



# REGATRACE

Renewable Gas Trade Centre in Europe

## D2.2. Report on content and attributes of GoO

<b>Deliverable:</b>	D2.2. Report on content and attributes of GoO
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## 1 REGATRACE in a Nutshell

REGATRACE (REnewable GAs TRAdE Centre in Europe) aims to create an efficient trade system based on issuing and trading biomethane/renewable gases certificates/Guarantees of Origin (GoO) with exclusion of double sale.

This objective will be achieved through the following founding pillars:

- European biomethane/renewable gases GoO system
- Set-up of national GoO issuing bodies
- Integration of GoO from different renewable gas technologies with electric and hydrogen GoO systems
- Integrated assessment and sustainable feedstock mobilisation strategies and technology synergies
- Support for biomethane market uptake
- Transferability of results beyond the project's countries

The network of issuing bodies will be established by including existing national biomethane registries (Austria, Denmark, Estonia, Finland, France, Germany, The Netherlands, Switzerland and UK) and by creating issuing bodies in the Target countries of the project (Belgium, Ireland, Italy, Lithuania, Poland, Romania and Spain).

Moreover, REGATRACE will prepare the ground for setting-up national biomethane registries in other 7 Supported countries (Croatia, Czech Republic, Greece, Latvia, Slovenia, Sweden and Ukraine).

Using a participatory process involving several stakeholders, REGATRACE will develop strategic visions and national roadmaps to boost the biomethane market.

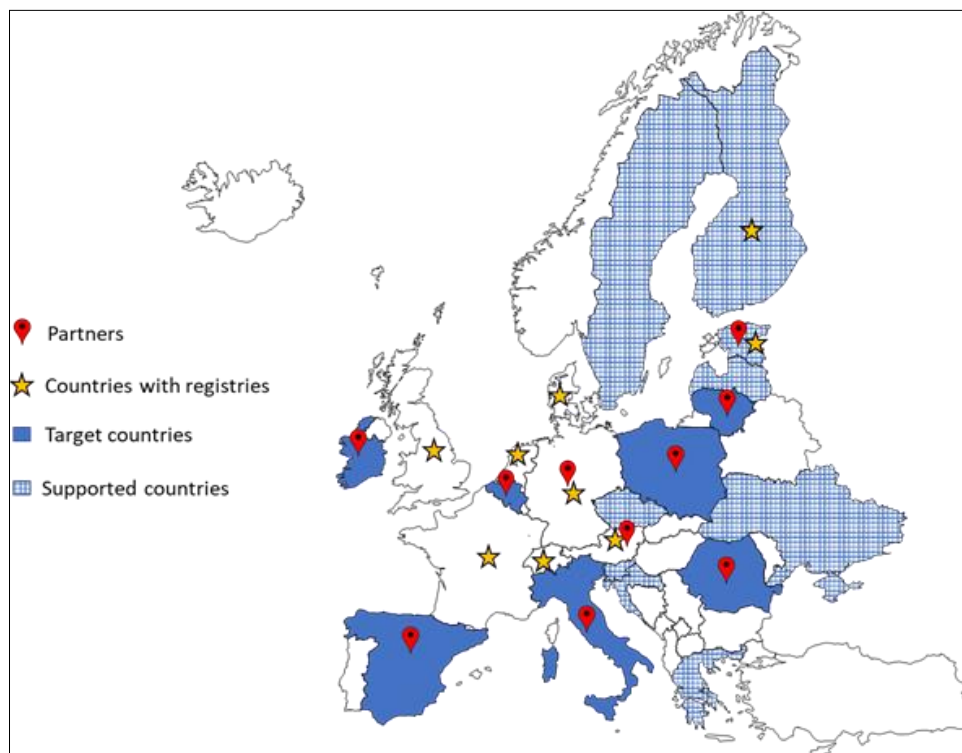


Figure 1: REGATRACE countries and partners

## 2 Purpose of the Document

### 2.1 Introduction

Renewable gases, with their characteristics of being a flexible energy carrier, can be applied for a broad set of marketing paths (renewable electricity, renewable gas for processing, heating and cooling, transportation sector, etc). Such different marketing paths require specific characteristics from the renewable gas product.

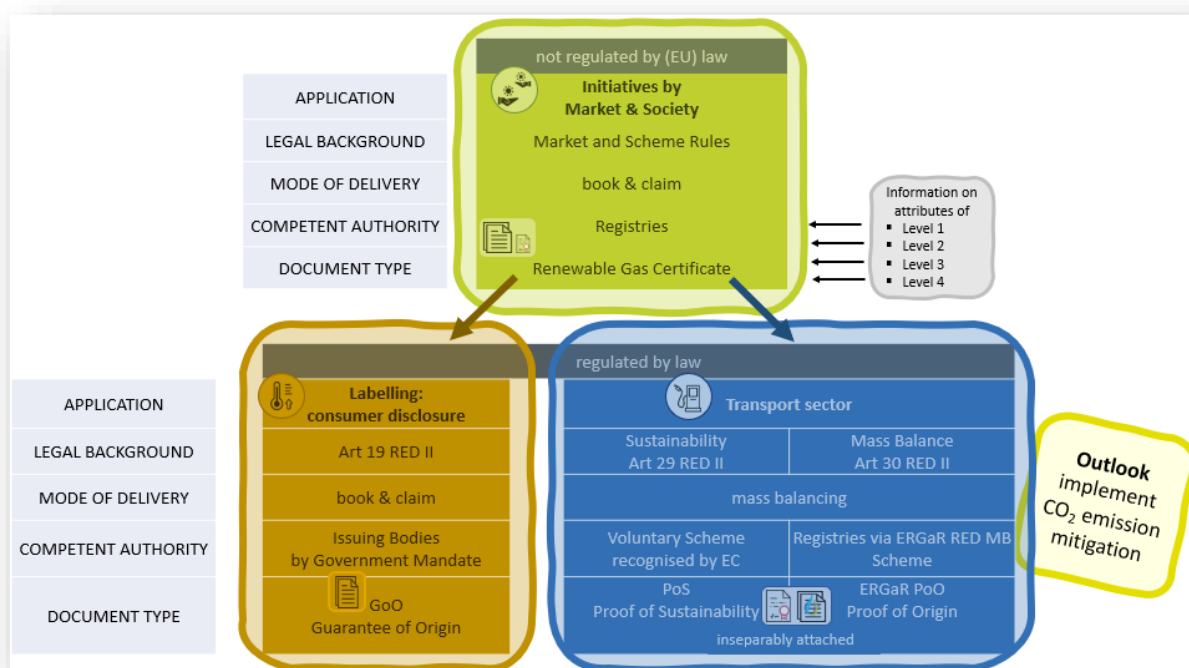
The definition of the origin, quality and quantity of renewable gases have not been requested by European legislation before the recast of the Renewable Energy Directive (RED II, 2018/2001/EU) in detail, which extends the purpose of GoOs as marketing paths for labelling end consumer disclosure for gas. According to RED II article 19, only certificates issued under the supervision of governments or of government designated bodies can be called GoOs. There are several other marketing pathways for renewable gases, such as the transportation sector, according to RED II articles 25-30. However, not all of them are regulated by EU legislation, but may still be chosen by renewable gas producers to market their product.

