



EU REQUIREMENTS FOR GREEN HYDROGEN AND ITS DERIVATIVES

Analysis of the two REDII Delegated Acts specifying rules for renewable electricity sources and GHG emissions savings of RNFBOs (December 2022 leaks)

Delegated act on requirements for the sourcing of renewable electricity for the production of RNFBOs¹:

General information

- The provisions in the delegated act explicitly apply both to domestic and imported RNFBO.
- Biomass and storage facilities are generally excluded as possible RES-E sources. In the EU Parliament's REDIII proposal of 15 September 2022, however, biomass appeared as a possible energy source.
- The present leak contains the provision that voluntary or national certification systems are suitable for demonstrating compliance with the requirements mentioned below. This corresponds to the handling in the biofuels sector. All schemes must first apply to the Commission and be approved by it in accordance with Art. 30 (4).
- For both direct connection and grid connection, the RE plant from which the electricity is purchased must not be older than 36 months compared to the RNFBO production plant. Capacity additions are allowed within a further 36 months. Compared to the May draft, this presents a harmonisation of the rules for both sourcing options (in the May draft, a 24-month period was included for direct connections).
- For sourcing from the grid with PPA(s), two exemptions are included, for which the requirements for additionality, geographical and temporal correlation do not have to be proven:
 - The renewability criterion is generally fulfilled in bidding zones with a RES share of more than 90% in the grid, as long as a certain number of full load hours of the electrolyser is not exceeded.
 - The electricity is also considered renewable if it is consumed at a time when there was a curtailment in the respective bidding zone due to a grid bottleneck.
- These exceptions are likely to increase with the progressive expansion of renewables in the energy supply.
- For cases where these exception do not apply, the criteria of additionality, temporal correlation and geographical correlation must be met if electricity is sourced from the grid.

Requirements for additionality

- The RE installation must not be older than 36 months (see above).
- The RE installation must not have received any financial support (neither CAPEX nor OPEX). Exceptions exist for land acquisition and grid access as well as support payments that have already been fully repaid.
- Grandfathering and first-mover advantage: RNFBO plants that started operation before 2027 are exempt from the additionality criterion until the end of 2036. However, this regulation does not apply to capacities added after this date.

Requirements for temporal correlation

- Until the end of March 2028, slightly more flexibility is granted here and only a quarterly correlation between the generation of RES-E and the RNFBO is required. From April 2028, this will be tightened to an hourly correlation. This is in line with the EU Parliament's proposal from September. In our view, however, a quarterly correlation cannot ensure that the electricity used in the electrolyser is actually green.

¹ RNFBO = Renewable Fuels of Non-Biological Origin, including renewable hydrogen

- Alternatively, the electricity can be drawn from a storage facility behind the same grid connection point as the electrolyser or the RE plant - as long as it meets the criteria at the time of charging.
- A second alternative is to purchase the RES-E in times of low electricity prices in the bidding zone (20€ / MWh or less than 36% of an allowance for one tonne of CO₂eq.). The rationale behind this is that at times of low prices, electricity production with fossil energy sources would not be economical and additional electricity demand from the electrolyser would stimulate the additional production of RES-E.

Requirements for geographical correlation

- The requirement here is that the electrolyser and the RE plant must be located in the same bidding zone. The assumption is that bidding zones are designed in such a way that grid bottlenecks within the zone are avoided through appropriate mechanisms.
- It is important to note that for third countries in which no bidding zones exist (according to the EU definition), it would be possible to use equivalent concepts for the purpose of verification. This is an important addition compared to the last draft and had previously been mentioned as an obstacle by stakeholders in the partner countries of the PtX Hub.
- It is also possible to use electricity from RE plants in neighbouring bidding zones as long as the electricity price there was the same or higher on the day-ahead market. In this way, the additional demand from the electrolyser helps to reduce grid bottlenecks.
- In addition, the purchase of electricity from a RE plant in a neighbouring offshore bidding zone is permitted.
- Member states have the possibility to define further requirements for geographical proximity.

Delegated act on the requirements for the calculation of GHG savings from the use of RFNBOs:

General information

- The second act sets out the methodology for calculating GHG savings from RFNBOs. According to the REDII, the GHG footprint reduction from the use of RFNBOs must be at least 70% compared to fossil fuels. This is in line with the requirements for biofuels in the EU. The reference value for fossil fuels of 94 g CO₂ equivalent per megajoule is taken here as a comparative value. Accordingly, the GHG emissions of an RFNBO must be below 28.2 g.
- It is important to highlight that the methodology covers the entire life cycle of the RFNBO and thus includes emissions from input, processing, transport and distribution, combustion as well as savings from Carbon Capture & Storage (CCS). The EU methodology thus differs significantly from schemes in the UK, Australia, and China (or the Green Hydrogen Organisation), for example, which only consider production.
- If the GHG emission savings of a certain batch of hydrogen do not reach this threshold of -70%, it will not be recognised as either renewable or low-carbon hydrogen, as the EU framework applies the same threshold to both technologies.

