

Q&A implementation of hydrogen delegated acts

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In meetings with certifiers and voluntary schemes, the Commission has discussed how hydrogen producers and voluntary schemes could implement the requirements set out in the “RFNBO delegated act”¹ and the delegated act setting out the GHG calculation methodology for renewable fuels of non-biological origin and recycled carbon fuels (“GHG methodology”)². This document sets out questions that have been raised by fuel producers and certifiers in the aftermath of the adoption of the delegated acts.

This report summarises the outcome of those meetings and does not create any enforceable right or expectation. The binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union. The views expressed in this document are without prejudice to the position that the Commission might take before the Court of Justice.

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As this report reflects the state of the art at the time of its drafting, it should be regarded as a 'living tool' open for improvement and its content may be subject to modifications without notice.

¹ [Commission Delegated Regulation \(EU\) 2023/1184](#)

² [Commission Delegated Regulation \(EU\) 2023/1185](#)

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General questions

1. What evidence would be required to demonstrate that hydrogen qualifies as renewable?

Reply: The RED does not include a definition of renewable hydrogen. Instead, the RED includes a definition of renewable fuels of non-biological origin (RFNBO), which covers hydrogen produced via electrolysis from renewable electricity as well as its derivatives. The term renewable hydrogen is often used as a simplification for hydrogen that qualifies as a RFNBO under the RED³. To count as an RFNBO, hydrogen is required to 1) fulfil the definition of an RFNBO as set out in Article 2(36) of RED, 2) comply with the rules set out in Article 27(6) of the RED for the sourcing of renewable electricity 3) achieve 70% emissions savings and (4) be traced through the supply chain in line with the rules set out in Article 30(1) and (2) RED. In this context the hydrogen delegated acts set out detailed rules for sourcing of renewable electricity that is used for the production of RFNBOs and for determining the GHG emission intensity (GHG methodology)⁴.

2. For what purposes do the rules on renewable hydrogen set out in RED apply?

Reply: The rules have to be met to count renewable hydrogen towards the targets set out in the RED. Complying with the rules is not a prerequisite for importing hydrogen or for placing hydrogen on the EU market but may be a prerequisite for receiving public support.

3. Are the RFNBO delegated act and the GHG methodology interlinked?

Reply: The RFNBO delegated act complements the RED by setting out detailed rules on how fuel producers can source electricity that counts as fully renewable. The RED itself already includes a rule that allows sourcing electricity that counts as partially renewable (average share of renewable electricity in the country in the year n-2). The GHG methodology includes a life-cycle approach to determine the greenhouse gas emission intensity of RFNBOs (and recycled carbon fuels “RCF”). This approach distinguishes between electricity that counts as fully renewable and electricity that counts as partially renewable. In addition, the methodology includes a formula that allows deriving the amount of RFNBOs and RCF that is produced as this is required to derive the emission intensity. The delegated acts are therefore closely interlinked.

4. What is the geographic scope of the hydrogen delegated acts?

Reply: The hydrogen delegated acts apply to hydrogen consumed in the EU, regardless of whether the hydrogen is produced inside or outside the territory of the Union. However, the application of the rules is limited to the purposes described under question 2. Accordingly, they do not set out binding rules for hydrogen production in third countries.

5. What means do fuel producers have to demonstrate that they comply with the criteria?

³ Hydrogen produced from biomass, although produced from renewable energy sources, is not eligible for counting towards the targets set out for RFNBOs.

⁴ Sourcing of electricity that is partially renewable is also possible in line with Article 27(3).

Reply: For certification of renewable hydrogen, producers can rely on a well-established system of certification by third parties, so-called voluntary schemes⁵. These are international companies with experience of more than a decade in certifying biofuels, biomass and other products worldwide. The Commission has been empowered to recognise voluntary and national schemes for certifying renewable hydrogen. The Member States are required to accept evidence from schemes that have been recognised by the Commission.

6. *How does the recognition process for voluntary certification schemes work?*

Reply: Voluntary schemes may submit applications for recognition to the Commission⁶. Before recognition, the schemes undergo a thorough assessment. Schemes meeting all criteria are recognised by the Commission via Commission Implementing Decisions. More details can be found on a dedicated [website](#).

7. *How can hydrogen producers get certified?*

Reply: Hydrogen producers have the option to either contact a voluntary scheme or to approach a national scheme set up by the EU Member States to get certified.

8. *May voluntary schemes apply further sustainability criteria (e.g. water input, resource efficiency etc.) than those set out under the RED and the delegated acts?*

Reply: Voluntary schemes are required to apply the criteria and certification rules set out in EU legislation. They may, however, go beyond these criteria on a voluntary basis provided compliance with the mandatory rules is still ensured.

9. *When can fuel producers start to certify renewable hydrogen under voluntary schemes? Is it possible to be certified before fuel production has started?*

Reply: Economic operators are required to successfully pass an initial audit before allowing them to participate in a voluntary scheme. The initial audit must always be on-site and must provide reasonable assurance on the effectiveness of its internal processes. This means that economic operators cannot make claims about the sustainability characteristics of individual consignments of RFNBOs under a voluntary scheme before the construction of the plant has been finalised and the plant is fully functioning. However, voluntary schemes are allowed to conduct document-based pre-audits assessing whether a project is designed in a way that should normally allow to pass the audit at a later stage. Such evidence may facilitate obtaining financing of projects. However, it must be considered that the official audits must be based on actual data from the facility.

10. *The RFNBO delegated act and the GHG methodology use the term renewable liquid and gaseous transport fuels of non-biological origin while the revised RED refers to renewable*

⁵ https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

⁶ Applications may be sent to the following address: ENER-VOLUNTARY-SCHEMES@ec.europa.eu

fuels of non-biological origin. Does this mean that the voluntary schemes should apply the methodologies set out in the delegated acts only to fuels consumed in the transport sector?

Reply: The revision on the RED increased the scope of the RFNBO definition to cover other sectors than transport. Accordingly, the Commission Decisions recognising the voluntary schemes will also apply the new terminology. The delegated acts will eventually be aligned with the new terminology. In the meantime, voluntary schemes that aim to cover other sectors than transport should apply the methodologies set out in the legislation that is in force for the certification of all RFNBOs, independently of the sectors where they are consumed.