Thus, in several European countries, national Renewable Gas Registries have been established, some on voluntary basis, others with government mandate. Their main purpose is to create Renewable Gas Certificates specifying the installation, quantity and quality of renewable gases injected into the national gas grids. Not only the different end uses, also the different types of renewable gases (biomethane, bio-syngas, green hydrogen) will be part of an integrated renewable gas market and should thus be considered in the specification of the renewable gas product. Such registries have responsibility towards market participants for being a neutral and trustworthy platform for Biomethane/Renewable Gas Certificates.

Figure 2 depicts the different marketing pathways of renewable gases and the respective regulatory framework leading to the related types of documentation.

REGATRACE Deliverable 3.1 *Guidelines for establishing biomethane registries* explains their roles and purpose in detail. REGATRACE Deliverable 2.1 *Updated Guidelines for creating the European Biomethane GoO* already draws up a first picture on requirements and guidelines, based on the knowhow of ERGaR, AIB and their respective members.





**Figure 2: Different marketing pathways of renewable gases and the respective regulatory framework leading to the related types of documentation**

## 2.2 Purpose of this document

The primary purpose of the report at hand is to elaborate a harmonised approach by the members of the REGATRACE consortium regarding the content and attributes of biomethane GoO to be issued in the future, in accordance with Article 19 of the RED II.

For comfortable reading, the document is written about biomethane, which is the most common among renewable gases. Nevertheless, the content can be directly extended to other renewable gases.

The authors are aware that the amended, updated and extended EN 16325<sup>1</sup> standard will regulate the content and attributes of the biomethane GoOs (along with other renewable gases). This work under the REGATRACE project fosters communication among interested stakeholders and is performed with the aim of assisting the upcoming standardisation process. For this reason, this document has been drafted applying the glossary and the relevant parts of the EN 16325 standard.

The authors note, at this point of the report, that this document has been written in relation to biomethane for simplicity reasons, although it is supporting the market uptake of all types of gases from renewable sources. However, biomethane is the type which is closest to market-readiness from

<sup>1</sup> This European Standard EN 16325 specifies requirements for Guarantees of Origin of Electricity from all energy sources. This standard establishes the relevant terminology and definitions, requirements for registration, issuing, transferring and cancellation in line with the RES, Energy Efficiency and IEM Directives. Following the recast of the Renewable energy directive (RED II), EN16325 shall be revised to broaden its scope with gaseous hydrocarbons and heating and cooling.

volume perspective/related to amount of volume and will thus be used to explain necessary procedures and technical requirements. Most of the attributes of a biomethane GoO can be directly or indirectly applied to other renewable gases, such as renewable methane of non-biological origin.

This document does not commit any of the REGATRACE partners in their activities.



### 3 Recommendations

The REGATRACE consortium provides the following recommendations to the CEN technical working group JTC 14 WG 5<sup>2</sup>:

- Renewable gas entails some specifics - especially the renewable gas production process and the specifics arising from the organic input material – to which special attention should be paid. REGATRACE reports Deliverables D2.1 and D2.2 provide a holistic and comprehensive few on the necessities for establishing a liquid renewable gas market.
- Focus on the main target to develop a competitive renewable gas market which tackles the challenges of climate change and not only provides a solution of the administrative issues of a national and European certificate scheme.
- For EU Member States who do not yet have an established biomethane market with an operating registry providing renewable gas multipurpose certificates, the most sensible option is a harmonised data protocol and centrally co-ordinated international transfer handling for electronic documents representing the attributes of renewable gases;
  - ✓ with the ability to cover all marketing paths (labelling for end consumer disclosure, biofuel sector including “sustainability criteria”, facilitating information exchange related to national subsidy schemes and market initiatives;
  - ✓ and with the ability to cover all types of renewable gases.
- A harmonised data protocol and centrally co-ordinated international transfer handling for electronic documents representing the attributes of renewable gases will:
  - ✓ provide simplicity in the operational processes;
  - ✓ provide maximum trust and transparency for all market participants;
  - ✓ prevent any options for double counting and claiming;
  - ✓ reduce transfer handling costs significantly.
- A clear requirement from market point of view - renewable gas producers and traders – is to be able to define the monetary value of the GoO based on the quantity of the renewable gas product. On the other hand, respective “quality information” will enable the consumers to understand details of the quality, origin and green value of the renewable gas product (respective GoO) in order to base their purchase on a conscious choice.
  - ✓ Special attention should be paid to the market need of including (limited) “quality information” (aka attributes of level 3). Two main options exist:
    - \* Extension of the existing CEN 16325 standard to include renewable gases via a dedicated chapter for renewable gases;
    - \* Development of a dedicated gas verification methodology.
  - ✓ A Europe-wide harmonised criteria catalogue of such “quality information” (aka attributes of level 3) should be developed in close collaboration with the renewable gas market participants (producers, traders, consumers). Example information are:
    - \* type of input materials (substrate) used;
    - \* the classification of input materials as products, co-products, ag. residues, processing residues or wastes;

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<sup>2</sup> CEN/CENELEC Joint Technical Committee 14 “Energy management and energy efficiency in the framework of energy transition” Working Group 5 “Guarantees of Origin”. It handles the compliance of EN 16325 according to RED II article 19.



- \* plausibility check of volumes of input materials (substrate) versus volumes of output materials (gas volumes) over a certain specified production period.
- ✓ The eligibility criteria for external auditors validating “quality information” (aka attributes of level 3) should be developed in close collaboration with the renewable gas market participants (producers, traders, consumers).
- ✓ Extension of “quality information” (aka attributes of level 3) provides the market with the possibility to access renewable gas multipurpose certificates as is a wish of renewable gas market participants.
- Develop an accurate terminology of gaseous hydrocarbons, and definitions on “renewable gases” and “biomethane” in close collaboration with the renewable gas market participants (producers, traders, consumers).
- Take into consideration the existence of “renewable gas multipurpose certificates” which will provide a holistic view on the renewable gas market including different purposes of end use applications (see Figure 2).
- Take sector coupling into consideration via the integration of different production technologies and also different energy carries. To do so, pay attention to REGATRACE Work Package 4 *Integration of GoO from different renewable gas technologies with electric and hydrogen GoO systems*.
- The EN 16247-1<sup>3</sup> standard shall be elaborated within the CEN 16325 working group if it can be properly used to overcome problems of harmonisation of verification methodologies.

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<sup>3</sup> The European Standard EN-16247 specifies the requirement for energy auditing.





