GHG Emissions & Sustainability

CertifHy EU RFNBO Voluntary Scheme

Dissemination level: public

Last update: 2024-05-02

Contents

Status of this document

This document, 'GHG Emissions & Sustainability', is part of the CertifHy EU RFNBO Voluntary Scheme.

All CertifHy EU RFNBO Voluntary Scheme documents in their latest applicable version are valid and must be considered for the scope of application.

In the event of conflict between the text of this document and the CertifHy EU RFNBO Voluntary Scheme "Scheme Document", the "Scheme Document" shall always take precedence.

Change History

Version	Date	Description
1.0	28.02.2023	Version 1.0
1.1	10.07.2023	Version1.1 (adjustments following the publication of an updated version of the Assessment Protocol for Voluntary Schemes for RFNBOs)
1.2	15.01.2024	Version1.2 (adjustments taking up the Q&A Document of the European Commission of 26.07.2023)
1.3	02.05.2024	Version 1.3 (adjustments taking up the Q&A Document of the European Commission of 14.03.2024 and feedback from DG ENER)

1 Introduction

The Renewable Energy Directive recast[1] and related Commission Delegated Regulations (see chapter 3) define requirements related to the greenhouse gas (GHG) emissions savings of renewable liquid and gaseous fuels of non-biological origin (RFNBO). Furthermore, they define requirements related to the electricity that is consumed in RFNBO production.

This document, GHG Emissions & Sustainability, is part of the CertifHy EU RFNBO Voluntary Scheme, and thus needs to be understood in connection with the other documents of the CertifHy EU RFNBO Voluntary Scheme. This document incorporates the requirements of RED II and the related Delegated Acts.

[1] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast); OJ L 328, 21.12.2018, p. 82; in the following referred to as RED II; modifications by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652

2 Purpose of this document

The Purpose of this document “GHG Emissions & Sustainability” is to lay down the CertifHy EU RFNBO Voluntary Scheme requirements regarding the methodology, rules and guidelines for calculating and verifying GHG emissions and emission reductions that can be attributed to a given volume of RFNBO as well as for verifying the requirements related to the electricity input used for RFNBO production.

These requirements shall apply to the production of RFNBO via electrolysis and analogously for less common production pathways.

They shall apply regardless of whether the RFNBO is produced inside or outside the territory of the European Union.

3 Scope and Normative References

The CertifHy EU RFNBO Voluntary Scheme requirements laid down in this document apply to all relevant elements of the supply chain from renewable electricity production to the distribution of the final product and intermediate products for the production of conventional fuels to the final consumer as applicable, including all relevant intermediate steps and supply chain elements related to materials, fuels or energies consumed in the full supply chain.

The rules set out in this document apply regardless of whether the RFNBO is produced inside or outside the territory of the European Union.

The legal basis for the provisions laid down in this document consists of:

- the Renewable Energy Directive recast[2];
- the Commission Delegated Regulation 2023/1184 of 10.02.2023[3] supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin,
- the Commission Delegated Regulation 2023/1185 of 10.02.2023[4] supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels.

The following further elements of the regulatory environment are relevant to this document:

- Internal Electricity Market Directive[5]
- Internal Electricity Market Regulation[6]

[2] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast); OJ L 328, 21.12.2018, p. 82; modifications by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652

[3] Commission Delegated Regulation of 10 February 2023, OJ L 157/11, 20.06.2023; in the following referred to as CDR 1184

[4] Commission Delegated Regulation of 10 February 2023 including its Annex, OJ 157/20, 20.06.2023; in the following referred to as CDR 1185

[5] Directive 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast); OJ L 158, 14.6.2019, p. 125

[6] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast); OJ L 158, 14.6.2019, p. 54

- Capacity allocation and congestion management Commission Regulation[7]
- Emissions Trading Directive[8]

Relevant terms used in this CertifHy EU RFNBO Voluntary Scheme document are defined in the legal texts listed above.

The European Commission has published a guidance document "Q&A implementation of hydrogen delegated acts"[9], that

> *"should be regarded as a 'living tool' open for improvement and its content may be subject to modifications without notice."*

The latest version of the document at the time of adoption of this CertifHy scheme document is the version of 14 March 2024.

The Commission defines the following disclaimer:

> *"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.*
>
> *Neither the European Commission nor any person acting on behalf of the European Commission is responsible for the use which might be made of the following information."*

For illustration purposes only, Figure 1 provides an overview of the scope of the two Commission Delegated Regulations as well as applicable electricity supply cases and major requirements. CDR 1184defines requirements for Sustainability (see chapter **Error! Reference source not found.**). CDR 1185with its Annex defines the methodology for calculating the GHG emissions, and the GHG reductions (see chapters 5, 6, 7).

Detailed requirements are included in the subsequent sections of this document:

Topic	Sub-topic	Section
Grid mix	Grid mix (≤90% renewable share)	Section 8.1
	Grid mix >90% renewable share	Section 8.3.1
Direct connection		Section 8.2

[7] Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management; OJ L 197, 25.7.2015, p. 24

[8] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC; OJ L 275, 25.10.2003, p. 32

[9] Available at https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

Topic	Sub-topic	Section
Grid connection	In general	Section 8.3
PPA	Specific PPA requirements	Section 8.3.4
	Additionality and no support	Section 8.3.5
	Temporal correlation	Section 8.3.6
	Geographic correlation	Section 8.3.7
Imbalance settlement		Section 8.3.3
Exceptions	Low carbon electricity grid <18 gCO2eq/MJel	Section 8.3.2
	Electricity price ≤EUR 20/MWh or <0.36 times the price of an emission allowance	Section 8.3.6
Combining electricity supply options		Section 8.4
Avoidance of double counting	Use of Guarantees of Origin (GO) or similar certificates in third countries	Sections 8.3.1, 8.3.4, 8.3.5
Detailed data requirements	List of data and documents	Annex C

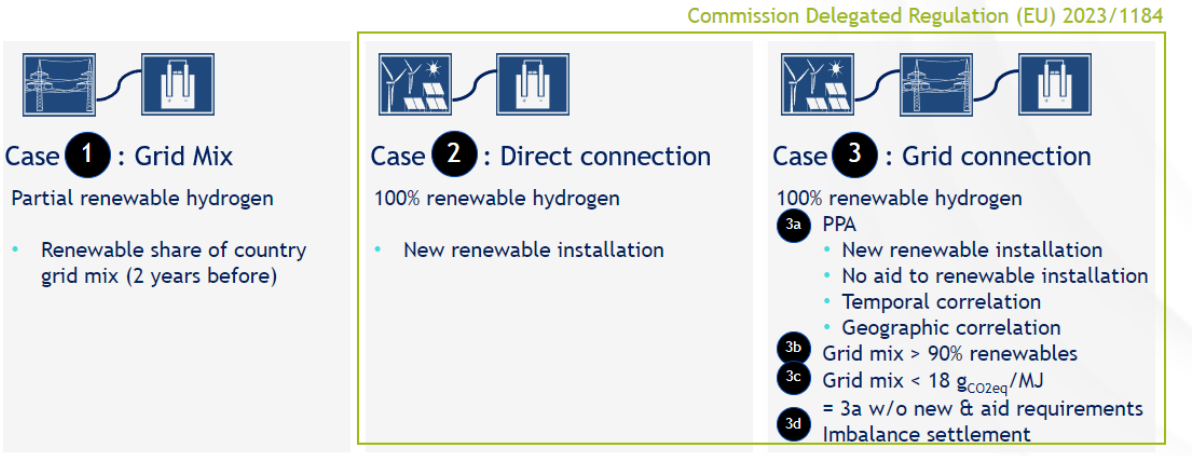

Figure 1: Overview of the scope of the two Commission Delegated Regulations as well as applicable electricity supply cases and major requirements

4 Definitions of Terms

Term	Definition
Bidding zone	The largest geographical area within which market participants are able to exchange energy without capacity allocation, as defined in in Article 2, point (65), of Regulation (EU) 2019/943
Come into operation	Starting production of RFNBO or renewable electricity for the first time or following a repowering as defined under Article 2, point (10) of RED II requiring investments exceeding 30% of the investment that would be needed to build a similar new installation, as defined in CDR 1184 Art. 2(6)
Direct line	Either an electricity line linking an isolated generation site with an isolated customer or an electricity line linking a producer and an electricity supply undertaking to supply directly their own premises, subsidiaries and customers, as defined in Article 2, point (41), of Directive 2019/944
Energy from renewable sources or Renewable energy	Energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas, as defined in RED II
Fuel producer	An Economic Operator that produces RFNBO , as defined in CDR 1184
Imbalance settlement period	The time unit for which the imbalance of the balance responsible parties is calculated, as defined in Regulation (EU) 2019/943; or an equivalent concept for third countries
Installation generating renewable electricity	Means individual units, or groups of units, producing electricity in one or several locations from the same or from different renewable sources, as defined in RED II, excluding units producing electricity from biomass and storage units
PPA	Power Purchase Agreement; renewables Power Purchase Agreement means a contract under which a natural or legal person agrees to purchase renewable electricity directly from an electricity producer as defined in RED II
RCF	Recycled Carbon Fuel, as defined in RED II

Smart metering system	An electronic system that is capable of measuring electricity fed into the grid or electricity consumed from the grid, providing more information than a conventional meter, and that is capable of transmitting and receiving data for information, monitoring and control purposes, using a form of electronic communication, as defined in Article 2(23) of Directive 2019/944

5 GHG emissions savings requirement and calculation methodology

This chapter defines the provisions related to the required GHG savings of RFNBOs, and to the calculation of GHG emissions.

5.1 GHG emissions savings requirement

According to RED II Art. 25(2), the greenhouse gas emissions savings from the use of RFNBOs shall be at least 70%.

