world. This also does nothing to reward new EU battery start-ups including Northvolt and Verkor which have based their business case on producing batteries with clean energy, expecting that EU rules would incentivise such decisions. On the contrary, the draft electricity modelling rules will make it easier for larger Chinese and other Asian players to access the EU market.

T&E estimates that battery makers in Germany, for example, would be able to artificially reduce - or greenwash - their carbon footprint by up to a quarter (26%) if they use GOs to claim and report 100% of their energy consumption as renewable for the production of the battery, even if they are connected to the grid (see Figure 3 below).

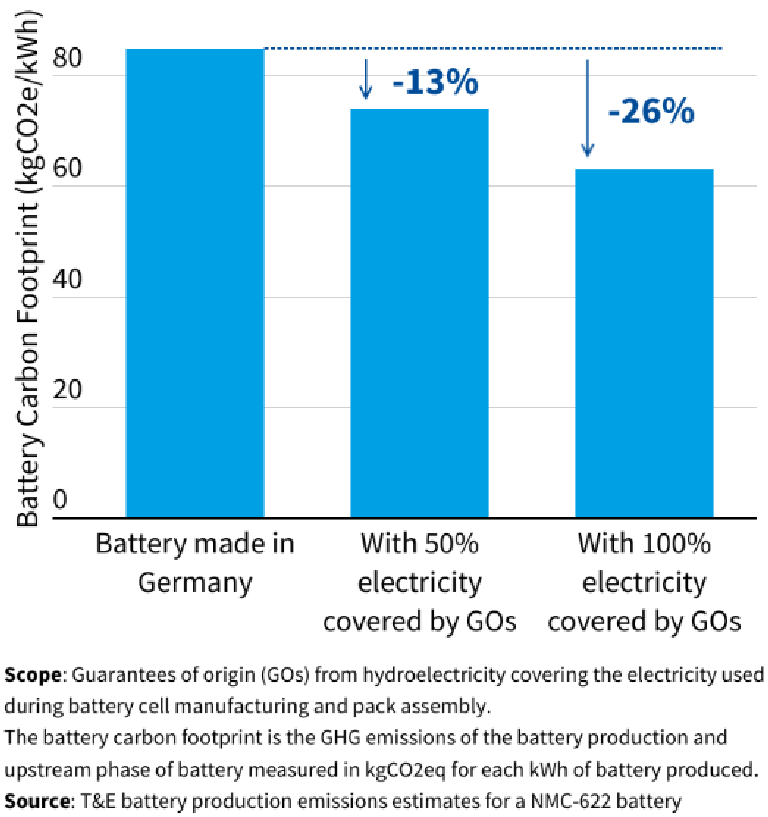

Figure 3: How much battery makers can greenwash their carbon footprint with GOs

T&E recommends the following additional criteria for the use of renewable energy certificates as part of the battery carbon footprint calculation:

- **hourly matching between energy generation and use** (instead of 12 months) - or at the very least over a 6 hour period - to ensure a direct connection between energy that is being generated and consumed.
- **a clear geographic link between the energy generation and use**, including that the battery producing plant be located in and connected to the same bidding zone or adjacent interconnected bidding zones.

A bidding zone is the largest geographical area in which market players can trade electricity without any restriction due to internal bottlenecks and where the same electricity price is applied. A bidding zone is usually a country or a subdivision of a country.

Therefore, to ensure a more direct physical connection between energy generation and use, the battery manufacturing plant should be located and connected to the same bidding zone as the energy producing plant.

JRC report - CFB-EV (June 2023)	**T&E proposed amendment**
§ 7.1.3.4 Criterion 4 7.1.3.4 Criterion 4 – Be as close as possible to the period to which the contractual instrument is applied To satisfy the criterion, the contractual instrument shall: - Ensure that certificates are valid ***no longer than 12 months*** after the represented electricity is generated. ***This means that the certificate shall be used (hence cancelled/redeemed/retired) within 18 months after the electricity was generated.***	§ 7.1.3.4 Criterion 4 7.1.3.4 Criterion 4 – Be as close as possible to the period to which the contractual instrument is applied To satisfy the criterion, the contractual instrument shall: - Ensure that certificates are valid ***on an hourly timestep*** after the represented electricity is generated.
§ 7.1.3.5 Criterion 5 7.1.3.5 Criterion 5 – Be sourced from the same ***market*** in which the reporting entity's electricity-consuming operations are located and to which the instrument is applied The electricity to which the contractual instruments refer to and the company claiming the contractual instrument shall be within the same ***market boundaries***.	§ 7.1.3.5 Criterion 5 7.1.3.5 Criterion 5 – Be sourced from the same ***bidding zone or adjacent interconnected bidding zone*** in which the reporting entity's electricity-consuming operations are located and to which the instrument is applied The electricity to which the contractual instruments refer to and the company