## 4 Content of a Renewable Gas GoO

### 4.1 Introduction

As explained in the introduction, in several European countries, national Renewable Gas Registries have been established, some on voluntary basis, others with government mandate. Their main purpose is to create Renewable Gas Certificates specifying the installation, quantity and quality of renewable gases injected into the national gas grids. Close contact with market participants, producers, consumers and traders has provided the established Registries to gain a lot of experience on the topic of Renewable Gas Certificates for different end uses and purposes, including the one of end consumer disclosure. This information is paired with the years-long experience collected by AIB on operating the EECS scheme rules, particularly for the power sector, which provide a multipurpose energy certificate scheme, a forum for cooperation between issuing bodies and international certificate transfer, and a contractual framework for scheme compliance rules.

Consequently, REGATRACE may provide a unique, holistic view to describe the wide range of minimum to maximum requirements on the content of a Renewable Gas GoO. To do so, this chapter is divided into sub-chapters starting with a citation of the requests of RED II on GoOs (see chapter 4.2 *Definitions according to Art 19. RED II*). Additionally to these requirements, chapter 4.3 *Practicalities on the Content of a Renewable Gas GoO* provides insights collected by the REGATRACE project consortium, which goes beyond the legal requirements.

### 4.2 Definitions of guarantee of origin (GoO) according to Art 19 RED II

Article 19 (2) defines:

*“(…) A guarantee of origin shall be of the standard size of 1 MWh. No more than one guarantee of origin shall be issued in respect of each unit of energy produced. (…)”*

Article 19(7) requests:

*“7. A guarantee of origin shall specify at least:*

- a. The energy source from which the energy was produced and the start and end dates of production.*
- b. Whether it relates to:
  - (i) electricity;*
  - (ii) gas including hydrogen; or*
  - (iii) heating and cooling**
- c. The identity location type and capacity of the installation where the energy was produced.*
- d. Whether the installation has benefited from investment support and whether the unit of energy has benefited in any way from a national support scheme, and the type of support scheme;*
- e. The date on which the installation became operational; and*
- f. The date and country of issue and a unique identification number.*

*Simplified information may be specified on guarantees of origin from installations of less than 50 kW.”*



## 4.3 Practicalities on the Content of a Renewable Gas GoO

### 4.3.1 Introduction

RED II only lists the minimum content of the energy GoOs. In relation to biomethane (and other renewable gases), the GoO should be extended and includes additional attributes which provide essential insight for transparency reasons, enabling consumers to make conscious choices and potentially increase monetary incomes for producers. To simplify the understanding of different types of attributes and their content, REGATRACE provides a possible categorisation of the attribute list of a GoO in the deliverable (REGATRACE, D2.1 *Updated Guidelines for creating the European Biomethane GoO*).

### 4.3.2 Volume and identification of a GoO

#### 4.3.2.1 Registration of production beyond the MWh

In accordance with RED II article 19.7 (a), GoOs are issued for a specific production period. While GoOs have a standard size of 1 MWh, it is unlikely that the exact production during a predefined production period comes down to a round MWh. Therefore, it is proposed that the residual gas production beyond the last MWh, is recorded in the Registration Database, and can be added to the nett production volume of the subsequent production period in case of GoO issuing.

#### 4.3.2.2 Gaining data handling efficiency through bundling of certificates in a set

In order to prevent double counting, it is essential that every GoO has a unique identification number. In line with RED II article 19.7 (f), this helps to identify and prevent double issuing, double transfer and double cancellation.

With huge volumes, having many single certificates of 1 MWh causes efficiency problems in registration databases, for both data storage and transfer. Therefore, the concept of the certificate set is introduced. A certificate set consists of the identification numbers of the first and the last certificate in the set. All data fields on each certificate in that set are identical, except for the unique identification number.

#### 4.3.2.3 Splitting a set

When an Account Holder chooses to transfer only part of a certificate set, it gets split into two sets, each identified by the identification numbers of the first and last certificate in the newly established sets.

The issuing body works only on the level of GoO creation and transfer, not on the level of transportation of physical volumes. GoO can be transferred between participants and deactivated by the respective owner. The issuing body records the corresponding GoO transfers for each participant.

For efficiency, GoOs can be bundled in certificate sets, which are further handled in the way described in this document. On the other hand, a GoO can be split to provide for different recipients. However, it is important to stress, that only the attribute “renewable gas volume” of a GoO can be split (see *Chapter 4.3.3. Attributes of a GoO*). All the other attributes of a GoO (attribute levels 1, 2 and 3) remain unchanged especially characteristics about substrates (attribute level 3).

### 4.3.3 Attributes of a GoO

#### 4.3.3.1 Introduction

The production of biomethane and the generation of Certificates require reliable documentation. The centrepiece of such a Certificate or GoO is the list of attributes which hold the essential information; on the one hand, information about the quality of injected biomethane, its sources, auditor statement and, on the other hand, information about the biomethane production plant. From technical and organisational point of view, attributes are considered data fields within an IT-database of the registry/issuing body.

The categorisation of the GoO attribute list suggested by REGATRACE, divides the types of renewable gas GoO attributes into four different attribute levels. REGATRACE D2.1 *Content and attributes of European Biomethane Guarantees of Origin* provides a first description of the Composition of GoOs on attribute level in Chapter 3.5 which is further developed within this report. Details on the technical requirements of GoO attributes have been explained in Chapter 3.4.2 of REGATRACE Deliverable 2.1. Chapter 4 *Content of a GoO* describe standardised attributes.