> *Application of the 70% reduction requirement to the fossil fuel comparator (see section 5.3 below) results in a threshold for GHG emissions of 28,2 g_{CO2eq}/MJ – the emissions as calculated according to the provisions in this document must be below this threshold for fuels to be RED II compliant.*

5.2 GHG emissions calculation

$DA_{28(5)}$ defines the methodology for assessing GHG emissions as well as GHG emissions savings from RFNBOs.

GHG emissions from the production and use of RFNBOs shall be calculated as follows:

$E = e_i + e_p + e_{td} + e_u - e_{ccs}$

where:

E = total emissions from the use of the fuel (g_{CO2eq}/MJ_{fuel})

$e_i = e_{i\ elastic} + e_{i\ rigid} - e_{ex\text{-}use}$: emissions from supply of inputs (g_{CO2eq}/MJ_{fuel})

$e_{i\ elastic}$ = emissions from elastic inputs (g_{CO2eq}/MJ_{fuel})

$e_{i\ rigid}$ = emissions from rigid inputs (g_{CO2eq}/MJ_{fuel})

$e_{ex\text{-}use}$ = emissions from inputs' existing use or fate (g_{CO2eq}/MJ_{fuel})

e_p = emissions from processing (g_{CO2eq}/MJ_{fuel})

e_{td} = emissions from transport and distribution (g_{CO2eq}/MJ_{fuel})

e_u = emissions from combusting the fuel in its end-use (g_{CO2eq}/MJ_{fuel})

e_{ccs} = emission savings from carbon capture and geological storage (g_{CO2eq}/MJ_{fuel})

All energy values shall be based on the lower heating value[10].

[10] Values regarding the energy content of fuels, as set out in the Renewable Energy Directive recast of 2018 in Annex III, shall be used. For the determination of the energy content of fuels not included in Annex III, the relevant European Standards Organisation (ESO) standards shall be used in order to determine the heating values of fuels. Where no ESO standard has been adopted for that purpose, the relevant International Organization for Standardisation (ISO) standards shall be used.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

The greenhouse gas emissions intensity of RFNBOs shall be determined by dividing the total emissions of the process covering each element of the formula by the total amount of fuel stemming from the process and shall be expressed in terms of grams of CO_2 equivalent per MJ of fuel (g_{CO2eq}/MJ_{fuel}). If a fuel is a mix of RFNBOs, recycled carbon fuels (RCFs) and other fuels, all (fuel) types shall be considered to have the same emission intensity.

While the previous paragraph sets out that in case of the production of a mix of fuels (RFNBOs, RCFs and other fuels), all (fuel) types shall be considered to have the same emission intensity, this provision based on CDR 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 RFNBOs and RCFs. The correct methodology to determine the emission intensity of biofuels for the purposes set out in RED II Article 29 is set out in RED II Article 31 and the related Annexes. The exception to this rule is the case of co-processing where RFNBOs are only partially replacing a conventional input in a process.

> *Co-processing covers cases where RFNBOs are replacing a conventional input in a process.*
>
> *The processing of mixed biogenic and non-biogenic non-recyclable waste into fuels is not considered as co-processing, as co-processing only covers cases where RFNBOs (and RCF) are replacing a conventional input in a process. As no replacement takes place in this case, the rules for co-processing do not apply and the entire output from the process is considered to have the same emission intensity.*
>
> *Further provisions on co-processing are provided in Annex A.*

In such a situation it shall be distinguished in the calculation of the GHG emissions intensity on a proportional basis of the energetic value of inputs between:

- the part of the process that is based on the conventional input and
- the part of the process that is based on RFNBOs assuming that the process parts are otherwise identical.

An analogous distinction between processes shall be applied where RFNBOs are processed together with biomass.

The greenhouse gas emissions intensity may be calculated as an average for the entire production of fuels occurring during a period of at most one calendar month but may also be calculated for shorter time intervals. Where electricity qualifying as fully renewable according to the methodology set out in RED II 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 as defined in section 8.3.6.

> *Accordingly, the emission intensity of renewable hydrogen produced via electrolysis according to section 8.3.6 has to be determined on an hourly basis*

as of January 2030 (or earlier if a Member State decides to apply hourly correlation earlier for RFNBO produced in its territory).

Where relevant, GHG intensity values calculated for individual time intervals may then be used to calculate an average GHG emissions intensity for a period of up to one month, provided that the individual values calculated for each time period meet the minimum savings threshold of 70%.

5.3 GHG emissions savings calculation

For all RFNBOs, the total emissions from the fossil fuel comparator shall be 94 g_{CO2eq}/MJ.

GHG savings from RFNBOs shall be calculated as follows:

Savings = (E_F – E) / E_F

where:

E = total emissions from the use of RFNBO

E_F = total emissions from the fossil fuel comparator.

5.4 RFNBO share calculation

If the output of a process does not fully qualify as RFNBO, notably where the relevant energy input is not fully renewable, their respective shares in the total output shall be determined as follows:

The fraction of RFNBO shall be determined by dividing the relevant renewable energy input into the process by the total relevant energy inputs into the process.

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). This shall also be applied if the processing steps take place in the same facility.

The relevant energy for material inputs is the lower heating value of the material input that enters into the molecular structure of the fuel[11].

For fuels used as input to generate heat enhancing the heating value of the produced fuel, the relevant energy is the lower heating value of these fuels.

For electricity inputs that are used to enhance the heating value of the fuel or intermediate products the relevant energy is the energy of the electricity.

[11] For material inputs containing water, the lower heating value is taken to be the lower heating value of the dry part of the material input (i.e. not taking into account the energy needed to evaporate the water). RFNBO used as intermediate products for the production of conventional fuels are not considered.

Figure 2 shows the determination of inputs using an example for the production of ammonia

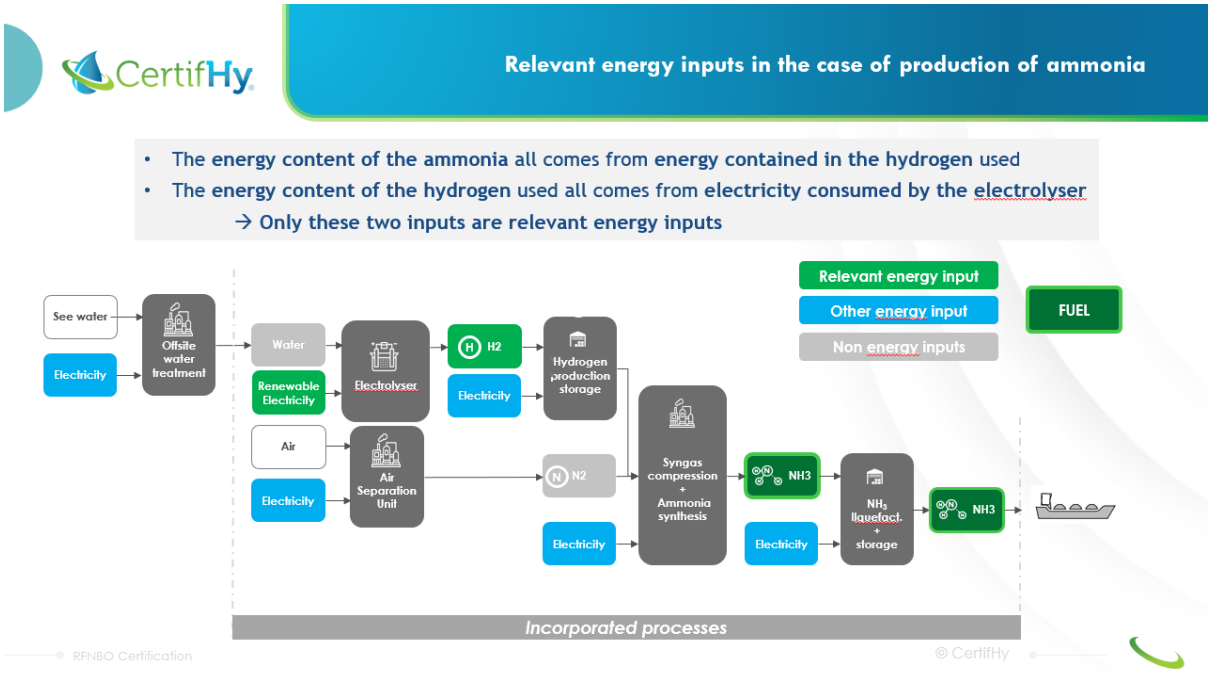

Figure 2: Example of relevant energy inputs in a case of ammonia production

For industrial off-gases, it is the energy in the off-gas based on their lower heating value. In case of heat that is used to enhance the heating value of the fuel or intermediate product, the relevant energy is the useful energy in the heat that is used to synthesise the fuel. Useful heat is the total heat energy multiplied by the Carnot efficiency, as defined in Annex V, part C, point (1)(b) of RED II. Other inputs are only taken into account when determining the emission intensity of the fuel.

> *Electricity or other forms of energy that are not used to enhance the heating value of the products or intermediate products are not required to be renewable. This applies to hydrogen production, to other processing steps, and generally to all steps in the supply chain.*
>
> *The GHG emissions associated to such energy consumption are to be taken into account in the calculation of the GHG emissions intensity, and the GHG emissions savings achieved by the RFNBO.*
>
> *Where the use of electricity and/ or heat for the reconversion of RFNBOs such as ammonia, methanol, methane or others into hydrogen and possibly co-products does not increase the heating value of the (co-)products, the share of 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 RFNBO that enters the process and qualifies as an RFNBO shall be compared to the heating value of the (co-)products the process yields. If the heating value of the hydrogen and co-products where applicable, that yield 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.

5.5 Elastic versus rigid inputs

When determining emissions from supply of inputs, it shall be distinguished between elastic inputs and rigid inputs. Rigid inputs are those the supply of which cannot be expanded to meet extra demand. Thus, all outputs produced in fixed ratio by an incorporated process[12] and which represent less than 10% of the economic value of the output are rigid. If it represents 10% or more of the economic value, it shall be treated as elastic. In principle, elastic inputs are those the supply of which can be increased to meet extra demand. Petroleum products from refineries fall into this category because refineries can change the ratio of their products.

