Feedback on the delegated acts of REDII

GHG methodology for RFNBOs and RCFs consumed in transport

In order to prevent any misunderstanding and miscalculation of the climate impact of both RFNBOs and RCFs, the methodology developed in the delegated acts should be clear and reflect the existing principles outlined in the REDII. Precise definitions and guidance for calculations will avoid misinterpretation of the formula and ensure that all the relevant climate impacts of the fuels are counted.

1. Renewable Fuels of Non-Biological Origin

Calculations must include electricity use for RFNBO production

Large electricity inputs are necessary for the production of RFNBOs[i,ii,iii]. These electricity inputs determine the climate footprint of RFNBOs to a significant extent. For instance, hydrogen produced via electrolysis in a high-carbon electricity grid of 440gCO_2/kWh will have a climate footprint of ~551 gCO_2/kWh$_{thermal}$[1]. This means that it will produce twice the CO_2 as natural gas to deliver the same energy service (natural gas ~204 gCO_2/kWh$_{thermal}$). Another example demonstrating the relevance of scope 2 (indirect) emissions was given by the Federal Minister for Environment, Nature Conservation and Nuclear Safety of Germany. They estimated that a RFNBO diesel produced with current German electricity would emit more than 330 gCO_2/ MJ (around 3.5 times more CO_2 intensive then fossil diesel, 94,1 gCO_2/ MJ).[iv, 2] Synthetic hydrocarbons need an even cleaner electricity input to breakeven with their fossil counterparts while providing the same energy service. Creating fuels such as synthetic kerosene and diesel requires lower carbon intensity of the grid (in gCO_2/KWh) due to the additional efficiency loss in the process. For instance, for synthetic aviation fuel, the literature estimates a breakeven of less than 100 g CO_2/KWh with grid electricity. Bringezu and Turnhau (2018) estimate that reaching a break-even point with conventional fossil products requires a minimum 86% renewable power input[v] (other estimates by Giesen et al.[vi] and Falter et al.[vii]).

To prevent stakeholders from miscounting their renewable electricity input, the current formula should clarify how electricity inputs should be counted (E_i). The counting should reflect the principles already outlined in the REDII.

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[1] Precise gCO_2/kWh thresholds vary due to the variety of types of fuels and conversion technologies. This estimate is based on assessments from van der Giesen et al. (2014), Falter et al. (2016) and Bringezu and Turnhau (2018).

[2] Assumed 50% conversion efficiency for synthetic RFNBO hydrocarbon production.

E_i Scenario 1: Grid connection

When calculating the emissions of hydrogen from electrolysis, the **carbon intensity of the electricity used to produce the fuel, in gCO2/kWh of respective national grid (unless directly connected with RES) should be taken into account.**

This requirement is in line with the solid environmental requirements outlined in the REDII on electricity:

- Article 27, 3. ''The **average share of electricity from renewable sources in the country of production**, as measured two years before the year in question, shall be used to determine the share of renewable energy''

Predictions of the emission factor of the grid in 2030 and 2050 should not be used to calculate the climate impact of electrolytic hydrogen produced today.

E_i Scenario 2: Additional RES electricity

When calculating the emissions of hydrogen from electrolysis, the **carbon intensity of the electricity used to produce the fuel, in full lifecycle emissions of gCO2/kWh of RES should be taken into account.** The emissions should also include construction emissions from the RES directly connected to the RFNBO production facility.

E_i Scenario 3: Power Purchase Agreements with temporal and geographical correlation

To ensure that the electricity used for RFNBO production can be counted as truly renewable, the production and consumption of electricity should be connected as much as possible. This requirement is in line with the PPA requirements outlined in the REDII:

- (90) ''/e/nsure that there is a **temporal and geographical correlation between the electricity production /.../ and the fuel production**''; '' renewable fuels of non-biological origin **cannot be counted as fully renewable if they are produced when** the contracted **renewable generation unit is not generating electricity**''

Standard Guarantees of Origin without any proof of temporal and geographical correlation should not be used as proof of RES consumption for the RFNBO production facility.