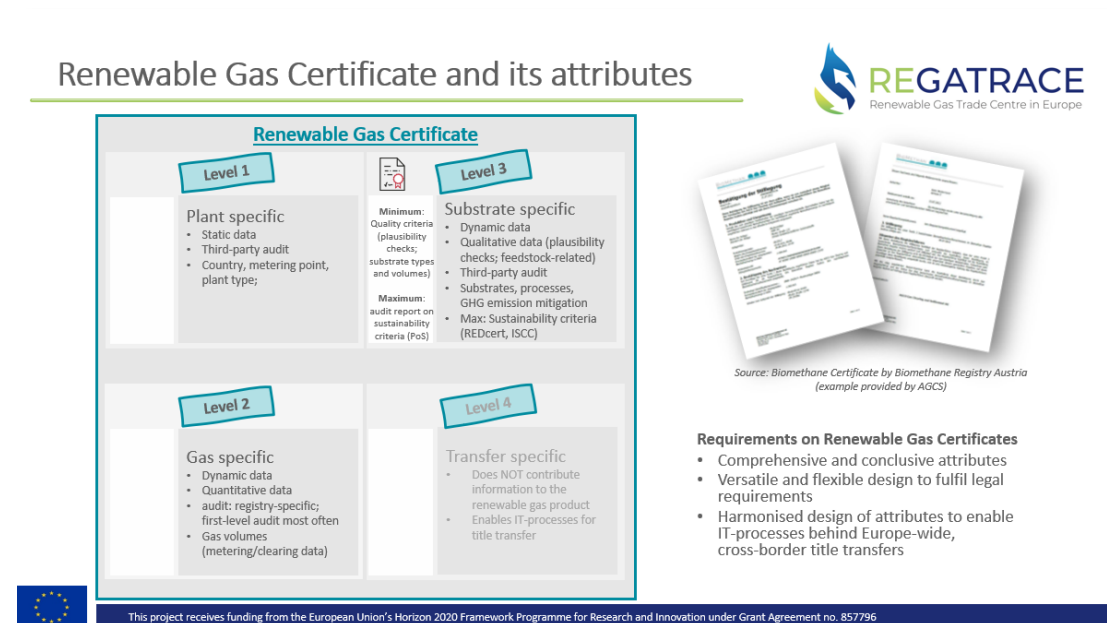


Figure 3, here below, illustrates the four attribute levels comprising the relevant information for a Renewable Gas Certificate. The information presented within an attribute may be provided by different parties who contribute to the issuing of the GoO. The main purpose of the graphic illustration is to explain the separated information flows provided by different auditing parties which merge within the attribute list in order to create a viable and robust GoO holding all necessary information on the respective renewable gas product.

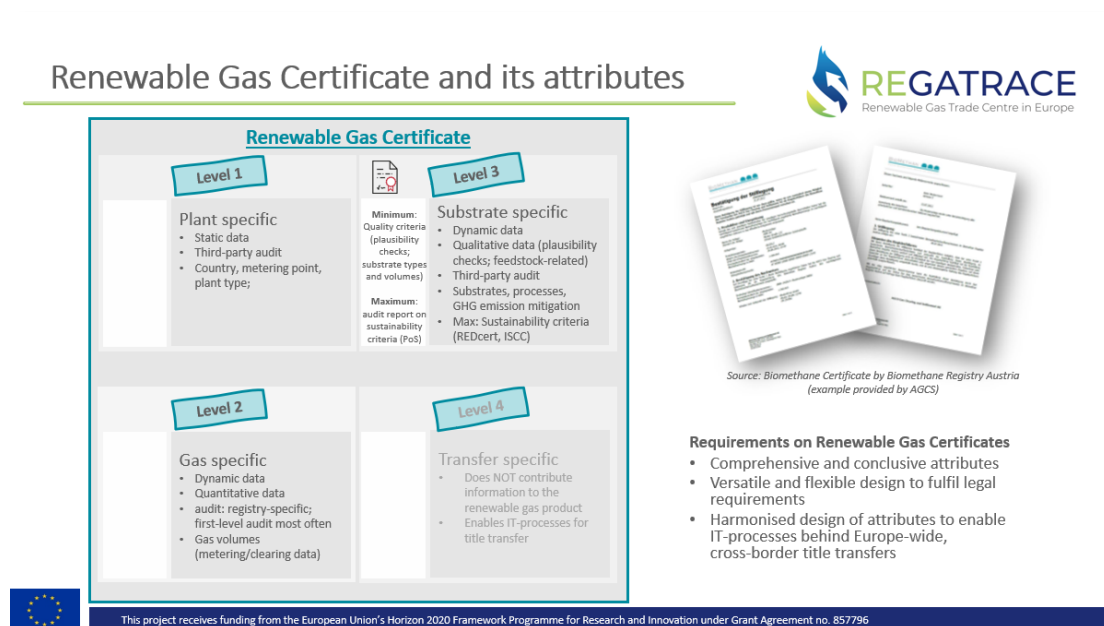


Figure 3: Illustration of the four attribute levels of a Biomethane Certificate; comprises the relevant information for a Renewable Gas GoO

#### 4.3.3.2 Attribute level 1 – plant/installation-specific information (master database)

At the moment of issuing the GoO, it will be automatically assigned to the Registrant. Such data are a pre-requisite to create a GoO with further attributes whose information will be provided at a later stage. The timeline for the creation of a GoO is presented in Figure 4.

Information on the installation at which the renewable gas product of the GoO was produced, represents the first attribute level. This type of information is static, considered to be constant information unless constructional adaptations of the plant, e.g. production capacity, are performed. Thus, each Renewable Gas Registry / Issuing Body should prepare a master database including all relevant information and data on the producing installation.

Attributes to be recorded on the GoO are:

- production facility, according to point (c) of Art 19 (7):
  - ✓ the type of installation (see Annex 3);
  - ✓ the energy source (see Annex 2);
  - ✓ (optional) injection and withdrawal metering point;
  - ✓ the biomethane production capacity of the BPI in MW th (HHV);
- production facility, according to points (e) and (f) of Art 19 (7):
  - ✓ commissioning: the date when the BPI first became operational;
  - ✓ the country in which the relevant BPI is situated;
  - ✓ the location of that BPI, being its latitude and longitude; and/or country, city and postal code (according to Annex 4);

- static production information with relation to received support, according to point (d) of RED II article 19 (7):
  - ✓ an indication whether and to what extent the Originating BPI had received Public Support relating to its investment (investment support) and/or relating to produced output (operational support, e.g. Feed-in subsidy);
  - ✓ A reference to the type of support scheme (support description)
- static information clarifying that this is a renewable gas product, according to point (b) of RED II article 19 (7);
- type of gas produced: grid compatible hydrocarbon gases.

### 4.3.3.3 Attribute level 2 – Gas production quantitative information (renewable gas injection volumes)

The second attribute level contains quantitative data and information on the renewable gas product of the related GoO.

Attribute level 2 includes basic information on the volume and production period and the GoO (set) identification number(s). The moment of making information of attribute level 2 available is equivalent to the issuing time of the GoO.

A unique identification number of the GoO that remains unchanged during the full GoO lifetime is essential in order to identify the GoO and hence prevent double counting (double issue, double transfer and double cancellation).

Attributes are:

- unique identification number of the GoO, or the first and the last identification numbers of the GoO set;
- energy source from which the energy was produced;
- the classification of the energy source as a product, co-product, agricultural residue, processing residue or waste;
- energy carrier (electricity, gas incl. hydrogen, heating or cooling);
- production period;
- volume: 1 MWh (The standard size of a GoO is 1MWh. The total volume of a production patch is identified by the certification ID scheme but not explicitly recorded.)

In order to handle the coding structures across border in a transparent and clear manner, a 30-digit code in the GS1 coding structure is proposed (see Annex 3 and here, [https://www.gs1.org/docs/barcodes/GS1\\_General\\_Specifications.pdf](https://www.gs1.org/docs/barcodes/GS1_General_Specifications.pdf)). It contains a country prefix, a company prefix, a product prefix, a sequential number and a check digit that is universally calculated with the same formula to prevent erroneously transferred GS1 numbers to be acceptable.