Waste heat from incorporated processes might also fall into the category of rigid input.

Elastic inputs comprise for instance petroleum products, electricity, natural gas and CO_2.

In case of doubt an input should be considered as elastic.

5.6 GHG emissions of renewable electricity

Where electricity is used for the production of RFNBO, either directly or for the production of intermediate products, electricity qualifying as fully renewable according to Article 27(6) of RED II, shall be attributed zero GHG emissions.

Electricity used for the production of RFNBO includes electricity that is adding to the heating value of the fuel and electricity that 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 unless they are located in the same industrial complex as the RFNBO production. Accordingly, the provisions of section 5.7 apply to attribute the emissions intensity of such electricity.

5.7 GHG emissions of grid electricity

One of the three following alternative methods shall be applied during each calendar year to attribute GHG emissions values to the electricity taken from the grid that does not qualify as fully renewable according to Article 27(6) of RED II and is used to produce RFNBOs:

(a) GHG emissions values shall be attributed according to chapter 7. This is without prejudice to the assessment under State aid rules; or

[12] Incorporated processes include processes that take place in the same industrial complex, or that supply the input via a dedicated supply infrastructure, or that supply more than half of the energy of all inputs to the production of the RFNBO .

(b) GHG emissions values shall be attributed depending on the number of full load hours the installation producing RFNBOs is operating. Where the number of full load hours is equal to or lower than the number of hours in which the marginal price of electricity was set by installations producing renewable electricity or nuclear power plants in the preceding calendar year for which reliable data are available, grid electricity used in the production process of RFNBOs shall be attributed a GHG value of zero g_{CO2eq}/MJ. Where this number of full load hours is exceeded, grid electricity used in the production process of RFNBOs shall be attributed a GHG emissions value of 183 g_{CO2eq}/MJ; or

(c) the GHG emissions value of the marginal unit generating electricity at the time of the production of the RFNBO in the bidding zone may be used if this information is publicly available from the national transmission system operator.

If the method set in point (b) is used, it shall also be applied to electricity that is used to produce RFNBOs and qualifies as fully renewable according to Article 27(3) of RED II.

Option (b) can only be applied in jurisdictions where a liberalized electricity market with free access for all electricity producers is implemented, and a transparent market-based pricing mechanism is available, and price data are made publicly available by a reliable source that is independent of own market interests.

5.8 GHG emissions of elastic inputs

GHG emissions of elastic inputs that are obtained from an incorporated process shall be determined based on data from their actual production process. This shall include all emissions arising due to their production over the whole supply chain (including emissions arising from the extraction of the primary energy required to make the input, processing of the input and transportation of the input). Combustion emissions related to the carbon content of fuel inputs shall not be included[13].

However, GHG emissions from the elastic inputs that are not obtained from an incorporated process shall be determined based on the values included in chapter 6. If the input is not included in the list, information of the emission intensity may be drawn from the latest version of the JEC-WTW report[14], the ECOINVENT database[15],

[13] If carbon intensities are taken from the table in chapter 6, combustion emissions shall not be considered. This is because combustion emissions are counted in processing or in the combustion emissions of the final fuel.

[14] The current version as of 27 September 2022 can be found here: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC121213/jec_wtw_v5_121213_final.pdf

[15] https://ecoinvent.org/

official sources such as the IPCC[16], IEA[17] or government, other reviewed sources such as the E3[18] and GEMIS[19] database and peer reviewed publications.

5.9 Supply chain elements

The supplier of each input, excluding those where the values are taken from chapter 6, shall calculate the emissions intensity[20] of the input following the procedures in this document, and report the value to the next production step or final fuel producer. The same rule applies to the suppliers of inputs further back in the supply chain.

The GHG methodology applies to each processing step.

The provisions of the CertifHy EU RFNBO Voluntary Scheme document Traceability & Chain of Custody need to be complied with as well as all other provisions of the CertifHy EU RFNBO Voluntary Scheme.

Where renewable electricity is supplied via the electric grid based on PPA(s) (see section 8.3.4) the hydrogen producer shall provide the data to the Certification Body from an independent reliable source such as the grid operator or the electricity market regulator. If this is not possible, the producer needs to provide a certificate for the electricity production data on an hourly basis from an independent 3rd party according to a standard recognized by the CertifHy EU RFNBO Voluntary Scheme. The list of recognized standards is available from the CertifHy EU RFNBO Voluntary Scheme *upon request.*

5.10 GHG emissions of rigid inputs

Emissions from rigid inputs shall include the emissions resulting from the diversion of those inputs from a previous or alternative use. These emissions shall take into account the loss of production of electricity, heat or products that were previously generated using the input as well as any emissions due to additional treatment of the input and transport. The following rule shall apply:

Emissions attributed to the supply of rigid inputs shall be determined by multiplying the lost production of electricity, heat or other products with the relevant emission factor. In case of lost electricity production, the emission factors to consider are for grid electricity generation in the country where the displacement occurred determined according to the appropriate methodology set out in sections 5.6 or 5.7. In case of diverted material, the emissions to be attributed to the replacement material are calculated as for material inputs in this methodology. For the first 20

[16] https://www.ipcc.ch/
[17] https://www.iea.org/
[18] http://e3database.com/
[19] https://iinas.org/downloads/gemis-downloads/
[20] If carbon intensities are taken from the table in chapter 6, combustion emissions shall not be considered. This is because combustion emissions are counted in processing or in the combustion emissions of the final fuel.

years after the start of production of RFNBOs, the loss of production of electricity, heat and material shall be determined based on the average amount of electricity and heat that was produced from the rigid input over the last three years before the start of production of RFNBO. After 20 years of production, the loss of production of electricity, heat or other products shall be determined based on the minimum energy performance standards assumed in pertinent best available technology (BAT) conclusions. Where the process is not covered by a BAT, the estimation of lost production shall be based on a comparable process applying state of the art technology.

5.11 GHG emissions from existing use or fate, including of sources of CO_2

Emissions from existing use or fate include all emissions in the existing use or fate of the input that are avoided when the input is used for fuel production.

> *In the case of waste used for fuel production which would otherwise be sent to landfill, all emissions that occur in the landfill including non-CO_2 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.*

These emissions shall include the CO_2 equivalent of the carbon incorporated in the chemical composition of the fuel that was or would have otherwise been emitted as CO_2 into the atmosphere. This includes CO_2 that was captured and incorporated into the fuel provided that at least one of the following conditions is fulfilled:

(a) the CO_2 has been captured from an activity listed under Annex I of Directive 2003/87/EC[21] and has been taken into account upstream in an effective carbon pricing system and is incorporated in the chemical composition of the fuel before 2036. This date shall be extended to 2041 in other cases than CO_2 stemming from the combustion of fuels for electricity generation; or;
(b) the CO_2 has been captured from the air, or;
(c) the captured CO_2 stems from the production or the combustion of biofuels, bioliquids or biomass fuels complying with the sustainability and greenhouse gas saving criteria and the CO_2 capture did not receive credits for emission savings from CO_2 capture and replacement, set out in Annex V and VI of RED II, or;
(d) the captured CO_2 stems from the combustion of RFNBOs or recycled carbon fuels complying with the greenhouse gas saving criteria, set out in Article 25(2) and Article 28(5) of RED II and CDR 1185; or

[21] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC; OJ L 275, 25.10.2003, p. 32

(e) the captured CO_2 stems from a geological source of CO_2 and the CO_2 was previously released naturally.

Provisions on what constitutes an "effective carbon pricing system" are provided in Annex B.

Installations that incinerate municipal waste are currently not covered under Directive 2003/87/EC (Emission Trading System) and fossil-based CO_2 from the incineration of municipal waste can therefore not automatically be considered as avoided in the EU. However, CO_2 from these installations can be considered as avoided where a Member State, in its application of Directive 2003/87/EC, covers such emissions under the Emissions Trading System and the CO2 is incorporated in the chemical composition of the fuel before 2036.

Biogenic CO_2 including the biogenic share of CO_2 arising due to the incineration of municipal waste constitutes an eligible carbon source provided the sustainability and GHG criteria are met. Compliance with the criteria could be assumed if the installation producing the CO_2 is exempt from demonstrating compliance with the sustainability criteria, (e.g. if the installation has a rated thermal input below the applicable threshold).

Biogenic CO_2 stemming from processes which are out of the scope of the sustainability and greenhouse gas saving criteria of RED II are also eligible.

In case of a CO_2 stream including both fossil-based and biogenic CO_2 the rules of the mass balance system should be applied. Accordingly, it is possible to consider all CO_2 taken from the stream biogenic, provided the amount of biogenic CO_2 taken from the stream does not exceed the amount of biogenic CO_2 that is included in the mixture. The appropriate period of time for achieving the mass balance is 3 months[22].

Captured CO_2 stemming from a fuel that is deliberately combusted for the specific purpose of producing the CO_2 and CO_2, the capture of which has received an emissions credit under other provisions of the law shall not be included.

All sources of CO_2 can be used. However, some CO_2 sources make it challenging to achieve the 70% GHG savings threshold:

CO_2 from sources listed under a) to d) above thus have a factor $e_{ex\text{-}use}$ of 1 kg_{CO2eq}/kg_{CO2}. CO_2 from other sources has a factor $e_{ex\text{-}use}$ of 0 kg_{CO2eq}/kg_{CO2}.

Captured CO_2 stemming from a fuel that is deliberately combusted for the specific purpose of producing the CO_2 has a factor $e_{ex\text{-}use}$ of 0 kg_{CO2eq}/kg_{CO2}.

In a situation where biomass is burned for electricity production, the CO_2 captured from this process for fuel processing is not considered 'deliberately

[22] See also CertifHy Voluntary Scheme document Traceability & Chain of Custody, notably section 6.1.

combusted for the specific purpose of producing the CO_2' if an economically meaningful use of the energy stemming from the combustion takes 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.