Furthermore, the RES used in the process should ideally be additional to what would have otherwise been consumed in the power sector. Otherwise, the fact that RES could've been used elsewhere should be accounted for in E_i (e.g. diverted from households, where it might've achieved more emission reductions per electron).

Examples of RFNBOs meeting the 70% reduction threshold

Using breakeven points to define truly low-carbon RFNBOs could be a way to strengthen current prerequisites for the production of these fuels and illustrate how renewable the electricity input should be.

Current estimates show that electricity needs to be less than~149gCO_2/kWh for hydrogen via electrolysis (estimated breakeven point with fossil natural gas) and **less than**

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~90gCO_2/kWh for synthetic hydrocarbons (estimated breakeven point with fossil counterparts) for RFNBOs to breakeven with their fossil counterparts. Defining the emission intensity of electricity (in gCO_2/kWh) for examples which cause 70% less emissions than their fossil counterparts would be a valuable addition to the current methodology. These examples could also demonstrate the use of the methodology in practice.

Defining where the 70% reduction threshold lies would be beneficial for selecting and developing projects which truly contribute to climate change mitigation[3].

Calculations must include all indirect emissions and carbon inputs

The carbon source in synthetic hydrocarbons also influences its overall carbon intensity. Synthetic liquid and gaseous fuels still emit CO_2 when they are burned. Hence, the climate effect of synthetic hydrocarbon fuels is not only dependent on the CO_2 intensity of hydrogen production, but also on the energy for capture of the CO_2, the energy lost in chemical synthesis of the fuels and the source of the CO_2 (e.g. atmospheric or fossil origin).

We **recommend that the formula differentiates between fossil, atmospheric and biogenic source of carbon**.[viii],[ix] For each of these sources, there are indirect emissions which can influence the climate impact of RFNBOs and therefore need to be taken into account:

- Fossil carbon: added emissions for fossil origin, added emissions for carbon capture energy use,
- Biogenic carbon: emission reduction for atmospheric origin, added emissions for ILUC impacts,
- Atmospheric carbon: emission reduction for atmospheric origin, added emissions for carbon capture energy use.

If the carbon in the form of CO_2, CO or materials such as waste is fossil, it could disincentivise the decarbonisation of other sectors . For instance, if taken from energy intensive industries, the CO_2 of fossil origin would simply be transferred to a different sector and emitted. If installations within the EU ETS would get credit for such a transfer, they would lose incentives to reduce their emissions.

Specifying the source of the carbon when talking about synthetic fuels would help in defining the robust environmental criteria for liquid and gaseous synthetic fuels. This clarification

[3] For more information on accounting and sustainability criteria for hydrogen, read our response to the consultation for the Hydrogen Strategy: https://bellona.org/publication/consultation-response-08-06-eu-hydrogen-strategy

could be included under the E_i by counting carbon inputs and the direct and indirect emissions associated to their origin.

Recycled Carbon Fuels

The source of carbon is even more relevant for the calculation of the climate impact of RCFs. Even when waste carbon flows provide a 'rigid' supply, they still contribute to an increase in the concentration of CO_2 in the atmosphere when converted to a fuel and combusted.

It's important to clarify that t**he final combustion of the fuel, particularly when it is made out of fossil feedstocks, is fully counted in E_u**. E_u should always be counted fully (in grams CO_2 emitted per MJ of fuel used), particularly for fuels made with fossil waste inputs.