### 4.3.3.4 *OPTIONAL: Attribute level 3 – qualitative information (third-party information, substrate and process data)*

When it comes to Renewable Gas Certificates as created by established Registries, this level represents audited information dedicated to the substrates - including details on processing, quality, volume – as well as GHG emission volumes and characteristics of the renewable gas produced. Since the Certificate shall represent the green value of the renewable gas, certain “quality information” of the renewable



gas product shall be published on the GoO. A clear requirement from market point of view - renewable gas producers and traders – is to be able to define the monetary value of the GoO based on the quality of the renewable gas product. On the other hand, respective “quality information” will enable the consumers to understand details of the quality, origin and green value of the renewable gas product (respective GoO) in order to base their purchase on a conscious choice.

It should be noted that such “quality criteria” shall not be confused with the “sustainability criteria” as described in Art 29 RED II. It has to be noted at this point, that the Art 29 requirements are not obligatory for GoOs as they relate to the transport sector target obligations and not to the purpose of labelling for end consumer disclosure. Sustainability criteria shall not be depicted on the GoO according to RED II. Consequently, the authors include a note about their obligatory relevance for the GoO for the purpose of reader-friendliness and labelled such details with “OPTIONAL”.

This report does not provide details on the use of the electronic document for other purposes than consumer disclosure, but it establishes how more data can be contained on a similar type of electronic document. This has multiple advantages:

- a) prevent double disclosure: if a single electronic document can be used to serve multiple purposes, the risk is reduced that another certificate than a GoO is used to claim the consumption/supply of renewable gas by consumers/suppliers;
- b) efficiency gains by synchronising administrative processes handling the same data;
- c) increase transparency for consumers by providing increased level of detail;
- d) transparency, security, simplicity and high level of services for the respective market participants particularly related to climate relevant impact;
- e) the Competent Body will hold the necessary know-how and will thus act as knowledge-lighthouse for the renewable gas sector, providing support to the market participants.

Attribute level 3 includes attributes which are created by external auditors after validation of the plant has been performed or at least qualitative checks of data of level 1 and 2 have been performed.

For renewable gas volumes, primarily from biomethane, the input for the production process may vary significantly by time and volume. It is common practice, to apply a mix of different substrates for biomethane production via anaerobic digestion. Especially waste-treating biomethane plants may vary in their substrate composition over the year (seasonal availability). The big advantages of the anaerobic digestion process are that a vast range of organic materials (substrates) may be utilised/treated to produce biomethane. On the other hand, the more complex the compositions of substrates, the more versatile the biotechnological process becomes. The main aim of the diverse substrate composition is to reach:

- a suitable nutrient composition to reach a high microbiological degradation rate of the applied organic materials;
- a stable biotechnological process;
- with high gas yield (thanks to high productivity).

Thus, the attributes of level 3 of any biomethane certificate represent the complexity of applied substrates and the complexity of the versatile biotechnological process. Only a knowledgeable external auditor with the suitable skill set will be eligible to include the necessary attributes of level 3.



In case a GoO should be also comprising the GHG emission mitigation potential (“sustainability criteria”) according to Art 29 RED II, there is a clear definition of the eligibility of respective auditors. However, such auditing is very complex and not required for a GoO for the purpose of labelling for end consumer disclosure. More detailed information on the auditing requirements and process for attributes of level 3 are provided in chapter 5.5 *Auditing attribute level 3 (qualitative, substrate specific data)*. Thus, the “quality information” shall be harmonised on European level, in order to allow cross-border transfers.

Optional attributes are:

- According to renewable gas producers, traders and consumers on the current renewable gas market (Q1 2020, before implementations of RED II) the following information is an important requirement to set the monetary value of a Renewable Gas Certificate and, hence, it is recommended to provide such information in a Europe-wide harmonised manner:
  - ✓ More detailed description of source materials to produce the renewable gas, according to point (a) of Art 19 (7), as in annex 2;
  - ✓ Clear technology codes considered in direct relation to the technology of conversion as in annex 3;
    - \* biomass for biomethane production via anaerobic digestion technology (see EN 16325, Annex B);
    - \* biomass for syngas production via gasification technology (see EN 16325, Annex B);
    - \* electricity, hydrogen, carbon dioxide, water for syngas production via PtG);
  - ✓ GHG emission intensity expressed in g CO<sub>2</sub> eq/MJ LHV and additionally in g CO<sub>2</sub> eq/MWh LHV.

#### 4.3.3.5 *Attribute level 4 – transfer-specific information*

Attribute level 4 has a special ranking within the four attribute levels, as it is the only one, which does not provide any information on the renewable gas product per se. Attribute level 4 contains information which is specific to the transfer and/or trade only. Although it is not related to the quantity and quality of the renewable gas product, it provides essential information to enable the (semi-)automated IT-processes necessary to conduct the cross-border transfer of the GoO, for example information on target registry or receiving entity and transfer identification time including time stamps.

Example of attributes are:

- the unique ID number assigned to the GoO by the issuing Competent Body, see normative Annex C RED II;
- the identity and country or region of the Originating Competent Body;
- the date when the electronic issuance of the GoO took place;
- mode of delivery;
  - relevant for GoO, according to Art 19 RED II:
    - \* book and claim;
  - relevant for type of certificate referring to biomethane applied in the transportation sector; Sustainability criteria according to Art 30 RED II:

- \* mass balancing.

#### 4.3.3.6 *Challenges & Recommendation*

To enable harmonised cross-border exchanges, competent bodies will have to align and harmonise their attribute list, as well as their respective technical requirements and organisational business processes. However, this needs to be balanced against the natural wish of national Issuing Bodies to retain their own data, in order for this to be easily available for other purposes, and their ability to influence the specification of their registry. Such concerns need to be overcome in order to gain trust and participation in Europe's registry architecture.

A minimum consensus for harmonised attributes is a pre-requisite if there is to be smooth and faultless cross-border transactions and trade of GoOs within Europe. In order to develop a competitive renewable gas market which tackles the challenges of climate change and provides a solution to the administrative issues of a national and European certificate scheme, the most favourable option is to develop one centralised registry, in each country, with the ability to cover all types of renewable gases and all types of applications. It simplifies the operational processes while offering maximum trust and transparency to all market participants, while preventing double counting and double claiming (REGATRACE, *D3.1 Guidelines for establishing national biomethane registries*, 2019). It will also significantly reduce transfer handling cost.



## 5 Auditing

### 5.1 Introduction

Renewable energy can be produced via different technologies, from various energy sources and in various energy carriers. Not all of them require the same level of continuous audits, as are relevant for production technologies using biomass or biogas, especially when they are based on unlimited available resources such as wind and photovoltaic. Those generation plants are providing renewable energy via an input, which is not easily replaced by a non-renewable input, whether intentional or erroneously. Therefore, the generation process of such electricity GoO can be done by using one-time production plant information (technology, size, address, maximum injection volume = attributes level 1) and energy related production data (measured by electricity network operators = attributes level 2), which measurements are usually available by a neutral third party at a satisfying accuracy level as they also used for billing purposes. Based on that information, the creation of electricity GoO can be majorly automated and require minimal manual workload.