CO_2, the capture of which has received an emissions credit under other provisions of law has a factor $e_{ex\text{-}use}$ of 0 kg_{CO2eq}/kg_{CO2}.

Emissions associated with the inputs such as electricity and heat and consumable materials used in the capture process of CO_2 shall be included in the calculation of emissions attributed to inputs.

Emissions associated with the inputs like electricity and heat and consumable materials used in the capture process of CO_2 are to be included in the factor $e_{ex\text{-}use}$ in addition to the values based on the input source as defined under a) to d) above.

5.12 Allocation

Where a process yields multiple co-products such as fuels or chemicals, as well as energy co-products such as heat, electricity or mechanical energy exported from the plant, greenhouse gas emissions shall be allocated to these co-products applying the following approaches in the following manner:

(a) the allocation shall be conducted at the end of the process that produces the co-products. The emissions allocated shall include the emissions from the process itself, as well as the emissions attributed to inputs to the process.
(b) the emissions to be allocated shall be e_i plus any fractions of e_p, e_{td} and e_{ccs} that take place up to and including the process step at which the co-products are produced. If an input into the process is itself a co-product of another process, the allocation at the other process shall be done first to establish the emissions to be attributed to the input.
(c) if any installation inside the project boundary treats only one of the project's co-products, then the emissions from that installation shall be allocated entirely to that co-product.
(d) where the process allows to change the ratio of the co-products produced, the allocation shall be done based on physical causality by determining the effect on the process' emissions of incrementing the output of just one co-product whilst keeping the other outputs constant.
(e) where the ratio of the products is fixed and the co-products are all fuels, electricity or heat, the allocation shall be done by energy content. If allocation concerns exported heat on the basis of the energy content, only the useful part of the heat may be considered, as defined in point 16 of RED II Annex V, part C.
(f) where the ratio of the products is fixed and some co-products are materials with no energy content, the allocation shall be done by the economic value of the co-products. The economic value considered shall be the average factory-gate value of the products over the last three years. If such data is

not available, the value shall be estimated from commodity prices minus the cost of transport and storage[23].

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

If a process yields next to RFNBOs, RCF and other fuels also materials with no energy content, a first allocation shall be done based on the economic value of the co-products as set out above under point (f), while for the energy products the allocation rule set out in section 5.2 and Annex A applies. An example of a process that yields fuels as well as materials with no energy content, chlor-alkali electrolysis producing chlorine and soda as materials with no energy content and hydrogen as fuel. The hydrogen stemming from the process could qualify as an RFNBO if all relevant requirements of this CertifHy document are fulfilled. Each co-product would include the same share of RFNBOs, (RCF) and other fuels in line with Article 30(2) of RED II (see section 5.2 and Annex A).

Emissions from an electrolyser facility shall be allocated between hydrogen and oxygen based on economical allocation if the oxygen is used in other processes or otherwise valorised, and the oxygen is not released to the atmosphere. 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, an average price (weighted arithmetic average) can be applied.

Figure 3 serves as a further illustration when it comes to GHG Intensity of RFNBO production from co-processing of different types of inputs.

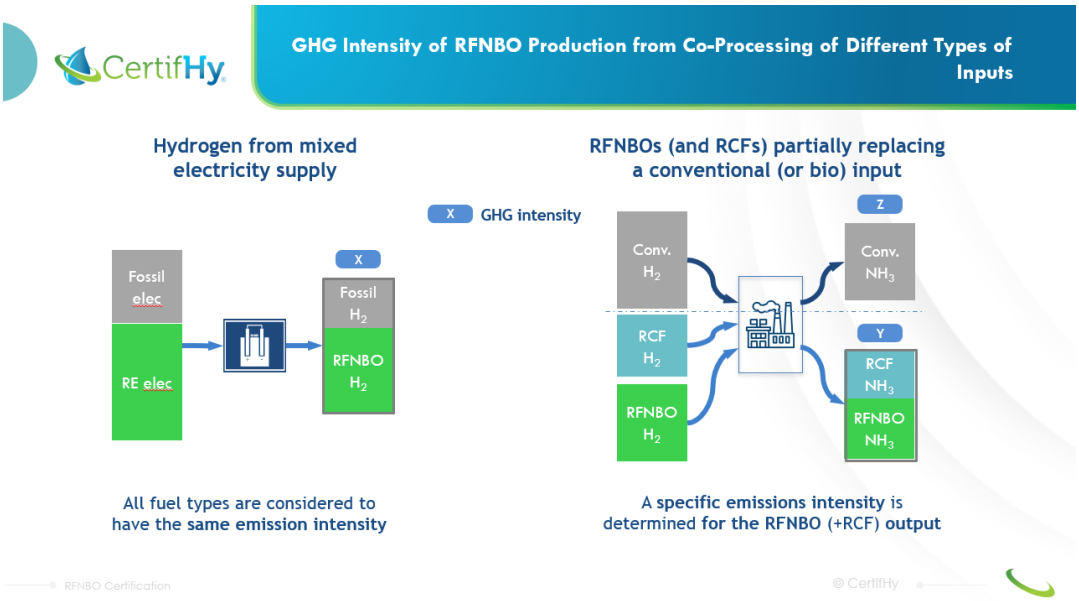

Figure 3: GHG intensity of RFNBO production from co-processing of different types of inputs

[23] Note that it is the relative values of the co-products that matters, so general inflation is not an issue.

5.13 Further provisions

Emissions from processing shall include direct atmospheric emissions from the processing itself, from waste treatment and from leakages.

Emissions from combustion of the fuel refer to the total combustion emissions of the fuel in use.

> *To determine the emissions of fuel in use (e_u), the values for the combustion emissions set out in the first table in chapter 6 shall be used.*

The GHG taken into account in emissions' calculations, and their carbon dioxide equivalents, shall be the same as specified in paragraph 4 of Annex V, part C, of RED II.

Emissions from transport and distribution shall include emissions from the storage and distribution of the finished fuels.

> *For the calculation of the GHG emissions associated with transport, distribution and storage of RFNBOs, in case of mixtures of compliant RFNBOs with non-compliant products, the GHG emissions associated with the RFNBO should be attributed according to the share of RFNBOs in the mixture.*

Emissions attributed to inputs e_i shall include emissions from their associated transport and storage.

5.14 CCS

Where a process for making RFNBOs produces carbon emissions that are permanently stored in accordance with Directive 2009/31/EC on the geological storage of carbon dioxide, this may be credited to the products of the process as a reduction in emissions under e_{ccs}. Emissions arising due to the storage operation (including transport of the carbon dioxide) will also need to be taken into account under e_p.

6 “Standard Values” for Greenhouse Gas Emission Intensities of Elastic Inputs

The following data are set out in part B of the Annex to CDR 1185.

The GHG intensities of inputs other than electricity are shown in the tables below:

	Total emissions g_{CO2eq}/MJ	*Upstream emissions* g_{CO2eq}/MJ	*Combustion emissions* g_{CO2eq}/MJ
Natural gas	66.0	9.7	56.2
Diesel	95.1	21.9	73.2
Gasoline	93.3	19.9	73.4
Heavy fuel oil	94.2	13.6	80.6
Methanol	97.1	28.2	68.9
Hard coal	112.3	16.2	96.1
Lignite	116.7	1.7	115.0

	Total emissions g_{CO2eq}/kg
Ammonia	2351.3
Calcium chloride ($CaCl_2$)	38.8
Cyclohexane	723.0
Hydrochloric acid (HCl)	1061.1
Lubricants	947.0
Magnesium sulphate ($MgSO_4$)	191.8
Nitrogen	56.4
Phosphoric acid (H_3PO_4)	3124.7
Potassium hydroxide (KOH)	419.1
Pure CaO for processes	1193.2
Sodium carbonate (Na_2CO_3)	1245.1
Sodium chloride (NaCl)	13.3
Sodium hydroxide (NaOH)	529.7
Sodium methoxide ($Na(CH_3O)$)	2425.5
SO_2	53.3
Sulphuric acid (H2SO4)	217.5
Urea	1846.6

7 GHG Emission Intensity of Electricity

The GHG emission intensity of electricity shall be determined at the level of countries or at the level of bidding zones. The GHG emission intensity of electricity may be determined at the level of bidding zones only, if the required data are publicly available. The calculation the carbon intensity of electricity, expressed as gCO_{2eq}/kWh electricity, shall consider all potential primary energy sources for electricity generation, type of plant, conversion efficiencies and own electricity consumption in the power plant.

The calculation shall consider all carbon equivalent emissions, associated with the combustion and supply of the fuels used for electricity production. This relies on the amount of different fuels used in the electricity production facilities and the emission factors from fuel combustion and the upstream fuel emission factors.

Greenhouse Gases other than CO_2 shall be converted to CO_{2eq} by multiplying their Global Warming Potential (GWP) relative to CO_2 over the 100-year time horizon as set out in Annex V, part C, point 4 to RED II. Because of their biogenic origin, CO_2 emissions from the combustion of biomass fuels are not accounted for, but emissions of CH_4 and N_2O shall be accounted for.

> *Hydrogen leakages should be considered as an energy loss (leading to proportional increase of the emission intensity). The global warming potential of emitted hydrogen should be considered as soon as a value for the global warming potential of hydrogen is added in RED II Annex V.*

For the calculation of the GHG emissions from fuels combustion, the IPCC default emission factors for stationary combustion in the energy industries shall be used (IPCC 2006). The upstream emissions shall include emissions from all the processes and phases required to make the fuel ready to supply the power production; they result from the extraction, refining and transport of the fuel used for electricity production.

In addition, all the upstream emissions from the cultivation, harvesting, collection, processing and transport of biomass shall be considered. Peat and the components of waste materials that are from fossil origins shall be treated as fossil fuels.

The fuels used for gross electricity production in electricity only plants are determined based on the electricity production and the efficiency of conversion to electricity. In the case of Combined Heat and Power (CHP), the fuels used for heat produced in CHP shall be counted by considering alternative heat production with average overall efficiencies of 85%, while the rest shall be attributed to electricity generation.