Detailed questions: RFNBO Delegated Act

Scope

11. Must all energy consumption used by a hydrogen production facility be of renewable origin to produce RFNBOs?

Reply: No, not necessarily. Electricity or other forms of energy that are used for other purposes (lighting, safety, balance of system) but do not add to the heating value of the output do not need to be renewable. However, the CO₂ content of this energy source should be taken into account to calculate the greenhouse gas emissions savings achieved by the RFNBO. Similarly, electricity consumption that is used to compress transport or further process RFNBOs does not need to be renewable, unless it is used to add energy value to the RFNBO.

Direct connection

12. Does the exclusion of operating aid or investment aid also apply for directly connected installations generating renewable electricity?

Reply: No, the exclusion of public support does not apply for directly connected installations.

13. Is it required to conclude power purchase agreements “PPAs” if the electricity is sourced via a direct connection?

Reply: No, this is not required.

14. Can directly connected installations generating renewable electricity be also connected to the grid?

Reply: Yes, this is possible. Indeed, both the installations generating renewable electricity as well as the installation producing RFNBOs can be connected to the grid. In this case the provisions set out in Article 3 of the RFNBO delegated act apply for the electricity sourced via the direct connection and the provisions set out in Article 4 apply to the electricity sourced from the grid.

Sunset clause

15. How should the RES-E share in bidding zones be calculated (Article 4(1) of the RFNBO delegated act)?

Reply: The average share of renewable electricity shall be determined by dividing the gross final consumption of electricity from renewable sources in the bidding zone, calculated by analogy to the rules set out in Article 7(2) of Directive (EU) 2018/2001, by the gross electricity production from all energy sources as defined in Annex B to Regulation (EC) 1099/2008, except from water previously pumped uphill (excluded from both the numerator and the denominator), plus imports minus exports of electricity to the bidding zone. Imports and exports are not considered in the numerator. Where bidding zones are

identical to countries, the latest data on the RES-E that has been published by Eurostat are to be used for EU Member States and the latest data on the share of renewable electricity that has been published by the IEA for third countries. When IEA data is not available, data from the nation statistical institutes may be used. Where bidding zones are not identical to countries, data from official national statistics that have been derived in line with the methodology applied for determining the RES-E share in the SHARES tool have to be used⁷.

16. Under which scenario is a bidding zone, for which it has been established that the share of renewable electricity is 90% or more, no longer considered as having this status?

Reply: A bidding zone is no longer considered under Article 4(1) of the RFNBO delegated act to have a share of renewable electricity higher than 90% if the actual share drops below 90% for more than 5 consecutive years. The same principle applies to the calculation of the emission intensity of electricity in the bidding zone in the context of the application of Article 4(2).

17. We understand that even in bidding zones where the share of renewable electricity is 90% or higher, full load hours of hydrogen production may not exceed the maximum number of hours set in relation to the proportion of renewable electricity. What happens if this rule is not correctly implemented?

Reply: In the case described, the hydrogen produced during the maximum number of hours set in relation to the proportion of renewable electricity (8760 hours x RES-E share) would count as renewable (RFNBO) and hydrogen produced outside of these hours would count as non-renewable.

Curtailment

18. Is the cause of redispatch relevant when implementing Article 4(3) of the RFNBO delegated act?

Reply: The delegated act does not set conditions for the reason of the redispatch.

Renewable PPAs

19. What are the minimum requirements for “renewable PPAs”?

Reply: The requirements for renewable PPAs stem from the definition set out in the RED itself and the RFNBO delegated act. In the RED, a renewable PPA is defined as a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer. The delegated act allows fuel producers to conclude one or more renewable power purchase agreements directly, or via intermediaries. The renewable PPAs need to clearly identify the installations that produce the amount of renewable electricity that is used to produce the renewable hydrogen. Furthermore, the hydrogen producer can only claim the production of RFNBOs based on a renewable PPA if the electricity supplied under the

⁷ [https://ec.europa.eu/eurostat/web/energy/database/additional-data#Short%20assessment%20of%20renewable%20energy%20sources%20\(SHARES\)](https://ec.europa.eu/eurostat/web/energy/database/additional-data#Short%20assessment%20of%20renewable%20energy%20sources%20(SHARES))

contract has effectively been produced. Intermediaries referred to in the RFNBO delegated act may be involved by various means and for various purposes, including as a contracting party. For example, intermediaries can represent the electricity producers, but it is important that a direct relationship between the electricity producer and the hydrogen producer is maintained. In addition, the requirements on cancelling Guarantees of Origin “GOs” as described under question 20, the requirements set out in Article 5 of the RFNBO delegated act, as well as the requirements set out in Article 19 RED (referred to in recital 15 of the RFNBO DA), have to be met.

20. Several provisions in the RFNBO delegated act require concluding renewables PPAs with economic operators producing renewable electricity. What requirements would apply for GOs in this context?

Reply: The GOs for the PPA need to comply with the general requirements in Article 19 of RED and furthermore carry the same attributes as the physical installation producing the electricity. This includes e.g. the location of the installation, the age of the installation, and the time of the production. The associated GOs need to be cancelled before the expiry of the validity period and the volume cancelled shall correspond to that claimed under the PPA. The RES-e producer is not allowed to sell or transfer the associated GOs to any other entity than the operator of the electrolyser under the PPA. To enforce this, the Member State may decide to immediately cancel the associated electricity GOs. The requirements on GOs also apply in cases where the RFNBO DA does not require the conclusion of a renewables PPA.

Additionality

21. What could be considered as operating aid or investment aid referred to in Article 5(b) of the RFNBO delegated act?

Reply: Operating aid or investment aid referred to in Article 5(b) could be considered to include any payments received from public authorities for the construction of the installations generating renewable electricity and any benefits received from public authorities for the production of renewable electricity, including feed-in tariffs, feed-in premiums, reductions applying for the production, contracts for difference or any direct payments linked to the production of renewable electricity. Operating aid or investment aid does not include obligations or restrictions placed on energy consumers, producers or suppliers such as renewable energy obligations. Article 5(b) also sets out that support received by installations before their repowering, financial support for land or for grid connections, support that does not constitute net support and incentives provided via the renewable PPA are not considered. Whether e.g., a contract for difference constitutes net support should be assessed ex-ante and verified ex-post. For the ex-ante assessment, fuel producers should demonstrate based on the terms of the contract for difference that the contract is unlikely to result in net support for the contracted installation generating renewable electricity. In the ex-post verification, fuel producers should demonstrate that the contracted installations generating renewable electricity did not receive net support.