For renewable energy production from biomass and biogas, especially when transferred and consumed in the form of biomethane, the main input substrates for the production process may vary over time and volume significantly. Therefore, providing production plant information, such as maximum injection volume and energy production volume measured by network operators, does not suffice to create a renewable gas GoO with its full set of (optional) information at the time of creation. For biomethane, information on the substrate should be provided for correct categorisation of renewable gas or to the highest extent, include volume information on each substrate. Such information can be added by the production plant operator during the GoO creation process. But for maximum security and trustworthiness, an external and neutral auditor shall verify the input materials used to generate the dedicated production volume (external audit for attributes of level 3).

### 5.2 Types and Requirements

#### 5.2.1 First-party Audits

This type of audit is only required to audit internal processes, e.g. in order for the competent body to prove its eligibility to operate according to specific scheme rules. As there are not yet any set scheme rules, this report is mainly concerned with the external audits which refer to the audit of specific attributes of a Certificate. Those audits are limited in scope to a single organisational unit and are conducted for operational trustworthiness to the government and market participants. Upon conclusions by internal audits, external audits may be ordered. The definition is provided in the glossary, annex 1.

#### 5.2.2 Third-party/External Audits

External audits/inspections are defined in chapter 5.5 Auditing attribute level 3 (qualitative, substrate specific data) (p. 19). Such audits are necessary to provide proof for the correctness of provided data on a Renewable Gas Certificate. The following sub-chapters will provide insights on the requirements of the auditing process and the eligibility of auditors concerning each attribute level separately.

RED II article 19 does not define the requirements and eligibility of auditors for GoOs. The following questions remain:

- who might be an eligible auditor of the (optional) GoO attributes of level 3?



- How might a standardisation of auditors across the European Union be achieved?

The latter point on harmonisation of standardisation requirements on auditors for GoOs is a clear requirement to allow cross-border title transfers and trades, but not yet legally defined. The REGATRACE consortium therefore recommends the CEN technical working group to take up the topic of standardised requirements to decide upon the eligibility of auditors for attribute level 3 of a GoO. The following requirements should be suggested:

- auditors may be independent and either accredited by a competent national public authority, or accredited against ISO 19011:2011, which sets out requirements for auditing bodies.
- accreditation of an auditor may be granted by competent national public authorities which are officially responsible for the recognition of auditors, in line with the national transpositions of RED II.
- accreditation may be performed by a national accreditation body that is a member of the International Accreditation Forum (IAF); by the bodies referred to in Article 4 of Regulation (EC) No. 765/2008; by bodies having a bilateral agreement with the European co-operation for Accreditation (EA); or by an accreditation body that is a full member or associate member of ISEAL.

The external audit may be split into different levels depending in the attribute levels and the internal processes of the Registry. The potential audits for each level are explained in the following chapters in detail.

### 5.3 Auditing attribute level 1 (plant specific data; auditing of BPIs)

Each biomethane producer shall undergo a plant audit prior to admittance to the national biomethane registry/issuing body.

All biogas and biomethane producing units must undergo initial audits in their home country confirming that the units are qualified as a biomethane production facility. This qualification may be different in each Member State and national registry, due to different requirements on technical capability, equipment, processing potential of substrates and others. The task of an audit in this respect is to document the possibility to produce biogas/biomethane in the manner of the technical limitations of the production unit. Information of this initial audit are not attached to the GoO. They serve as a basis for the registration as production facility in a biomethane registry/issuing body and such plant information is usually not changed during the production period, unless adaptations are conducted of the production unit.

The national registries may perform the audits with their own staff or may appoint independent auditors. In case the audit is outsourced to a non-accredited auditor, the registry must exercise control over whether the audit was duly performed and - correspondingly - gain confidence that the correct volume of biomethane has been produced and injected. It is preferred appointing or use an accredited auditor under national law or alike. See also the Best Practice Recommendation for Production device Inspections on <https://www.aib-net.org/eecs/best-practice-recommendations> (see Chapter 4.2.4 of REGATRACE, *D2.1 Updated Guidelines for creating the European Biomethane GoO*, 2019).

Auditing of BPIs may be done in accordance with EN 16247-1.

The EN 16247-1 standard shall be elaborated within the EN 16325 working group, if it can be properly used to overcome problems of harmonisation of verification methodologies:



- a) each measurement device registering data that is being used to determine the amount of Output for the purposes of GoOs, is correctly positioned in order to measure the quantity needed for calculating the amount of GoOs to be issued.
- b) after onsite verification of the BPI and its measurement equipment, the formula for calculating the amount of GoOs correctly reflects the amount of Output that qualifies for the purposes of GoOs, or whether amendments to this formula are needed.

When the gross gas production meter reading needs to be deducted with other measurement data, e.g. measured auxiliary consumption, the configuration of meters needs careful checking, and so does the way the measurement data is computed into a nett gas production value for GoOs issuing. This configuration and calculation must be subjected to audit, as it has proven to enable erroneous GoO issuing, either by fraudulent data reporting by Registrants, either by mistake. Fraudulent and erroneous reporting show to occur less frequent in countries where there is a higher chance for being audited.

#### 5.4 Auditing attribute level 2 (quantitative, gas specific data)

There are two main options on how audits of level 2 attributes are performed by established Biomethane Registries. However, metering data of network operators are always the basis for content and audit of attributes level 2.

Article 25 (4) of the directive 2009/73/EC on the common rules for the internal market in natural gas states:

*"Tasks of distribution system operators:*

*(...) Each distribution system operator shall provide system users with the information they need for efficient access to, including use of, the system. (...)"*

One of the tasks of the network operators is to meter injection (and consumption) data of system users. Biomethane plant operators injecting into the national gas grids are considered system users whose metered injection data are automatically retrieved on a regular basis (usually monthly) by network operators via metering devices to be automatically processed further.

Interface for data import by network operators into Biomethane Registry:

- Either the network operators provide data manually to the Biomethane Registry or the data transfer is performed automatically via an interface. Such a data transfer shall include coordinated business processes, standardised communication channels (e.g. E-Mail, FTP, SFTP, webservices, web-based client solution, standalone client solution) and a harmonised data format (e.g. csv-format, xml-format, MSCONS-format).
- If the data provision is done by the network operators, the GoOs are created based on metered injection data directly and automatically accepted as audited attributes in the Registry system. No further external audit for attributes level 2 is thus required.

This method provides for a simple option from a technical point of view and highest security level concerning the correctness of data from organisational and technical point of view. This option is highly recommended to Member States in the process of establishing national Issuing Bodies and Registries.