For nuclear power plants, the conversion efficiency from nuclear heat shall be assumed to be 33% or data provided by Eurostat or a similar, accredited source.

No fuels are associated with electricity production from renewables that include hydro, solar, wind and geothermal. The emissions from the construction and decommissioning and waste management of electricity producing facilities are not

considered. Thus, the carbon equivalent emissions associated with the renewable electricity (wind, solar, hydro and geothermal) production are considered to be equal to zero.

The CO_2 equivalent emissions from gross electricity production shall include upstream emissions from JEC WTW v5[24] listed in Table 3 and the default emission factors for stationary combustion from IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006) listed in Tables 1 and 2. The upstream emissions for supplying the fuel used shall be calculated applying the JEC WTW v5 upstream emission factors[24].

The calculation of the carbon intensity of electricity shall be done following the formula:

$$e_{gross\_prod} = \sum_{i=1}^{k} (c_{i-ups} + c_{i-comb}) * B_i$$

where: e_{gross_prod} - CO_2 equivalent emissions [gCO_{2eq}]

c_{i-ups} - upstream CO_2 equivalent emission factors [$\frac{\mathrm{gCO2eq}}{\mathrm{MJ}}$]

c_{i-comb} - CO_2 equivalent emission factors from fuels combustion [$\frac{\mathrm{gCO2eq}}{\mathrm{MJ}}$]

B_i - fuel consumption for electricity generation [MJ]

i=1⋯k -fuels used for electricity production

The amount of net electricity production is determined by the gross electricity production, own electricity consumption in the power plant and the electricity losses in pump storage.

$$E_{net} = E_{gross} - E_{own} - E_{pump}$$

where: E_{net} - net electricity production [MJ]

E_{gross} - gross electricity production [MJ]

E_{own} - own internal electricity consumption in power plant [MJ]

E_{pump} - electricity for pumping [MJ]

The carbon intensity of net produced electricity shall be the total gross GHG emitted for producing or using the net electricity:

$$CI = \frac{\mathrm{egross_{prod}}}{\mathrm{Enet}}$$

Where: CI - CO_2 equivalent emissions from electricity production [$\frac{\mathrm{gCO2eq}}{\mathrm{MJ}}$]

[24] Prussi et al., 2020: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC121213/jec_wtw_v5_121213_final.pdf

7.1 Electricity production and fuel consumption data

Data on electricity production and fuel consumption shall be sourced from IEA Data and statistics that provides data on energy balances and electricity produced using various fuels, e.g. from IEA website, Data and Statistic section ("Energy Statistics Data Browser")[25].

For EU Member States, Eurostat data are more detailed and can be used instead. Where the GHG emission intensity is established at the level of bidding zones, data from official national statistics of the same level of detail as the IEA data shall be used.

> *Where bidding zones are not identical to countries, data from official national statistics have to be used that have been derived in line with the methodology applied for determining the RES-E share in the SHARES tool[26].*

Fuel consumption data shall include available data at the highest level of detail available from national statistics: solid fossil fuels, manufactured gases, peat and peat products, oil shale and oil sands, oil and petroleum products, natural gas, renewables and biofuels, non-renewable waste and nuclear. Renewables and biofuels include biofuels, renewable municipal waste, hydro, ocean, geothermal, wind, solar and heat pumps.

[25] Example: https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=GERMANY&energy=Coal&year=202

[26] https://ec.europa.eu/eurostat/web/energy/database/additional-data

7.2 Input data from literature sources

The following data are set out in part C of the Annex to CDR 1185.

Table 1 Default emissions factors for stationary combustion [g/MJ fuel on a net calorific value]. Note: values have to be multiplied with GWP factor set out in Annex V, part C, point 4 to RED II.

Fuel	*CO_2*	*CH_4*	*N_2O*
Solid fossil fuels			
Anthracite	98.3	0.001	0.0015
Coking coal	94.6	0.001	0.0015
Other bituminous coal	94.6	0.001	0.0015
Sub-bituminous coal	96.1	0.001	0.0015
Lignite	101	0.001	0.0015
Patent fuel	97.5	0.001	0.0015
Coke oven coke	107	0.001	0.0015
Gas coke	107	0.001	0.0001
Coal tar	80.7	0.001	0.0015
Brown coal briquettes	97.5	0.001	0.0015
Manufactured gases			
Gas works gas	44.4	0.001	0.0001
Coke oven gas	44.4	0.001	0.0001
Blast furnace gas	260	0.001	0.0001
Other recovered gases	182	0.001	0.0001
Peat and peat products	106	0.001	0.0015
Oil shale and oil sands	73.3	0.003	0.0006
Oil and petroleum products			
Crude oil	73.3	0.003	0.0006
Natural gas liquids	64.2	0.003	0.0006
Refinery feedstocks	73.3	0.003	0.0006
Additives and oxygenates	73.3	0.003	0.0006
Other hydrocarbons	73.3	0.003	0.0006
Refinery gas	57.6	0.001	0.0001
Ethane	61.6	0.001	0.0001
Liquefied petroleum gases	63.1	0.001	0.0001
Motor gasoline	69.3	0.003	0.0006
Aviation gasoline	70	0.003	0.0006
Gasoline-type jet fuel	70	0.003	0.0006
Kerosene-type jet fuel	71.5	0.003	0.0006
Other kerosene	71.5	0.003	0.0006
Naphtha	73.3	0.003	0.0006
Gas oil and diesel oil	74.1	0.003	0.0006
Fuel oil	77.4	0.003	0.0006
White spirit and SBP	73.3	0.003	0.0006
Lubricants	73.3	0.003	0.0006
Bitumen	80.7	0.003	0.0006
Petroleum coke	97.5	0.003	0.0006
Paraffin waxes	73.3	0.003	0.0006
Other oil products	73.3	0.003	0.0006
Natural gas	56.1	0.001	0.0001
Waste			
Industrial waste (non-renewable)	143	0.03	0.004
Non-renewable municipal waste	91.7	0.03	0.004

Source: IPCC, 2006; cited from $DA_{28(5)}$

Table 2 Default emissions factors for stationary combustion of fuels of biomass origin [g/MJ fuel on a net calorific value]

Fuel	*CO_2*	*CH_4*	*N_2O*
Primary solid biofuels	0	0.03	0.004
Charcoal	0	0.2	0.004
Biogases	0	0.001	0.0001
Renewable municipal waste	0	0.03	0.004
Pure biogasoline	0	0.003	0.0006
Blended biogasoline	0	0.003	0.0006
Pure biodiesels	0	0.003	0.0006
Blended biodiesels	0	0.003	0.0006
Pure bio jet kerosene	0	0.003	0.0006
Blended bio jet kerosene	0	0.003	0.0006
Other liquid biofuels	0	0.003	0.0006

Source: IPCC, 2006; cited from CDR 1185

Table 3. Fuel upstream emission factors [g CO_{2eq}/MJ fuel on a net calorific value]

Fuel	*Emission factor*
Hard coal	15.9
Brown coal	1.7
Peat	0
Coal gases	0
Petroleum Products	11.6
Natural gas	12.7
Solid biofuels	0.7
Liquid biofuels	46.8
Industrial Waste	0
Municipal waste	0
Biogases	13.7
Nuclear	1.2

Source: JEC WTW v5; cited from $DA_{28(5)}$

Table A includes the values for the GHG emission intensity of electricity at country level in the European Union. If the GHG emission intensity of electricity is determined at country level, these values shall be used for electricity sourced in the European Union until more recent data becomes available to determine the emission intensity of electricity.

> *The objective of the Commission is to update these data annually. Data will be made available on the website of the European Commission.*

Table A: Emission intensity of electricity in the European Union 2020

Country code	Country	Emission intensity of generated electricity (g_{CO2eq}/MJ)
AT	Austria	39.7
BE	Belgium	56.7
BG	Bulgaria	119.2
CY	Cyprus	206.6
CZ	Czechia	132.5
DE	Germany	99.3
DK	Denmark	27.1
EE	Estonia	139.8
EL	Greece	125.2
ES	Spain	54.1
FI	Finland	22.9
FR	France	19.6
HR	Croatia	55.4
HU	Hungary	72.9
IE	Ireland	89.4
IT	Italy	92.3
LV	Latvia	39.4
LT	Lithuania	57.7
LU	Luxembourg	52.0
MT	Malta	133.9
NL	Netherlands	99.9
PL	Poland	196.5
PT	Portugal	61.6
RO	Romania	86.1
SK	Slovakia	45.6
SI	Slovenia	70.1
SE	Sweden	4.1

Source: CDR 1185 based on JRC, 2022

8 Sustainability

This chapter defines the provisions related to the electricity used to produce RFNBOs.

If the output of a process does not fully qualify as RFNBO, the RFNBO share in the total output shall be determined according to the provisions in section 5.4 above.

> *The requirements on GOs defined in this chapter also apply in cases where this document and CDR 1184 do not require the conclusion of a renewables PPA.*

8.1 Case 1: Grid mix

Article 27(3), fourth subparagraph, of RED II defines that where electricity is used for the production of RFNBOs, either directly or for the production of intermediate products, 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.