The "market boundary" refers to an area in which: ***— There is a physical interconnection between the point of generation and the point of consumption of renewable electricity. When interconnection happens across different grids, there shall be an entity that coordinates and tracks the exchange between such grids. — The countries' utilities/energy suppliers recognize each other's energy source tracking instruments and have a system in place to prevent double counting of claims.***	claiming the contractual instrument shall be within the same ***bidding zone or adjacent interconnected bidding zone***.

3. End-of-life and recycling - rules should incentivise use of primary data

The proposed Circular Footprint Formula as it is currently specified will yield high credits for the end of life recovery of materials, which is unverifiable at the point of placing the battery on the market. The default values proposed in the JRC report for *AMat* will also disincentivise the use of primary data by battery manufacturers who will automatically benefit from generous credits without having to use any recycled materials in their batteries.

Instead, the 'cut-off' approach (or recycled content approach) is an easier and more transparent approach as it relies on primary data by only applying credits or emission reductions for actual use of recycled content which is reported.

As the collection and recycling of batteries is already incentivised and mandated by the new Battery Regulation (Article 57 and Annex XII), **T&E recommends that the Commission considers using the cut-off approach instead, or at least amending the *AMat* values to prioritise the use of primary data** and minimise the risk of inflated carbon reduction credits and greenwashing.

JRC report - CFB-EV (June 2023)	**T&E proposed amendment**
§ 7.3.1 AMat: Material-specific allocation factor of burdens and credits between two life-cycles (i.e. the one supplying and the one using recycled material) aiming to reflect market realities. Values of parameter "AMat" shall be	§ 7.3.1 AMat: Material-specific allocation factor of burdens and credits between two life-cycles (i.e. the one supplying and the one using recycled material) aiming to reflect market realities. Values of parameter "AMat" shall be

selected according to ***Table 2***. In case a material is not present in Table 2, reference applicationspecific values shall be used (as available in the Part C of the Annex II of the EF method39). If no values for a specific application are not available, material-specific values for the parameter “AMat” may be used (using same reference as in above). If values of parameter “AMat” for the considered materials are not available, the default value of 0.5 shall be used.	selected according to Table 2. ***AMat should be equal to 0.8 instead of 0.2 for Al metal, Fe metal, Cu metal, Co salts, Ni salts, Mn salts, Li salts and graphite as listed in Table 2.*** In case a material is not present in Table 2, reference applicationspecific values shall be used (as available in the Part C of the Annex II of the EF method39). If no values for a specific application are not available, material-specific values for the parameter “AMat” may be used (using same reference as in above). If values of parameter “AMat” for the considered materials are not available, the default value of 0.5 shall be used.

Furthermore, as has been raised by several other stakeholders, T&E supports using a coherent term of E*v all across instead of switching between Ev* and E*v. The JRC’s current draft risks incentivising the use of materials with high footprint by granting equally high credits, regardless of where the recycling of the battery will actually take place and the material that will be substituted. We recommend the choice of E*v as a fixed dataset (and not a variable one as it is currently included) that will depend on the region in which the recycling is expected to take place (fixed E*v, that in the case of this specific regulation should be representative of the European production of the materials or if not available the global production of the material). To avoid the generation of negative results, we would then recommend to impose E*v=Ev when Ev is lower than the fixed E*v.

JRC report - CFB-EV (June 2023)	**T&E proposed amendment**
E*v: specific emissions and resources consumed arising from the acquisition and pre-processing of primary material assumed to be substituted by recyclable materials. ***E***v* shall be equal to Ev.	E*v : specific emissions and resources consumed arising from the acquisition and pre-processing of primary material assumed to be substituted by recyclable materials ***where recycling takes place.*** ***E*v is a fixed dataset (E*v(fixed)), that will depend on the default region in which the recycling is expected to take place. To avoid the generation of negative results, where Ev<E*v(fixed), then*** E****v*** shall be equal to Ev.