Interface for data import by external auditors into Biomethane Registry: External auditor provides content and audit of attributes level 2. Another option is to provide data manually by the registry user



or by authorised external auditor. In the example of the Biogas Registry Germany, the same auditor may provide information for attributes of level 2 and level 3.

The advantage of measurements by gas grid operators, is that these are recorded by measurement equipment which is used for billing purposes in a regulated environment. There is hence an incentive for high measurement accuracy outside the triggers provided by the GoO system. If the meters are not followed up by grid operators, it is to be agreed whether apart from auditing the meter reading, the meter accuracy needs to be checked, e.g. through regularly updated calibration certificates (e.g. every 5 years).

## 5.5 Auditing attribute level 3 (qualitative, substrate specific data)

### 5.5.1 Requirements on attributes level 3

Renewable gas producers, traders and consumers of the current renewable gas market (Q1 2020, before implementation of the RED II) request to publish certain “quality information” of their renewable gas product to present the green value of their product. Thus, on the practical side, such “quality criteria” may be defined as “sustainability criteria”, according to Art 29 RED II, as maximum quality information that may be attached to the GoO as “optional” information. Including such information may lead to expanding the purpose of the document and embedding the GoO in a multipurpose energy attribute certificate, similar to Renewable Gas Certificates, as created by established Renewable Gas Registries. Consequently, the requirements on the audit of the respective attributes are also presented in this report.

### 5.5.2 Standardisation of audits

For “sustainability criteria” according to Art 29 RED II, there is a clear definition of the eligibility of respective auditors: voluntary schemes accepted by the European Commission (e.g.: REDCert, ISCC, etc.) shall provide the respective information. Experiences from plant operators show that auditing on the level of “sustainability criteria” according to Art 29 RED II (which has to be performed on a yearly basis) might cost several thousands of EURO per year (up to more than € 10,000 in case of complex audits including several substrates and supply chains), which can put a high financial burden on small installations (see REGATRACE, D2.1 *Updated Guidelines for creating the European Biomethane GoO*, 2019, Chapter 4.2.8). Such “sustainability criteria” go beyond the needs of a GoO.

However, the specific auditing requirements of GoO for the purpose of labelling for end consumer disclosure have not yet been legally defined but are crucial to allow for cross-border title transfers and trades. The REGATRACE consortium therefore recommends the CEN technical working group to take up the topic of standardised requirements to decide upon the eligibility of auditors for attribute level 3 of a GoO.

### 5.5.3 Creation process of Renewable Gas GoOs via input of auditor information

The timeline for creating a Renewable Gas GoO is very specific to the nature of renewable gas production (substrates and biotechnological process, see Figure 4). As mentioned in chapter 4.3.3.3, the moment of making information of attribute level 2 available, would be equivalent to the issuing time of the GoO, when following schemes operated by established Renewable Gas Registries. In other systems, there will be time spent on communicating this data to the registry where the GoOs are issued, and/or on verifying the measurement data before issuing. However, the (optional) attribute 3

level data on the GoO is usually reported by the Registrant and ex post verified on an annual basis, as the attributes of level 3 are usually verified within an external audit process done on a yearly basis.

Usually audits of attributes level 3 are performed once a year for the last calendar year, so for the past, however providing a leap of faith for the producer for the following year, so for the future. Those audits can be conducted for different production time periods, usually annually.

Only when information on attributes of level 1, 2 and 3 have been created, the GoO has reached full completeness, which represents a major difference to the issuing of a GoO for energy from non-biological sources which only requires the data of attribute levels 1 (plant-specific information) and 2 (meter data). In some countries, the issuing of a certificate including attribute 3 will be postponed until after audit, which puts a challenge on the market for the leftover time for tradability of the GoO.

Example of timeline:

- January 2020 to December 2020: production period;
- January 2021: audit

January 2020 volumes are therefore audited in 2021 ex post. If any issuing errors would be found in the audit, and if the GoOs have been transferred in the meantime, this will be rectified in the issuing of the future GoOs.



From organizational point of view the dedicated external auditor is granted access to the issued baseline GoO via access to the registry IT-system and is thus able to insert the information of attribute level 3 in the GoO.