22. How could the definition of ‘come into operation’ set out in Article 2(5) be understood? First day of commercial delivery of even an uncomplete installation?

Reply: The RFNBO delegated act defines ‘come into operation’ as starting production of renewable fuels of non-biological origin or renewable electricity for the first time. Starting production should be

considered to include any form of commercial production of hydrogen, derivate or renewable electricity that is intended to be used or sold and goes beyond a pure testing of the installation. If the installation is taken into operation step by step (part of the capacity at date 1 and other part(s) of the capacity at (a) later date(s)), then the definition of coming into operation would refer to the first date. This applies to installations producing renewable electricity as well as to installations producing RFNBOs. For installations producing RFNBOs, the conditions for adding additional capacity in Articles 3(b) and 5(a), 3rd subparagraph, of the RFNBO delegated act shall be complied with in order to consider the different capacity parts as one installation.

Temporal and geographic correlation

23. Do interconnected bidding zones need to be adjacent?

Reply: No. While interconnected bidding zone are usually adjacent, there may be exceptions e.g., if the bidding zones are connected via a direct line such as a sub-sea cable but otherwise not adjacent.

24. How could the concept of the "offshore bidding zone" be implemented?

Reply: Offshore bidding zones should be considered as bidding zones that comprise only offshore areas i.e. no land. No such bidding zone has been created, so far.

25. Is it required to monitor physical electricity flows when sourcing renewable electricity from an interconnected bidding zone? Is it required to book capacity?

Reply: No, there are no such requirements under the delegated acts.

26. The third subparagraph of Article 6 of the RFNBO DA refers to the price of an allowance to emit 1 tonne of carbon dioxide equivalent. Which price should be applied exactly?

Reply: The closing price of the previous trading day for December futures for the ongoing year (source: [ICE Index](#) or [EEX](#), which are the most liquid platforms for these contracts at the moment) should be applied for the implementation of this provision.

27. The RFNBO allows the Member States to introduce additional criteria concerning the location of electrolysers and the installation producing renewable electricity and to introduce hourly correlation earlier than 2030 (as of July 2027). How should this be considered in the certification?

Reply: Where a Member State makes use of these flexibilities, voluntary schemes are required to take them into account in the certification. Such rules apply only for the production of RFNBO within the territory of the relevant Member State i.e. not for imported RFNBOs.

28. Which installations should be considered as new storage assets?

Reply: The RFNBO delegated act does not set a concrete requirement. One approach could be to consider storage assets that came into operation not earlier than 36 months before the installation producing renewable liquid and gaseous transport fuel of non-biological origin as new.

29. Assuming that the electricity price is low, so that the conditions set out in the third subparagraph of Article 6 of the RFNBO delegated act are met but installations producing renewable electricity under the PPA are not operative during this period, would it still be possible to consider electricity taken from the grid as fully renewable?

Reply: This would be possible if all other relevant criteria set out in the RFNBO act are met. This includes criteria on additionality as well as on geographical correlation. As regards the criteria on additionality, it would be enough that a sufficient amount of renewable electricity has been effectively produced by eligible installations under the PPA. However, it would not matter when this production has taken place.

Combination of options

30. May fuel producers source renewable electricity via different options (counting as partially renewable and counting as fully renewable)?

Reply: The RED sets out two main pathways to produce RFNBOs: The first approach, set out in the fourth subparagraph of Article 27(3), determines the share of renewable hydrogen based on the share of renewable electricity in the country of production in the year n-2. The second approach set out in the fifth and sixth subparagraphs of Article 27(3), which is further detailed in the RFNBO delegated act, allows the production of fully renewable hydrogen via several sub-options. Fuel producers may combine the pathways and options to source renewable electricity provided the way the electricity is sourced is fully documented in line with the requirements set out in Article 8 of the RFNBO delegated act. This applies also for electricity sourced during the same time interval. For each way of sourcing electricity, the dedicated rules apply. If for instance an electrolyser is fed with 50% electricity that counts as fully renewable and 50% electricity that is only 40% renewable, 70% of the total hydrogen produced will be renewable. The remaining 30% cannot be made renewable by applying the rules of the RFNBO delegated act. The hydrogen produced from the remaining 30% electricity may count as low carbon hydrogen under the forthcoming framework under the Hydrogen and Gas Market Decarbonisation Package.

Documentation

31. Article 8 of the RFNBO delegated act sets out reporting requirements for fuel producers. In this context it implies that information for each hour must be recorded where relevant. How could RFNBO producers do it practically?

Reply: Some of the requirements can only be verified if information is available on an hourly basis. This will be the case in particular when hourly temporal correlation is applied. Given that the requirement for hourly correlation applies only as from 2030, monthly correlation may be sufficient in many cases unless compliance options, which require checking hourly data, are applied (e.g. sourcing of electricity from an interconnected bidding zone, curtailment). It is recommended, however, to gradually introduce systems that automatically record information on an hourly basis e.g. via smart metering systems.

32. Which requirements on electricity GOs would apply when the RFNBO delegated act does not require the conclusion of a renewables PPA (e.g. areas with more than 90% RES in the electricity mix)

Reply: According to recital 15 of the RFNBO delegated act, Article 19 of RED obliges Member States to ensure that the same unit of energy from renewable sources is taken into account only once. Therefore, if RES GOs have been issued for the electricity used to produce the hydrogen, then these GOs need to be cancelled. The cancellation of the respective GOs can be done e.g. by the competent body designated by the Member States or by the producer of the hydrogen. It is up to the certifier of the installation to ensure that the amount cancelled corresponds to the volume of electricity used.

33. What is the role of GOs for the implementation of the RFNBO delegated act?

Reply: The RFNBO delegated act does not set out rules for the use of GOs and the use of GOs is not required to implement the requirements of the hydrogen delegated acts. The requirements for GOs stem entirely from Article 19 RED and therefore apply only where GOs have been issued or are used.