> *The average share of electricity from renewable sources in the country of production shall be determined by dividing the gross final consumption of electricity from renewable sources in the country of production 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, plus imports minus exports of electricity to the country.*
>
> *Guarantees of Origin (GOs) according to RED II Art. 19 for renewable electricity need to be cancelled for RFNBO production in EU-Member States and in EFTA States. The renewable electricity GOs for the direct line need to comply with the general requirements in Article 19 of RED II. In Member States where GOs cannot be issued for self-consumption, no GOs are required.*
>
> *Similarly, in third countries where a certification system similar to the definition in RED II Art. 19 for renewable electricity exists, the related certificates need to be cancelled for RFNBO production.*
>
> *The electricity GOs or certificates in third countries shall be issued for installations located in the same country as the electrolyser.*
>
> *All provisions related to electricity GOs or certificates in third countries detailed in section 8.3.5 apply.*

8.2 Case 2: Rules for counting electricity obtained from direct connection to an installation generating renewable electricity as fully renewable

For the purpose of demonstrating compliance with the criteria set out in Article 27(3), fifth subparagraph, of RED II for counting electricity obtained from direct connection to an installation generating renewable electricity as fully renewable, the fuel producer shall provide evidence on the following:

(a) the installations generating renewable electricity are connected to the installation producing RFNBO via a direct line, or the renewable electricity production and production of RFNBO take place within the same installation;
(b) the installations generating renewable electricity came into operation not earlier than 36 months before the installation producing RFNBO; where additional production capacity is added to an existing installation producing RFNBO, the added capacity shall be considered to be part of the existing installation, provided that the capacity is added at the same site and the addition takes place no later than 36 months after the initial installation came into operation; and
(c) the installation producing electricity is not connected to the grid, or the installation producing electricity is connected to the grid but a smart metering system that measures all electricity flows from the grid shows that no electricity has been taken from the grid to produce RFNBO.

If the fuel producer also uses electricity from the grid, it may count it as fully renewable if it complies with the rules set out in section 8.3.

An installation shall be considered to be in operation once the physical production of RFNBO or renewable electricity has started (i.e. once the production of fuels including hydrogen or any other RFNBO or renewable electricity has started; see definitions in section 4 as well as section 8.3.5).

Guarantees of Origin (GOs) according to RED II Art. 19 for renewable electricity need to be cancelled for RFNBO production in EU-Member States and in EFTA States. The renewable electricity GOs for the direct line need to comply with the general requirements in Article 19 of RED II. In Member States where GOs cannot be issued for self-consumption, no GOs are required.

Similarly, in third countries where a certification system similar to the definition in RED II Art. 19 for renewable electricity exists, the related certificates need to be cancelled for RFNBO production.

All provisions related to electricity GOs or certificates in third countries detailed in section 8.3.5 apply.

Electricity sourced via a direct connection from an installation that does not meet the requirements for being considered fully renewable would not count

as fully renewable, and the rules applying for electricity taken from the grid that does not qualify as fully renewable apply (see section 5.7).

8.3 Case 3: Rules for counting electricity taken from the grid as fully renewable

8.3.1 Grid mix above 90% renewables

Fuel producers may count electricity taken from the grid as fully renewable if the installation producing the RFNBO is located in a bidding zone where the average proportion of renewable electricity exceeded 90% in the previous calendar year and the production of RFNBO does not exceed a maximum number of hours set in relation to the proportion of renewable electricity in the bidding zone.

This maximum number of hours shall be calculated by multiplying the total number of hours in each calendar year by the share of renewable electricity reported for the bidding zone where the renewable RFNBO is produced. 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, plus imports minus exports of electricity to the bidding zone. Once the average share of renewable electricity exceeds 90% in a calendar year, it shall be continued to be considered to be higher than 90% for the subsequent five calendar years.

The definition of 'bidding zone' for the European Union (see definition in section 4) is to be applied in countries where the European definition of bidding zone can be applied.

As regards the implementation of the bidding zone concept, recital 3 of CDR 1184 provides guidance:

"[…] 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 shall be applied:

- *It shall be assessed whether at the location of the electrolyser, market regulations apply, which are similar to the rules set out for bidding zones in Regulation (EU) 2019/943. Similar means in this context 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, it shall be assessed 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 methodology.*
- *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 (see section 8.3.1), the emission intensity of electricity (see section 8.3.2) or the price of electricity (see section 8.3.6 and 8.3.7), the conditions can only be considered as fulfilled if compliance can be demonstrated based on reliable data from official sources.*

Guarantees of Origin (GOs) according to RED II Art. 19 for renewable electricity need to be cancelled to the benefit of the RFNBO producer in EU-Member States and in EFTA States. The renewable electricity GOs need to comply with the general requirements in Article 19 of RED II.

Similarly, in third countries where a certification system similar to the definition in RED II Art. 19 for renewable electricity exists, the related certificates need to be cancelled for RFNBO production.

The electricity GOs or certificates in third countries shall be issued for energy originating from installations located in the same country as the electrolyser.

All provisions related to electricity GOs or certificates in third countries detailed in section 8.3.5 apply.

8.3.2 Emission intensity of grid electricity lower than 18 g_{CO2eq}/MJ

Where the conditions set out in section 8.3.1 are not met, fuel producers may count electricity taken from the grid as fully renewable if the installation producing the RFNBO is located in a bidding zone where the emission intensity of electricity is lower than 18 g_{CO2eq}/MJ, provided that the following criteria are met:

(a) the fuel producers have concluded directly, or via intermediaries, one or more renewables power purchase agreements with economic operators producing renewable electricity in one or more installations generating renewable electricity for an amount that is at least equivalent to the amount of electricity that is claimed as fully renewable and the electricity claimed is effectively produced in this or these installations; and

(b) the conditions on temporal and geographical correlation in accordance with sections 8.3.6 and 8.3.7 are met.

The emission intensity of electricity shall be determined following the approach for calculating the average carbon intensity of grid electricity in the methodology for determining the greenhouse gas emissions savings from RFNBO set out in sections 5, 6, and 7 based on latest available data.

Once the emission intensity of electricity is lower than 18 g_{CO2eq}/MJ in a calendar year, the average emission intensity of electricity shall be continued to be considered to be lower than 18 g_{CO2eq}/MJ for the subsequent five calendar years.

> *The conditions can only be considered as fulfilled if compliance can be demonstrated based on reliable data from official sources.*

8.3.3 Imbalance settlement

Electricity taken from the grid that is used to produce RFNBO may also be counted as fully renewable if the electricity used to produce RFNBO is consumed 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;
(b) the electricity consumed for the production of RFNBO reduced the need for re-dispatching by a corresponding amount.

> *In practice, one or several bids inserted by* installation producing the RFNBO *(or one of its intermediaries) on the manual Frequency Restoration Reserve (mFRR) (or an equivalent mechanism) were selected by the TSO in the corresponding bidding zone and the reason for the bid being selected is identified as "redispatching", "congestion management" or equivalent.*
>
> *These rules will likely be applied only in exceptional cases and the provision shall be followed strictly.*
>
> *The above provision can only be applied in jurisdictions where Regulation (EU) 2019/943 applies or where market rules are implemented that allow applying this provision, i.e. that entities adopting the tasks of national transmission system operators as well as rules for re-dispatching are set out.*

8.3.4 Power Purchase Agreements

Where the conditions in sections 8.3.1, 8.3.2, and 8.3.3 are not met, fuel producers may count electricity taken from the grid through PPAs as fully renewable if it complies with the conditions on additionality, temporal correlation and geographic correlation in accordance with sections 8.3.5, 8.3.6, 8.3.7.

> *Requirements for renewable power purchase agreements (PPA) stem from the definition set out in RED II and in CDR 1184. CDR 1184 allows fuel producers to conclude one or more renewable PPAs 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 contract has effectively been produced. Intermediaries referred to in CDR 1184 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 (GO) of renewable electricity as described in section 8.3.5, the requirements set out in Article 5 of CDR 1184, and the requirements set out in Article 19 of RED II (referred to in recital 15 of CDR 1184), have to be met.

8.3.5 Additionality and no support

The additionality condition referred to in section 8.3.4, shall be considered complied with if fuel producers produce an amount of renewable electricity in their own installations that is at least equivalent to the amount of electricity claimed as fully renewable, or have concluded directly, or via intermediaries, one or more renewables PPA with economic operators producing renewable electricity in one or more installations for an amount of renewable electricity that is at least equivalent to the amount of electricity that is claimed as fully renewable and the electricity claimed is effectively produced in this or these installations, provided that the following criteria are met:

(a) the installation generating renewable electricity came into operation not earlier than 36 months before the installation producing the RFNBO.
Where an installation generating renewable electricity complied with the requirements set out in the previous sentence under a renewables PPA with a fuel producer that has ended, it shall be considered to have come into operation at the same time as the installation producing the RFNBO under a new renewables PPA.
Where additional production capacity is added to an existing installation producing RFNBO, the added capacity shall be considered to have come into operation at the same time as the initial installation, provided that the capacity is added at the same site and the addition takes place no later than 36 months after the initial installation came into operation.

For installations producing RFNBOs, the condition for adding additional capacity in the previous paragraph shall be complied with in order to consider the different capacity parts as one installation.

Starting production should be considered to include any form of commercial production of hydrogen or other RFNBOs 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.

(b) The installation generating renewable electricity has not received support in the form of operating aid or investment aid, excluding support received by installations before their repowering, financial support for land or for grid connections, support that does not constitute net support, such as support that is fully repaid and support for installations generating renewable electricity that are supplying installations producing RFNBO used for research, testing and demonstration.

Operating aid or investment aid 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. Whether e.g., a contract for difference constitutes net support, it 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.

This provision shall not apply until 1 January 2038 to installations producing RFNBO that come into operation before 1 January 2028. This exemption shall not apply to capacity added after 1 January 2028 for the production of RFNBOs.

RED II defines in Art. 27(3), sixth subparagraph: "Electricity that has been taken from the grid may be counted as fully renewable provided that it is produced exclusively from renewable sources and the renewable properties and other appropriate criteria have been demonstrated, ensuring that the renewable properties of that electricity are claimed only once and only in one end-use sector."

In order to ensure this, Guarantees of Origin (GOs) according to RED II Art. 19 for renewable electricity need to be cancelled for RFNBO production in EU-Member States and in EFTA States. The renewable electricity GOs for the PPA (see section 8.3.4) need to comply with the general requirements in Article 19 of RED II.

Similarly, in third countries where a certification system similar to the definition in RED II Art. 19 for renewable electricity exists, the related certificates need to be cancelled for RFNBO production.