Some stakeholders might assume that the emissions from the feedstock's fossil origin can be discounted by labelling it as a waste. In other words, some stakeholders using the methodology might want to discount their fossil waste input as waste with a zero GHG burden. To prevent such misinterpretation, **fossil inputs should be counted fully in E_i.**

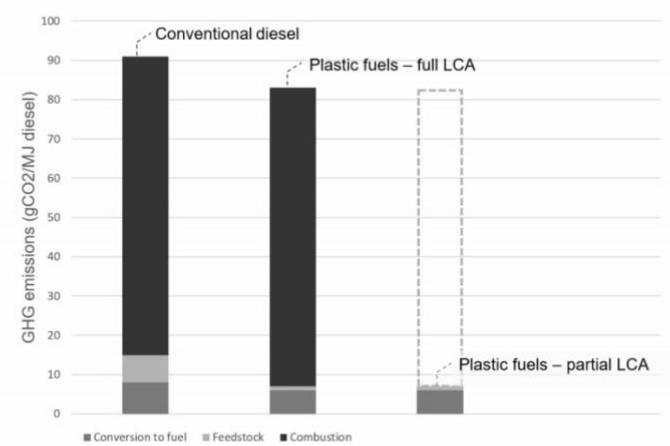

Figure 1: For plastic fuels, E_u needs to be counted fully. Combustion makes up the majority of the climate footprint of the fuel and a partial LCA would leave most of the GHG emission unaccounted. Adapted from Benavides et al. (2017)[x]

Overall, a methodology that accounts for all emissions to the atmosphere is needed to reach climate goals.

Recommendations for clarifications regarding both types of fuels

1. **Fossil fuel 'avoidance' should not be counted under any of the categories in the formula**. Some fuel producers claim that by producing a fuel they are directly displacing other fossil fuels in the market and might want to add it to the calculation. Due to a lack of evidence for the production of fuels causing a drop in fossil fuel consumption, this avoidance should not be recognised in the methodology.

2. **E_{rc} should be clearly defined in order to avoid misinterpretations of the term.** For instance, the term should not be interpreted as it fossil fuel displacement describe above. Recycling carbon only prevents emissions from going into the atmosphere if it is a circular process. If emissions to the atmosphere do occur, they should be clearly allocated to the producer or the emitter.

Minimum GHG emission thresholds for RCFs

RCFs should be requested to contribute to climate change mitigation on the same level as other fuels. As of January 2021 RFNBOs will need to meet the 70% emission reduction threshold. Therefore, we recommend that the same 70% emission reduction threshold is used for RCFs.

For any clarifications or comments, please contact ana@bellona.org

[i] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118776/current_status_of_chemical_energy_storage_technologies.pdf [ii] The Royal Society, "Policy briefing: Options for producing low-carbon hydrogen at scale," 2018. [iii] National Research Council; National Academy of Engineering, "The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs," THE NATIONAL ACADEMIES PRESS, Washington, D.C., 2004. [iv] https://www.transportenvironment.org/sites/te/files/Renewable%20fuels%20of%20nonbiological%20origin%20in%20transport%20decarbonisation%2C%20Thomas%20Weber_0.pdf [v] Bringezu, Stefan and Sebastian Turnau. 2018. Life Cycle Assessment of CCU technologies, 17 September 2018. https://ec.europa.eu/clima/sites/clima/files/events/docs/0129/03_technology_assessment_2_en.pdf [vi] van der Giesen et al, Energy and Climate Impacts of Producing Synthetic Hydrocarbon Fuels from CO2. Environ. Sci. Technol. (2014) [vii] Falter et al, Climate Impact and Economic Feasibility of Solar Thermochemical Jet Fuel Production. Environ.
Sci. Technol. (2016).

[viii] https://mobil.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF-Germany-CCU-Position-Paper-engl.pdf

[ix] Ramirez et al. 2020. LCA4CCU: Guidelines for Life Cycle Assessment of Carbon Capture and Utilisation. Commissioned by DG ENER, published March 2020. Document reference: CA4CCU001

[x] Benavides, P. T., Sun, P., Han, J., Dunn, J. B., & Wang, M. (2017, April 27). Life-cycle analysis of fuels from post-use non-recycled plastics. Fuel, pp. 11-22.

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