GOs and systems characterised by a comparable degree of robustness may still be used as a tool for demonstrating compliance with the criteria of the RFNBO delegated act. For instance, it would be possible for the fuel producer to demonstrate via cancelling the required number of GOs that at least an equivalent amount of electricity that is claimed as fully renewable has been produced by the installations producing renewable electricity under the renewable PPA. Only electricity produced by the contracted installations themselves is eligible. Accordingly, only GOs that have been issued for the installations covered by the renewables PPAs can be used to demonstrate compliance with the conditions on additionality and temporal and geographic correlation.

Application of equivalent rules in third countries

34. How should the concept of bidding zone and curtailment be implemented in third countries?

Reply: See Annex.

Detailed questions: GHG methodology

Source of carbon

35. *What are the requirements for an effective carbon pricing system?*

Reply: See Annex.

36. *What can be considered as biogenic CO₂ under the GHG methodology and how is it treated?*

Reply: Biogenic CO₂ comprises CO₂ that stems from the production or the combustion of biofuels, bioliquids or biomass fuels. CO₂ from the treatment of biogenic wastes is also eligible. In order to be eligible to count as emissions from existing use or fate *e_{ex-use}*, biogenic CO₂ must comply with the sustainability and greenhouse gas saving criteria and must not have received credits for emission savings from CO₂ capture and replacement, set out in Annex V and VI to Directive (EU) 2018/2001. Biogenic CO₂ stemming from processes which are out of the scope of the sustainability and greenhouse gas saving criteria are also eligible (e.g. if the installation has a rated thermal input below the applicable threshold).

37. *Can CO₂ for incineration of municipal waste in the EU be considered as avoided under the GHG methodology?*

Reply: According to Point 10(a) of the GHG methodology, one of the carbon sources that can be considered as avoided is CO₂ that (i) has been captured from an activity listed under Annex I to Directive 2003/87/EC and (ii) has been taken into account upstream in an effective carbon pricing system and (iii) is incorporated in the chemical composition of the fuel before the deadline set out.

Installations that incinerate municipal waste are currently not covered under the ETS and fossil-based CO₂ from the incineration of municipal waste can therefore not automatically be considered as avoided in the EU. However, CO₂ from these installations can be considered as avoided where a Member State, in its application of the ETS Directive, covers such emissions under the ETS. Further, biogenic CO₂ including the biogenic share of CO₂ arising due to the incineration of municipal waste constitutes an eligible carbon source provided the sustainability and greenhouse gas saving criteria are met. Compliance with the criteria could be assumed if the installation producing the CO₂ is exempt from demonstrating compliance with the sustainability criteria.

38. *If only part of the CO₂ released from a plant co-processing biogenic and non-biogenic input is captured, and if this part represents a share of all the CO₂ otherwise released smaller than the share of biogenic CO₂, can the captured CO₂ be considered 100% biogenic?*

Reply: In case of a CO₂ stream including both fossil-based and biogenic CO₂ the rules of the mass balance system should be applied. Accordingly, it is possible to consider all CO₂ taken from the stream biogenic, provided the amount of biogenic CO₂ taken from the stream does not exceed the amount of biogenic CO₂ that is included in the mixture. The appropriate period of time for achieving the mass balance is 3 months.

39. *In the case of production of RFNBO/RCF from CO₂ of fossil origin, is there a limitation for use of this carbon source, besides not being possible to consider savings under *e_{ex-use}*?*

Reply: No, it is not forbidden to use fossil-based CO₂, but it would make it more challenging to achieve the 70% threshold.

40. Are the combustion emissions of biogenic carbon considered? Which values should be used?

Reply: The emissions of fuel in use (e_u) of the produced RFNBO are always considered. The source of the carbon is not relevant. However, use of CO₂ would allow claiming a credit under e_{ex-use} , which may fully compensate the emissions due to fuel in use. The rules set out under point 10 of the methodology apply for this purpose. To determine the emissions of fuel in use (e_u), the values for the combustion emissions set out in Annex B shall be used.

41. How is carbon monoxide considered under the methodology?

Reply: Carbon monoxide is treated as any other input that has an energy content. It would need to be established whether the carbon monoxide is an elastic or a rigid input. The factor e_i is determined by subtracting the factor e_{ex-use} (the carbon embedded in the fuel) from the factor $e_{i\text{ elastic}}/e_{i\text{ rigid}}$. In case the carbon monoxide qualifies as an elastic input, the CO₂ equivalent of the carbon incorporated carbon monoxide is not considered under e_{ex-use} given that the emissions are not avoided (there is no relevant existing use). The only exceptions are cases where CO is an intermediate product and e_{ex-use} has already been determined in a previous production step. In this case the previously established values are maintained and only the additional inputs are considered. Further, the origin of the input (RFNBO, RCF or fossil fuel) must be considered when determining the share of RFNBOs and RCF in the output.

Other questions on e_{ex-use}

42. What are the criteria (biogenic vs. non-biogenic) to be applied for other gaseous inputs other than CO₂ (e.g. CO, N₂)?

Reply: The phase-out dates (2035, 2040) apply only to CO₂. Some fossil inputs may indeed qualify as input for the production of recycled carbon fuels. The carbon intensity of other (fossil) inputs would need to be considered as set out in the methodology e.g. by distinguishing between rigid and elastic inputs and by considering the rules for co-processing (see Annex I).

43. How shall the emissions from existing use or fate be calculated for waste which would be sent to a landfill?

Reply: Emissions from existing use or fate are calculated in line with Point 10 of the GHG methodology. In the case of waste which would otherwise be sent to landfill, all emissions that occur in the landfill including non-CO₂ emissions due to methane leakage could be considered. The fossil carbon incorporated in the composition of the fuel cannot be considered, however, as landfilled waste is not combusted.

44. What is meant by “captured CO₂ stemming from a fuel that is deliberately combusted for the specific purpose of producing the CO₂”? Would that include biomass that is burned for electricity production and the CO₂ is captured for fuel processing?

Reply: No, as in the case described the biomass is combusted to produce electricity. The CO₂ would not be eligible if the biomass was combusted with the sole purpose of producing CO₂ or no economically meaningful use of the energy stemming from the combustion would take place. Economically meaningful

uses of the energy would comprise for instance cases where the energy is sold or required for the operation of own production facilities including the RFNBO plant.