Only GOs or certificates in third countries that have been issued for the installations covered by the renewables PPAs can be used as evidence. The GOs or certificates in third countries need to carry the same attributes as the physical installation producing the renewable electricity. This includes, but is not limited to:

- *The installation unique identifier,*
- *the location of the installation, either postal address where unique, or geographical coordinates,*
- *electrical production capacity of the installation,*
- *the production technology and energy source of the installation,*
- *the date when the installation came into operation,*
- *the production period or date and time of the production (start and end),*
- *financial support information (investment support, operational support, etc.).*

The associated GOs or certificates in third countries need to be cancelled before the expiry of the validity period to the benefit of the fuel producer and the volume cancelled shall correspond to that claimed under the PPA. The renewable electricity producer shall not sell or transfer the associated GOs or certificates in third countries to any other entity than the operator of the electrolyser under the PPA.

Where a Member State decides to immediately cancel the associated electricity GOs, this shall be recognized as proof for avoiding double counting.

In other countries, the fuel producer shall provide a signed declaration of the producer of the renewable electricity that there is no double selling or double claiming of the renewable attribute and/ or the GHG savings related to this electricity.

8.3.6 Temporal correlation

Until 31 December 2029 the temporal correlation condition referred to in sections 0 and 8.3.4, shall be considered complied with if the RFNBO is produced during the same calendar month as the renewable electricity produced under the renewables PPA or from renewable electricity from a new storage asset that is located behind the same network connection point as the electrolyser or the installation generating renewable electricity, that has been charged during the same calendar month in which the electricity under the renewables PPA has been produced.

From 1 January 2030, the temporal correlation condition shall be considered complied with if the RFNBO is produced during the same one-hour period as the renewable electricity produced under the renewables PPA or from renewable electricity from a new storage asset that is located behind the same network connection point as the electrolyser or the installation generating renewable electricity, that has been charged during the same one-hour period in which the electricity under the renewables PPA has been produced.

Storage assets are to be considered new if they came into operation not earlier than 36 months before the installation producing RFNBO.

Where a European Union Member State applies the rules set out in this paragraph already from 1 July 2027, for RFNBO produced in their territory, fuel producers shall conform to the rules set out in this paragraph from 1 July 2027 for RFNBO produced in the territory of this Member State, i.e. not for imported RFNBO.

The temporal correlation condition shall always be considered complied with if the RFNBO is produced during a one-hour period where the clearing price of electricity resulting from single day-ahead market coupling in the bidding zone, as referred to in Article 39 (2), point (a) of Commission Regulation (EU) 2015/1222[27], is lower or equal to EUR 20 per MWh or lower than 0.36 times the price of an allowance to emit one tonne of carbon dioxide equivalent during the relevant period for the purpose of meeting the requirements of Directive 2003/87/EC of the European Parliament and of the Council[28].

In case the installations generating renewable electricity are not in operation during a period where the conditions defined in the previous paragraph are complied with, the electricity taken from the grid could still be considered as fully renewable if all other relevant criteria set out in this document chapter 8 are met. This includes criteria on additionality as well as on geographical correlation. As regards the criteria on additionality, it would be sufficient to demonstrate that a sufficient quantity of renewable electricity was effectively produced by eligible installations under the PPA. It would not matter when this production took place.

For the price of an allowance to emit one tonne of carbon dioxide equivalent, the closing price of the previous trading day for December futures for the ongoing year should be applied.

Possible sources of data include[29]:

- *ICE Endex[30]*
- *EEX[31]*

The provision in the previous paragraph can only be applied in countries where Regulation (EU) 2015/1222 applies or where a liberalized electricity market exists and similar provisions to Regulation (EU) 2015/1222 are implemented. Where the provision in the previous paragraph makes

[27] Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (OJ L 197, 25.7.2015, p. 24).
[28] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).
[29] CertfiHy gives no warranty (express or implied) and excludes any liability (whether in negligence or otherwise) in connection with the Data provided by the listed sources, including (without limitation) in relation to their availability, suitability, quality, accuracy, timeliness, completeness and or performance.
[30] https://www.ice.com/products/197/EUA-Futures/data?marketId=5474738&span=1
[31] https://www.eex.com/en/market-data/environmentals/futures

reference to the price of an allowance to emit one tonne of carbon dioxide equivalent for the purpose of meeting the requirements of Directive 2003/87/EC, this can only be applied in countries where Directive 2003/87/EC applies.

Where electricity price data are required, the conditions can only be considered as fulfilled if compliance can be demonstrated based on reliable electricity price data from official sources.

8.3.7Geographical correlation

The geographical correlation condition referred to in sections 0 and 8.3.4 shall be considered complied with if at least one of the following criteria relating to the location of the electrolyser is fulfilled:

(a) the installation generating renewable electricity under the renewables power purchase agreement is located, or was located at the time when it came into operation, in the same bidding zone as the electrolyser; or
(b) the installation generating renewable electricity is located in an interconnected bidding zone, including in another Member State and electricity prices in the relevant time period on the day-ahead market referred to in section 8.3.6 in the interconnected bidding zone is equal or higher than in the bidding zone where the RFNBO is produced; or
(c) the installation generating renewable electricity under the renewables PPA is located in an offshore bidding zone[32] that is interconnected with the bidding zone where the electrolyser is located.

Where electricity price data are required, the conditions can only be considered as fulfilled if compliance can be demonstrated based on reliable electricity price data from official sources.

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.

Offshore bidding zones should be considered as bidding zones that comprise only offshore areas i.e. no land.

Where European Union Member States, without prejudice to Articles 14 and 15 of Regulation (EU) 2019/943, define additional criteria concerning the location of electrolysers and the installation producing renewable electricity to the criteria set out above in order to ensure compatibility of capacity additions with the national

[32] The term „offshore bidding zone“ is not yet defined legally in Europe. It is used by the European Commission in its „Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future"; Brussels, 19.11.2020; COM(2020) 74 final. The accompanying Commission Staff Working Document, Brussels, 19.11.2020, SWD(2020) 273 final, details the concept of offshore bidding zones.

planning of the hydrogen and electricity grid, these additional criteria have to complied with for the certification of RFNBO produced in the territory of this Member State, i.e. not for imported RFNBO.

For provisions on "bidding zone", please see section 8.3.1.

8.4 Combinations of electricity supply options

The RED II 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 CDR 1184, allows to produce fully renewable hydrogen via several sub-options.

Fuel producers may combine different pathways and options to source renewable electricity provided the way electricity is sourced is fully documented in line with the requirements set out in Article 8 of CDR 1184. This applies also for electricity sourced during the same time interval. For each way of sourcing electricity, the dedicated rules apply.

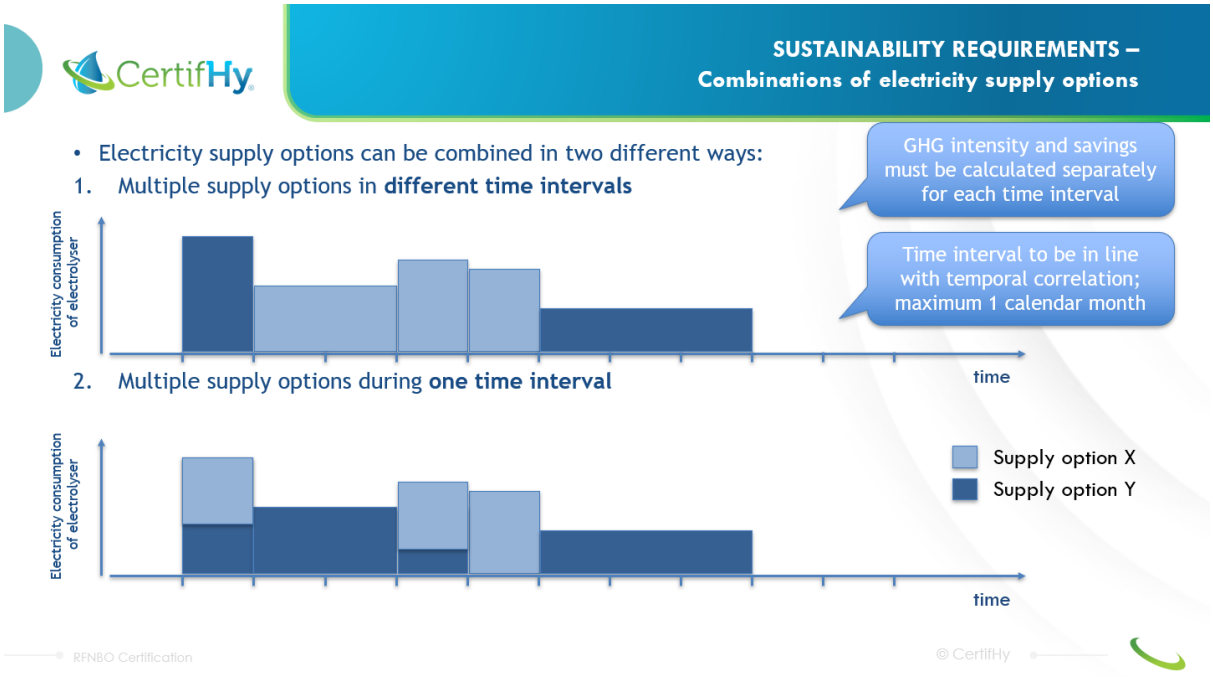

Figure 4: Combinations of electricity supply options

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 hydrogen produced from the remaining 30% electricity cannot be made renewable by applying the rules of CDR 1184. 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.