Treatment of carbon sources

- The recognition of the carbon source (in the production of e.g. methanol or PtL jetfuel) as "avoided emissions" in the methodology has a direct impact on the GHG footprint. By crediting the carbon source, the total footprint can be reduced, which helps to ensure that the RFNBO does not exceed the threshold and becomes eligible.
- Carbon sources used for the production of hydrogen derivatives can count as avoided emissions if they are covered by the EU ETS. It should be noted here that in countries where no equivalent CO₂ pricing system exists, the captured carbon cannot be credited. Other eligible sources are direct air capture, biogenic sources, combustion of RFNBOs and geological sources.
- Unsustainable sources originating from electricity generation are considered as avoided emissions only until 2035. For all other purposes, this applies until 2040. This regulation is based on the foreseeable decarbonisation process in the respective sectors until 2040.
- A regulation for the exclusive use of sustainable or unavoidable carbon sources (e.g. from cement production) would have been desirable but is not included.

Treatment of the electricity source

- As long as the electricity used is considered "fully renewable" according to the rules of the delegated act on the sourcing of renewable electricity (see above), the carbon intensity of the electricity input is zero according to

the methodology. As the source of electricity accounts for the largest share of total emissions, this linkage of the two pieces of legislation has a significant impact on the overall GHG balance.

- If the electricity purchased from the grid does not qualify as "fully renewable", the following handling applies:
 - The average carbon intensity of the electricity mix of the country where the RFNBO was produced is used.
 - Exception: Depending on the number of full load hours the electrolyser is running, the carbon intensity can also be zero (Annex A, 6.).
 - Alternatively, the value of the GHG emissions of the marginal unit generating electricity in the bidding zone at the time of production can be applied.

Dealing with co-processing

- With regard to co-processing, there are significant additions in the latest version. In the last published draft, the following sentence in particular caused confusion: "If a fuel is a mix of renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and other fuels, all (fuel) types shall be considered to have the same emission intensity" (Annex A, 1., 2. para.). According to this, the emission value for "green" and "grey" products produced in one and the same plant would be averaged and both products would receive the same emission value. Consequently, it would be almost impossible to achieve the required GHG saving of 70% for the green product. This problem was most recently pointed out in the recent pilot audits for the certification of RFNBOs in the Netherlands.
- According to the leak that is now available, co-processing with different emission levels for "green" and "grey" products would be possible. The now added exemption would allow to differentiate proportionally and on the basis of the energetic value between the different inputs when calculating the GHG footprint.

Case studies conducted by the PtX Hub in partner countries assessing the implementability of EU rules in third countries:

During the official consultation phase of the two delegated acts in 2022, the PtX Hub joined forces with Hincio and Dii Desert Energy to analyse whether the requirements can actually be met in the regulatory system of respective countries outside of the EU. Interviews with project developers and other industry partners were conducted and feedback was aggregated based on a questionnaire. This questionnaire was specifically designed to capture obstacles and open questions concerning the DA on the sourcing of renewable electricity illustrating where specifications may be required. Our results are summarized [here](#). With the now revised drafts of the DAs, a summary is provided below on updates in regard to the specific concerns raised in our case studies:

- **Bidding zones:** The definition of bidding zones for non-EU countries, which was an issue identified by our respondents, is now addressed in more detail, see geographical correlation above. The same applies to **Imbalance settlement periods**.
- **36 months-synching:** This timeline for synching the installations generating renewable electricity and the installation producing RFNBOs is still in place.
- **Risk of not cutting the threshold of 90%:** The threshold of renewable grid electricity in a bidding zone to be counted as renewable if it exceeds 90% renewables in the previous calendar year still exits. However, the clarification is added that once the average share of renewable electricity exceeds 90% in a calendar year, it will continue to be considered higher than 90% for the five following years - unless the share falls below 90% in two consecutive years .
- **Temporal correlation:** In the aggregated feedback, the point was raised that the more flexibility on temporal correlation is provided, the better the electrolysers can operated and the better the LCOH. With regard to temporal correlation, additional specifications and a slightly longer transitional phase can now be found.
- **Operating and investment aid:** With respect to the uncertainty among respondents on what type of aid is allowed, more details are now provided (see additionality above).