Rigid vs elastic inputs

45. What are examples for elastic and rigid inputs?

Reply: For determining whether an input has to be considered as elastic or rigid the rules are set out under point 4 of the GHG methodology. Rigid inputs include all inputs qualifying as a carbon source for the production of recycled carbon fuels, as well as outputs produced in fixed ratio by an incorporated process, which represent less than 10% of the economic value of the output. All other inputs are to be considered as elastic. Hence, the categorisation of an input may depend on the circumstances. Rigid inputs would therefore comprise liquid or solid waste streams of non-renewable origin which are not suitable for material recovery or waste processing gas and exhaust gas of non-renewable origin which are produced as an unavoidable and unintentional consequence of the production process in industrial installations (taken from the definition of RCF). Waste heat from processes might also fall into that category. Elastic inputs comprise for instance petroleum products, electricity, natural gas and CO₂. In case of doubt an input should be considered as elastic.

46. Assuming a process using municipal waste as feedstock that includes a mixture of biogenic feedstock and feedstock that can be used for the production of RCF, would the emissions from e_i including e rigid and e_{ex-use} need to be allocated to all products or only to the products from non-biogenic origin?

Reply: As a general rule, in accordance with point 1 of the GHG methodology, all (fuel) types shall be considered to have the same emission intensity. The overall emissions from e_i should thus be divided by the energy in the overall produced fuels.

Allocation of emissions

47. Point 1 of the Annex of the GHG methodology can be considered to set out allocation rules for emissions in its own right. How do these rules interrelate with the allocation rules for co-products set out in point 15?

Reply: Point 1 sets out that 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 unless the exceptions for co-processing apply. This represents a specific rule for a production step yielding only energy products including RFNBOs and RCF while point 15 sets out general rules including mixes of energy products and other products. The rules set out in point 15 therefore apply on top of the specific rule set out in point 1. If for instance a process yields next to RFNBOs, RCF and other fuels also materials with no energy content, a first allocation should be done based the economic value of the co-products as set out under point 15(f), while for the energy products the allocation rule set out under Point 1 applies.

48. Is the processing of mixed biogenic and non-biogenic non-recyclable waste into fuels considered as a form of co-processing?

Reply: No. According to the GHG methodology, co-processing covers only cases where RFNBOs and RCF are replacing a conventional input in a process. As no replacement takes place in the example given, the rules for co-processing do not apply and the entire output from the process is considered to have the same emission intensity.

49. How should emissions from an electrolyser facility be allocated between hydrogen and oxygen, if the oxygen is used in other processes and not released to the atmosphere?

Reply: In this case emissions should be allocated based on economical allocation. The economic value considered shall be the average factory-gate value of the products over the last three years. If the hydrogen is composed of products to which are attributed the same emission intensity (RCF and RFNBOs), an average price (weighted arithmetic average) can be applied.

50. Which rules apply for the allocation of emissions to heat as a co-product?

Reply: It is possible to allocate emissions to heat (if used as a product). The allocation should be based on a carnot efficiency calculation as defined in point 15(e) of the GHG methodology. The same rules apply as set out for biofuels in Annex V to the RED.

51. If all co-products have an energy content but are not fuels, should economic allocation be used?

Reply: All products with an energy content should be considered to be fuels.

52. If the ratio of the products is fixed and some co-products are materials with energy content, can the allocation be done in energy terms, even though the co-products do not all have an energy content?

Reply: No, point 15(f) of the GHG methodology requires in this case to use an economic value.

Calculation of the share of RFNBOs and RCF

53. How is the share of RFNBOs and RCF determined at different stages of the supply chain?

Reply: As set out under point 8 of the GHG methodology, the GHG methodology applies for each processing step. The emission intensity of inputs must be calculated and reported to the next production step or final fuel producer. Accordingly, the share of RFNBO is calculated at each step of the supply chain, where the heating value of the fuel is increased. At stages of the supply chain, where the heating value of the fuel remains unchanged only additional emissions are added (where relevant).

54. If the output of a process is a hydrogen derivative that does not fully qualify as an RFNBO, is the share of RFNBO calculated considering the share of RFNBO hydrogen in the step where RFNBO hydrogen is co-processed with other inputs, or on the basis of renewable non-biological relevant primary energy input to the upstream processes (e.g. electricity input to H2 production and biomass input to syngas production)?

Reply: As explained in the reply to question 53, the emission intensity of inputs must be calculated and reported to the next production step or final fuel producer. Accordingly, the share of RFNBO is also calculated considering the share of RFNBO hydrogen input at the step where RFNBO hydrogen is co-processed with other inputs. Such differentiation should also be applied if the processing steps take place in the same facility.

55. Does co-processing of syngas from biomass gasification and hydrogen from renewable electricity result in co-production of biofuel and RFNBO (although the biogenic CO in the syngas contributes to the energy content of all the product)?

Reply: Yes. See the relevant chapter in the Annex for further explanation.

56. For RFNBO H2 as an intermediate for conventional transport fuel production: What fraction from RFNBO H2 input to the refinery can fulfil RFNBO mandate?

Reply: Article 25(2) of the revised RED allows the counting of renewable fuels of non-biological origin that are used as intermediate products for the production of conventional transport fuels and biofuels. This means that all renewable hydrogen that is used for the production of conventional transport fuels in oil refineries can be counted towards the objectives of Article 25(1), i.e. before the final fuel is consumed. This implies that the contribution is counted towards the RES-T target in the Member State where the renewable fuel is used in the production of the fuel and not where the final fuel is consumed i.e. conventional fuels produced in the refinery will continue to count as fossil fuels. Under the revised RED also H2 as an intermediate that is used for the production of biofuels can be counted towards the targets set out in transport. Renewable hydrogen (RFNBOs) that is used in refineries for other purposes is counted towards the industry target.

57. One way to transport renewable hydrogen over long distance is to ship it in the form of derivatives (e.g. ammonia, methanol or methane) and to reconvert it into renewable hydrogen at the place of consumption. Is the energy used for converting hydrogen derivatives considered as relevant energy?