8.5 Common rules

Fuel producers shall provide reliable information demonstrating that all requirements set out in sections 8.1 to 8.3 are complied with, including for each hour as relevant:

(a) the amount of electricity used to produce RFNBO. This information shall be further detailed as follows:
  (i) the amount of electricity sourced from the grid that does not count as fully renewable as well as the proportion of renewable electricity;
  (ii) the amount of electricity that counts as fully renewable because it has been obtained from a direct connection to an installation generating renewable electricity as set out in section 8.2 (based on CDR 1184 Article 3);
  (iii) the amount of electricity sourced from the grid that counts as fully renewable according to the criteria set out in section 8.3.1 (based on CDR 1184 Article 4(1));
  (iv) the amount of electricity that counts as fully renewable according to the criteria set out in section 0 (based on CDR 1184 Article 4(2).
  (v) the amount of electricity that counts as fully renewable according to the criteria set out in section 8.3.3 (based on CDR 1184 Article 4(3).
  (vi) the amount of electricity that counts as fully renewable in accordance with the criteria set out in section 8.3.4 (based on CDR 1184 Article 4(4);
(b) the amount of renewable electricity generated by the installations generating renewable electricity, regardless of whether they are directly connected to an electrolyser and regardless of whether the renewable electricity is used for the production of the RFNBO or for other purposes;
(c) the amounts of RFNBOs produced by the fuel producer.

Annex C: *Data requirements for initial audits* provides a list of detailed data requirements.

Annex A: Implementation of co-processing for 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 explains how the relevant provisions set out in RED II and CDR 1185 shall be implemented to derive the share of RFNBOs in the output of the process as well as the achieved emission savings. Relevant for the implementation are in particular Articles 25(1)(a) and 30 (2) of RED II as well as in section 5.2.

Articles 25(2)(a) RED II sets out that RFNBOs are counted towards the targets if they are used as intermediate products for the production of conventional 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.

As a consequence, all renewable hydrogen that is used for the production of conventional transport fuels in oil refineries can be counted towards the objectives of RED II Article 25(1), i.e. before the final fuel is consumed. This implies that the contribution is counted towards the target for renewable energies in transport 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 RED II as amended by Directive (EU) 2023/2413 also hydrogen as an intermediate product that is used for the production of biofuels can be counted towards the targets set out in transport. Renewable hydrogen (RFNBOs) used in refineries for other purposes, e.g. for the production of heating oil, is counted towards the industry target.

CDR 1185 sets out a specific rule for calculating the emission intensity of RFNBOs stemming from a process where co-processing is applied (see section 5.2). 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 RFNBOs and RCFs assuming that the process parts are otherwise identical.

If for instance a process uses H_2, CO, CO_2 as well as other energy inputs to produce synthetic fuels and the producer intends to replace 20% of the H_2 with H_2 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 H_2 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 CO_2 (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 section 5.4).*

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:

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

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).

CO_2 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 term 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 in section 5.4. In case 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 RED II[33]. The ratio of different outputs of the virtual process should not differ from the share of outputs of the whole process. In accordance with section 5.2 it is possible to determine the emission intensity of the output over a period of at most one calendar month.

For illustration purposes only, Figure 5 provides a graphical representation of a process with several inputs; this process may have only one output, or several.

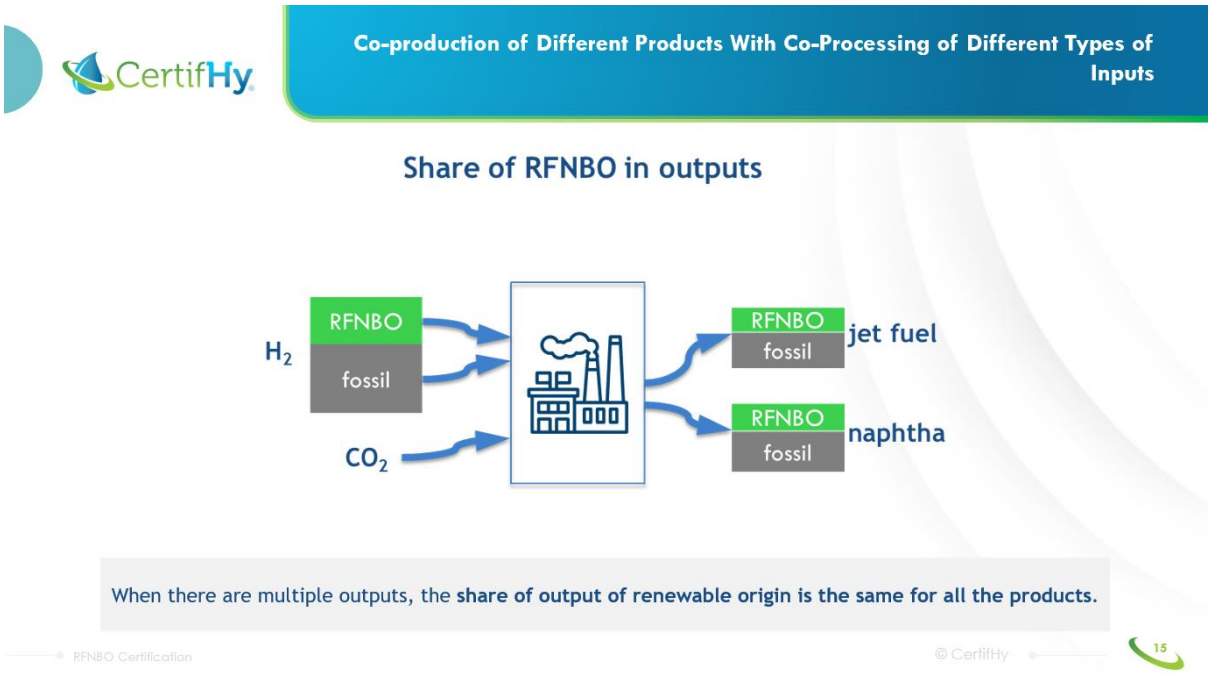

Figure 5: Co-production of Different Products With Co-Processing of Different Types of Inputs

[33] The described approach applies only for the production of RFNBOs and RCFs. For determining emission savings and produced amounts of biofuels the relevant provisions in Annex V to RED II and the Commission Delegated Regulation (EU) 2023/1640 of 5 June 2023 on the methodology to determine the share of biofuel and biogas for transport, produced from biomass being processed with fossil fuels in a common process apply.

Annex B: Criteria for "effective carbon pricing system"

The European Commission has published a guidance document "Q&A implementation of hydrogen delegated acts"[34].

The latest version of the document at the time of adoption of this CertifHy scheme document is the version of 14 March 2024.

This document contains in its Annex a chapter "Criteria effective carbon pricing system", which includes a list of countries with systems that "can be considered to fulfil the requirement of upstream accounting in an effective carbon pricing system".

The systems covered by this list are recognized by CertifHy.

This list is not exhaustive. Other systems within which RFNBOs and RCFs are expected to be produced may request to be assessed. Requests are to be put forward to CertifHy, and will be submitted to the European Commission.

The chapter "Criteria effective carbon pricing system" defines the following criteria, which are applied by the European Commission for assessing whether systems are to be considered to fulfil the requirement of upstream accounting in an effective carbon pricing system. In case these criteria are changed, the "Q&A implementation of hydrogen delegated acts" document has precedence over this CertifHy document.

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 CO_2 equivalent of the carbon incorporated in the RFNBO or and RCF that would have otherwise been emitted as CO_2 into the atmosphere. This includes CO_2 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

[34] Available at https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

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 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 Nationally Determined Contribution (NDC) aligned with the Paris agreement.
(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 NDC aligned with the Paris agreement.
(iii) for both an ETS and a tax: without design features which render the cap or tax ineffective.

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).

Annex C: Data requirements for initial audits

Type	Detailed information	Format[35]	Comments
Qualitative information	Where PPA applies: Signed PPA or signed term-sheet for PPA or tendering/ request for proposal documents for the renewable energy supply, including list of installations providing renewable electricity for the project with unique identification	pdf	Required to assess: • Fitness of Renewable Electricity procurement strategy with EU regulation • Additionality • Avoidance of double counting of renewable electricity attributes
	Description of supporting schemes for renewable electricity in the respective countries, states or regions, list of supported installations, Self-declaration concerning support received by renewable electricity generating installations	ppt/ pdf	
	Description/ Study of the available EAC/ REC[36]-System in the respective country and the commitment to use the EAC/ REC-System as far as it is/ will be available; or Description how the renewable electricity is statistically recorded and published in the respective country with references to legal regulations or national authorities who are responsible for such statistics	ppt/ pdf	
Quantitative information	Evidences for the recent national or regional electricity mix	ppt/ pdf	Required to assess: • Temporal correlation • Geographical correlation • Additionality
	Renewable electricity load profile forecast over a full year	xls	
	Electrolyser consumption profile forecast over a full year	xls	
	Proof of date when hydrogen production installation is planned to come into operation	pdf	

[35] File formats: ppt – powerpoint (slides), pdf – portable data format; xls – Excel (spread sheet)
[36] EAC – Energy Attribute Certificate; REC – Renewable Energy Certificate

Type	Detailed information	Format	Comments
Qualitative information	Simplified block diagram listing inputs/ process steps & outputs across the value chain	ppt/ pdf	Required for the auditor to: • Clarify the working hypotheses and plant configuration • Understand the relevant inputs to be considered • Make sure the GHG calculation is developed on the good scope
	Description of all inputs: origin/ renewability (if relevant)	ppt/ pdf	
	High level description of downstream (after FOB[37]) activities envisaged	ppt/ pdf	
Quantitative information	Heat & mass balance for all the different process steps	xls	Required for the auditor to: • Check the calculation scope and hypotheses • check consistency • Make sure that the methodology is correctly implemented
	Utilities consumption for all the different process steps (incl. what share of inputs/ outputs will be renewable)	xls	
	Emission factors for all the different inputs (incl. upstream emissions) based on the EU RED methodology or relevant official sources	xls	
	Carbon Footprint (CFP) calculation model detailing the operations performed at each process step and underlying the results	xls	
	Resulting final CFP for each products and/ or plant operating regime and % of GHG emissions reduction compared to the Fossil Fuel Comparator	xls	
	High-level mass balance tool allowing to follow a production batch over time	xls	
	Information above detailed for downstream (after FOB) activities envisaged	xls	

[37] FOB – free on board