Reply: As set out under point 3 of the GHG methodology, only electricity and heat that is adding to the heating value of the fuel is considered as relevant energy. Where the use of heat for reconversion of derivatives does not increase the heating value of the products, the share of RCF and RFNBO is not affected. To establish whether electricity and heat that are used in a process are adding to the heating value of the fuel, the heating value of the derivative that enters the process and qualifies as an RFNBO should be compared to the heating value of the hydrogen the process yields. If the heating value of the hydrogen that yields from the process exceeds the heating value of the RFNBO input, the heating value is increased and accordingly the electricity and heat is adding to the heating value of the fuel and must be considered as relevant energy.

58. How to calculate the greenhouse gas emissions in case of vessels that carry a mixture of RFNBO and non-RFNBO products, for example in the case of ammonia?

Reply: Greenhouse gas emissions associated with transport, distribution and storage of RFNBOs, including ammonia, need to be considered. In case of partial vessel loading or storage, the greenhouse gas

emissions associated with the RFNBO should be attributed according to the share of RFNBOs in the mixture. If the vessel has separated tanks for different fuels the allocation should be done on the "limiting" quantity of the vessel (volume or weight) and not on energy.

Other questions

59. Electricity is used at different stages of the RFNBO production, e.g. for the electrolyser, for fuel synthesis, CO₂ capture from biofuels production. What is the scope of electricity use in the two DAs? More specifically, do the same rules apply for different electricity uses when (i) calculating GHG emissions from electricity use, and (ii) determining if electricity is considered fully renewable?

Reply: The rules of the RFNBO delegated act are relevant for 1) determining the share of RFNBO that is produced and 2) the GHG emission intensity of the RFNBO. For determining the share of RFNBO in total output, only the relevant energy input matters as set out under point 2 of the GHG methodology. For determining the GHG emission intensity all electricity input is considered. Electricity that is fully renewable is considered as having an emission intensity of 0 gCO₂eq/MJ, while partially renewable electricity usually has a higher GHG emission intensity. Hence, it is not required to apply the criteria of the RFNBO delegated act for electricity that does not enhance the heating value of the fuel but applying the rules impacts the emission intensity of the output.

60. Is it possible to consider the entire amount of electricity used in the supply chain for RFNBOs and RCF as fully renewable and to consider such electricity as carbon neutral?

Reply: The rules set out in 27(6) RED for counting electricity as fully renewable apply for the production of RFNBOs. This can be considered to cover all cases where the electricity is adding to the heating value of the fuel or where electricity is used to power equipment that is required for the production or further processing of RFNBOs. Electricity used for the production of materials with no energy content or inputs that do not qualify as RFNBOs cannot be considered as fully renewable. Accordingly, point 6 of the Annex of the GHG methodology applies to attribute the emissions intensity of such electricity while in case of electricity that is counts as fully renewable zero greenhouse gas emissions are attributed.

61. When an electrolyser produces both RFNBOs and low carbon hydrogen, is it possible that the RFNBOs meet the 70% GHG emission saving threshold whereas the low carbon hydrogen does not meet the 70% GHG emission saving?

Reply: No, this is not possible as according to point 1 of the GHG methodology, the greenhouse gas emissions intensity of RFNBOs and RCF is determined by dividing the total emissions of the process by the total amount of fuel stemming from the process.

62. Does all hydrogen produced by an electrolyser have to meet the requirements to be considered as RFNBO including the threshold of 70% emission saving?

Reply: No, this is not required. Hydrogen producers may produce renewable hydrogen as well as other types of hydrogen in the same installation provided that the production of the different types of hydrogen is well documented.

63. How often does the Commission plan to update the factors provided for emission intensity of electricity in the European Union, provided in Table A, Annex C to the GHG methodology?

Reply: The objective is to update them annually. Data will be made available on the website of the Commission.

64. Shall H₂ leakages be included under e p, even if not listed as a greenhouse gas under the RED?

Reply: H₂ leakages should be considered as an energy loss (leading to proportional increase of the emission intensity). The global warming potential (GWP) of emitted H₂ should be considered as soon as a value for the GWP of H₂ is added in the relevant annex.

65. Does temporal correlation affect the calculation of the emission intensity?

Reply: According to the general rule, the emission intensity of RFNBOs and RCF is calculated for a time period of at most one calendar month. However, where electricity qualifying as fully renewable according to the methodology set out in Directive 2018/2001 is used as input that enhances the heating value of the fuel or intermediate products, the time interval shall be in line with the requirements applying for temporal correlation. Accordingly, the emission intensity of renewable hydrogen produced via electrolysis according to Article 6 of the delegated act has to be determined on an hourly basis as of January 2030 (or earlier if a Member State decides to apply hourly correlation earlier).

66. How should electricity sourced via a direct connection from an installation that does not meet the requirements set out in Article 4 of the RFNBO delegated be treated under the GHG methodology?

Reply: Such electricity would not count as fully renewable. Accordingly, the rules applying for electricity taken from the grid that does not qualify as fully renewable apply.

67. Does hydrogen produced via the brine process qualify as RFNBO?

Reply: Brine electrolysis with electricity as input could be considered a special case of electrolysis with co-products. Hence, the hydrogen stemming from the process could qualify as an RFNBO if all relevant requirements set out in RED and the delegated acts are fulfilled. Each co-product would include the same share of RFNBOs, RCF and other fuels in line with Article 30(2) of the RED.

68. Do biofuels stemming from the same process as RFNBOs and RCF have also the same emission intensity as the RFNBOs and RCF in line with point 1 of the Annex?

Reply: No. While point 1 of the Annex of the GHG methodology sets out that in case of the production of mix of fuels (RFNBOs RCF and other fuels), all (fuel) types shall be considered to have the same emission intensity, Delegated Regulation 2023/1185 applies only for defining the emission intensity of RFNBOs and RCF. Hence this rule serves only the purpose of allocating the appropriate share of emissions to RCF and RFNBOs. The correct methodology to determine the emission intensity of biofuels for the purposes set out in Article 29 RED is set out in Article 31 of the Directive and the related Annexes.

Annex

Implementation of bidding zone concept and curtailment in third countries

The RFNBO delegated act refers to several concepts set out in the EU electricity market design legislation. This concerns in particular the following two matters:

- The concept of the bidding zone
- The rules on curtailment

The methodology requires to implement the rules in third countries based on equivalent concepts.

Implementation of the concept of bidding zone

As regards the implementation of the bidding zone concept the recitals of the GHG methodology provide some guidance:

Recital 3: “[...]Where reference is made to bidding zone and imbalance settlement period, concepts that exist in the Union but not in all other countries, it is appropriate to allow fuel producers in third countries to rely on equivalent concepts provided the objective of this Regulation is maintained and the provision is implemented based on the most similar concept existing in the third country concerned. In case of bidding zones such concept could be similar market regulations, the physical characteristics of the electricity grid, notably the level of interconnection or as a last resort the country”.

Accordingly, the following approach should be applied:

- Certifiers should assess whether at the location of the electrolyser, market regulations applied are similar to the rules set out for bidding zones in Regulation (EU) 2019/943. In this context “similar” means that there are rules requiring establishing hourly prices for electricity in a geographical area. If such rules are in place, the geographical area for which the prices are established should be considered as a bidding zone for the purpose of the implementation of the methodology.
- If such rules are not in place, certifiers should assess whether the electricity network in the country of production is integrated or whether there are several separated networks. If there are several networks, each network should be considered as a bidding zone for the purpose of the implementation of the methodology.
- If the electricity network of the country is integrated and there are no geographically differentiated electricity prices, the whole country may be considered as one bidding zone for the purpose of the implementation of the RFNBO delegated act.
- Where the methodology requires certain conditions to be met related to the concept of a bidding zone e.g., on the average proportion of renewable electricity (Article 4(1)), the emission intensity of electricity (Article 4(2)) or the price of electricity (Articles 6 and 7(1)), the conditions can only be considered as fulfilled if compliance can be demonstrated based on reliable data from official sources.

Implementation of rules on curtailment

The methodology in Article 4(3) of the RFNBO delegated act sets out that electricity taken from the grid may be counted as fully renewable during an imbalance settlement period during which the fuel producer can demonstrate, based on evidence from the national transmission system operator, that a) power-generating installations using renewable energy sources were redispatched downwards in accordance with Article 13 of Regulation (EU) 2019/943 and b) the electricity consumed for the production of renewable liquid and gaseous transport fuel of non-biological origin reduced the need for redispatching by a corresponding amount. RFNBOs producers will likely rely on these rules only in exceptional cases and a misuse of the provision can only be avoided by following the rules thoroughly. An implementation of this provision in third countries will therefore only be feasible if it set out entities adopting the tasks of national transmission system operators as well as rules for redispatching.

Implementation of the rules on co-processing of RFNBOs
RFNBOs may be produced in processes which rely, next to renewable hydrogen, also on other inputs including fossil fuels, recycled carbon fuels and biomass. This annex aims to provide information on how the relevant provisions set out in the RED and the GHG methodology should be implemented to derive the share of RFNBOs in the output of the process as well as the achieved emission savings. Articles 25(2)(a) and 30 (2) of RED as well as Point 1 of the Annex to the GHG methodology are in particularly relevant for the implementation.

Articles 25(2)(a) RED sets out that renewable fuels of non-biological origin are counted towards the targets if they are used as intermediate products for the production of conventional transport fuels and biofuels. This covers cases where renewable hydrogen is used in refineries e.g., to remove impurities during the hydro treating as well as hydrogen used for the production of HVO and methanol that is used for the production of biodiesel. Given that the hydrogen is already counted, such use of hydrogen is not further considered for the calculation of the share of renewable energy in the output of the process.

The GHG methodology sets out a specific rule for calculating the emission intensity of RFNBOs stemming from a process where co-processing is applied. It allows to distinguish in the calculation of the greenhouse gas emissions intensity on a proportional basis of the energetic value of inputs between: (1) the part of the process that is based on the conventional input and (2) the part of the process that is based on renewable fuels of non-biological origin and recycled carbon fuels assuming that the process parts are otherwise identical.

If for instance a process uses H₂, CO, CO₂ as well as other energy inputs to produce synthetic fuels and the producer intends to replace 20% of the H₂ with H₂ qualifying as RFNBO, it would be possible to determine the emission intensity of the produced synthetic fuels assuming a virtual process which uses only 20% of all inputs mentioned above (20% of each input). In this example, all hydrogen qualifying as RFNBO (which is 20% of the total H₂ input) would be used in the virtual process, and the other 80% of the hydrogen (all non-RFNBO) would be used in the other process which uses 80% of all inputs. Such process would also yield only 20% of the output, but only the energy share of RFNBO hydrogen in the input would be considered an RFNBO. It would be possible to replace in this virtual process more than one input. Not only RFNBOs but also RCF, biomass, renewable electricity, renewable heat and CO₂

(including biogenic) could be used for this purpose. While the use of RCF and biomass would not add to the share of RFNBOs in the output, they could reduce the emission intensity of the output as the entire output of the virtual process would have the same emission intensity.

$$S_{RFNBO,out} = \frac{E_{RFNBO,in}}{E_{educts}} \quad (1)$$

Where:

$S_{RFNBO,out}$: energy share of the product that can be counted as RFNBO

$E_{RFNBO,in}$: energy content of the RFNBO input only

E_{educts} : energy content of all “relevant” inputs (as defined in the DA).

For instance, as stated above, if 20% of the energy of the “relevant” inputs comes from hydrogen that qualifies as renewable, 20% of the output can be claimed as RFNBO.

For the share calculated above, it is possible to virtually split the process and determine the emissions for the RFNBO only as follows:

$$Em_{RFNBO} = \sum_n s_n \cdot e_{i,n} + e_p + e_{td} + e_u - e_{ccs} \quad (2)$$

Where:

n: each “relevant” input

s_n : energy share of the input “n”: $s_n = \frac{E_{n,in}}{E_{educts}}$

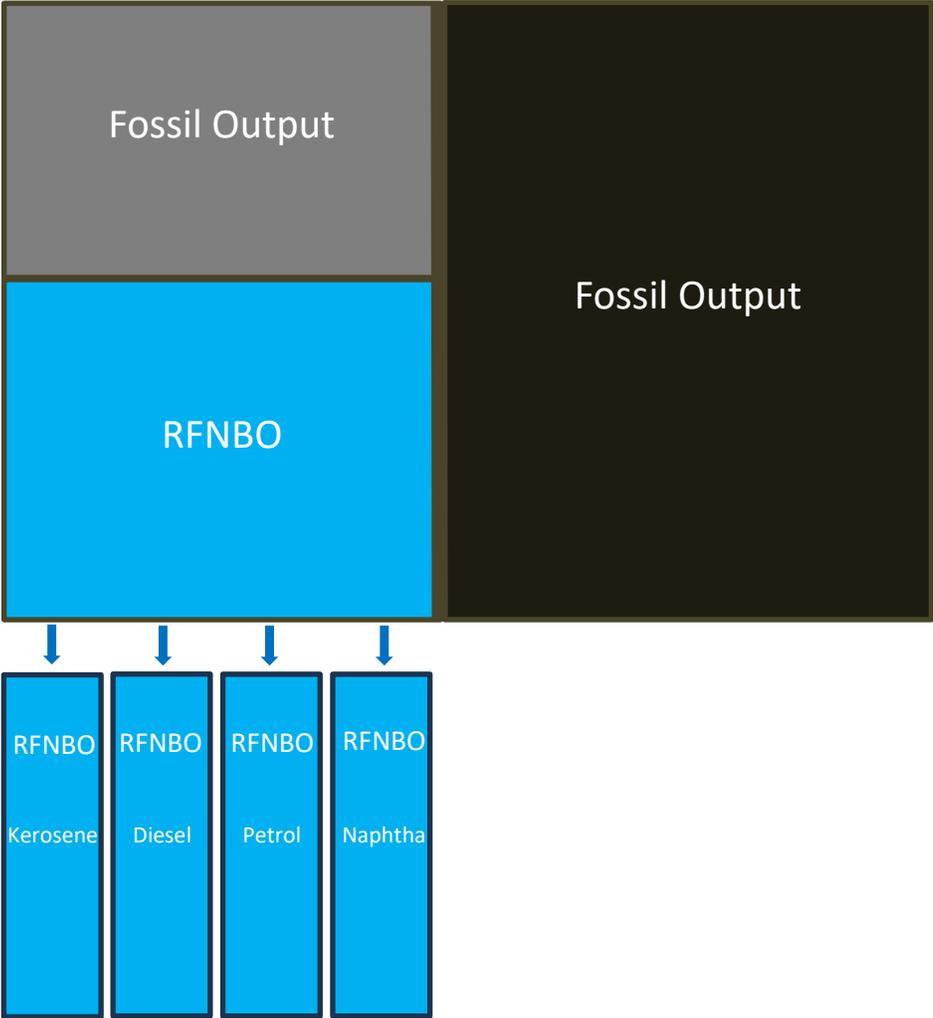
$e_{i,n}$: emissions intensity for the supply of the input “n”.

Inputs qualifying as RFNBO can be attributed to this part of the virtually split process with the upper limit of the energy (or stoichiometric) ratio of the input entering into the output (meaning the energetic share of all inputs has to be respected also for the virtually split part).

CO₂ emissions from fuel combustion have to be counted in the term e_u . If non-fossil carbon enters into the molecule of the output, those emissions might be compensated by the $e_{ex\ use}$ included in e_i for those non-fossil inputs. The share of RFNBOs in the output of the virtual process would be determined as set out under point 3 of the Annex to the GHG methodology. If the process yields more than one output, each type of output would include the same share of RFNBOs, RCF and other fuels in line with Article 30(2) of the RED⁸. The ratio of different outputs of the virtual process should not differ from the share of outputs of the whole process. In accordance with point 1 of the GHG methodology it is possible to determine the emission intensity of the output over a period of at most one calendar month.

⁸ The described approach applies only for the production of RFNBOs and RCF. For determining emission savings and produced amounts of biofuels the relevant provisions Annex V to the Directive and the delegated act in co-processing bio biomass in a common process with fossil fuels apply.

Example of a process with several inputs



Criteria effective carbon pricing system

The GHG Methodology sets out that emissions from an input that are avoided when the input is used for fuel production can be deducted from the calculation of the emission intensity of RFNBOs and RCF. Such emissions include the CO₂ equivalent of the carbon incorporated in the RFNBO or and RCF that would have otherwise been emitted as CO₂ into the atmosphere. This includes CO₂ from certain sources that were captured and incorporated into the fuel. One source is the activities listed under Annex I to the ETS Directive (Directive 2003/87/EC), provided that the captured CO₂ has been “*taken into account upstream in an effective carbon pricing system*” and is incorporated in the chemical composition of the fuel before a certain date.

Accounting upstream in an effective carbon pricing system means that the emissions are subject to a carbon price when the RFNBOs or RCF is first produced. For example, when emissions from an industrial process are subject to carbon pricing when captured and used to produce an RFNBO or RCF (e.g., e-kerosene). By contrast, downstream accounting means carbon pricing is only applied where the emissions are finally released into the atmosphere from the RFNBO or RCF (e.g. when the e-kerosene is used in aviation).

As concerns what is an *effective carbon pricing system* in this context, the system must meet minimum criteria ensuring effective enforcement, so each tonne emitted is paid for:

- (i) have a robust monitoring, reporting and verification (MRV) process;
- (ii) be binding on its participants;
- (iii) be stable;
- (iv) apply the carbon price at least on the whole sector producing the RFNBOs or RCFs;
- (v) ensure stringent enforcement;
- (vi) be government-led.

In addition, the design features of the system need to ensure that the carbon price is effective in achieving its purpose of leading to emission reductions in line with climate neutrality:

- (i) in the case of an emissions trading system (ETS): with an absolute and ultimately declining cap aligned with the climate neutrality target of the country for achieving the country’s Paris-aligned nationally determined (NDC).
- (ii) in the case of a tax: with an increasing trajectory aligned with the climate neutrality target of the country for achieving the country’s Paris-aligned NDC.
- (iii) for both an ETS and a tax: without design features which render the cap or tax ineffective.

The following systems can be considered to fulfil the requirement of upstream accounting in an effective carbon pricing system:

- EU ETS which applies in the 30 States of the European Economic Area: the EU-27 Member States and in three EFTA States Iceland, Liechtenstein and Norway
- Swiss ETS
- UK ETS

This list is not exhaustive. Other systems within which RFNBOs and RCFs are expected to be produced may request to be assessed.

The criteria applied in this context to assess what is an *effective carbon pricing system* do not prejudge the recognition of a carbon price paid under the Carbon Border Adjustment Mechanism (CBAM).