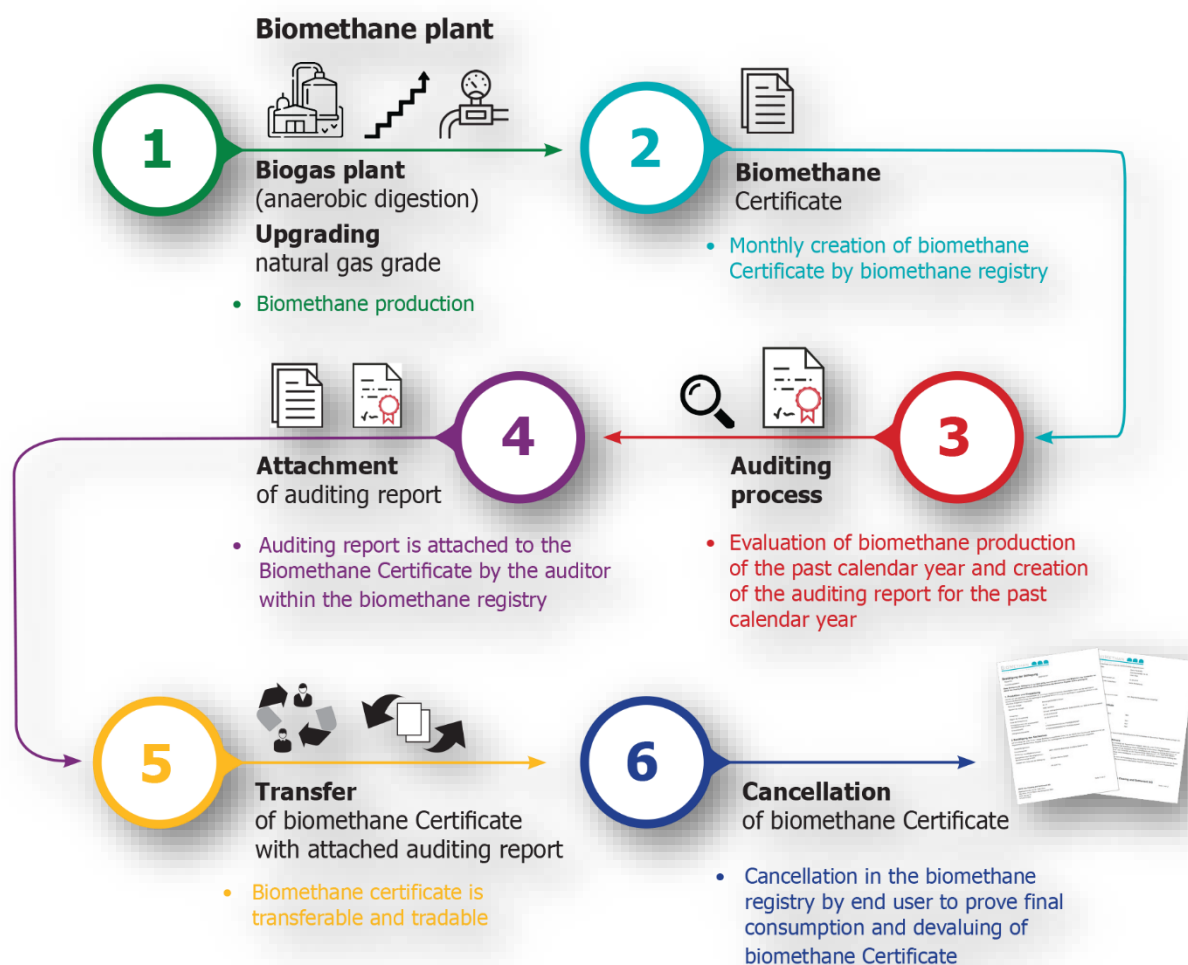


Figure 4: Lifetime of a Renewable Gas GoO based on the example of the Biomethane Registry Austria: from the creation of a complete (including the attachment of auditing reports for attribute level 3) via transfer to cancellation for proof of final consumption

## 5.6 Auditing attribute level 4 (transfer specific data)

Attribute level 4 has a special ranking within the four attribute levels. It includes information on the transfer process of a GoO between account holders. It is the only one, which does NOT contribute any information on the renewable gas product per se. In EECs there is a 3-yearly technical audit foreseen on the IT-message transfer, on top of the 3-yearly onsite AIB member audit. This technical audit has proven its value and increased quality assurance in message handling. However, it requires an agreement between Issuing Bodies for a joint messaging system and quality management system.

## 5.7 Operational practice

The expected provisions of each National GoO Scheme could comprise:

- a) each Account Holder shall be required to keep secret any passwords and other information used to establish that communications purportedly made on its behalf in connection with the National GoO Scheme are duly authorised ("authorisation data");
- b) each Competent Body shall require Account Holders to agree that any communication, which is sent using its currently applicable authorisation data, is valid and is committing to the Account Holder;
- c) the Account Holder(s) and the relevant Competent Body shall be obliged to retain all records to which they have had access relating to that GoO for not less than 5 years after its Cancellation (or such longer period as may be required by applicable national legislation);  
and
- d) each Competent Body shall ensure that its manual and automated information systems for the issue, holding and transfer of GoO are able to support audit of all transactions with respect to GoO held on its Registration Database or transferred to or from such Registration Database.

## 5.8 Recommendations and outlook to examples for national implementation

- The requirements for auditors of Renewable Gas GoOs have not yet been clarified within RED II and, thus, the REGATRACE consortium recommends to the CEN technical working group to consider the topic of standardised requirements to decide upon the eligibility of auditors of a GOo.
- REGATRACE recommends the EN 16325 technical working group to take up the topic of standardised requirements to decide upon the eligibility of auditors for attribute level 3 of a GoO taken into account the differences of electricity and renewable gas.





## 6 Differences of Renewable Power and Renewable Gas GoOs

### 6.1 Comparison of the supply chains for renewable power and gas production

The supply chain for the production of a Renewable Power GoO is quite straight-forward as it comprises the data of attribute levels 1 (plant-specific information) and 2 (meter data) and does not require any additional external audit for the GoO to reach full validity.

For renewable gas volumes, primarily from biomethane, the input for the production process may vary significantly by time and volume. It is common practice to apply a mix of different substrates for biomethane production via anaerobic digestion. Especially waste-treating biomethane plants may vary in their substrate composition over the year (seasonal availability). The big advantage of the anaerobic digestion process is that a vast range of organic materials (substrates) may be utilised/treated to produce biomethane. On the other hand, the more complex the compositions of substrates, the more versatile the biotechnological process becomes. The main aim of the diverse substrate composition is to reach:

- a suitable nutrient composition to reach a high microbiological degradation rate of the applied organic materials
- a stable biotechnological process
- with high gas yield (thanks to high productivity)

For the issuing of the complete Renewable Gas Certificate, the whole supply chain has to be covered. The complexity in the creation of the Certificate is based on the question if attributes of level 3 should be included and to which extent. Thus, the attributes of level 3 of any Renewable Gas Certificate must be able to represent the complexity of applied substrates and the complexity of the versatile biotechnological process. Only a knowledgeable, trustworthy and neutral external auditor with the suitable skill set will be eligible to create the necessary attributes of level 3.

### 6.2 Comparison of attributes

Attributes of levels 1 and 2 are equal for Power and Gas GoOs. However, attributes of level 3 (see *chapter "4.3.3.4 OPTIONAL: Attribute level 3 – qualitative information (third-party information, substrate and process data)"*) are of major importance to represent the quality of the Renewable Gas Product. The auditing process for GoO attributes of level 3 leads to at least two major differences of Renewable Power and Gas GoO:

- 1) an external audit is required to specify a set of attributes related to the GoO, even though such information can be entered by production plant operators (still a final confirmation step should be envisaged also by scheme rules / regulation on audits of renewable gas GoOs);
- 2) the GoO with all its attributes can be created to its full extent only after such an audit, which can be even in the next calendar year if the audit is done once per year.

Attribute Level	Renewable Power GoO	Renewable Gas GoO
Level 1	<ul style="list-style-type: none"> <li>▪ static data</li> <li>▪ plant specific data</li> <li>▪ auditing of installations</li> </ul>	<ul style="list-style-type: none"> <li>▪ static data</li> <li>▪ plant specific data</li> <li>▪ auditing of BPIs</li> </ul>



	<ul style="list-style-type: none"> <li>▪ type of production plant, metering point, etc.</li> </ul>	<ul style="list-style-type: none"> <li>▪ type of production plant, metering point, etc.</li> </ul>
<b>Level 2</b>	<ul style="list-style-type: none"> <li>▪ dynamic data</li> <li>▪ quantitative information</li> <li>▪ energy-specific data</li> <li>▪ automatic audit with metering data</li> </ul>	<ul style="list-style-type: none"> <li>▪ dynamic data</li> <li>▪ quantitative information</li> <li>▪ energy-specific data</li> <li>▪ automatic audit with metering data or external audit</li> </ul>
<b>Level 3</b>	<ul style="list-style-type: none"> <li>▪ no attributes</li> <li>▪ no external audit required</li> </ul>	<ul style="list-style-type: none"> <li>▪ dynamic data</li> <li>▪ qualitative information</li> <li>▪ third-party information</li> <li>▪ substrate and process data</li> <li>▪ “sustainability criteria” according to Art 29 RED II</li> </ul>
<b>Level 4</b>	<ul style="list-style-type: none"> <li>▪ transfer-specific information</li> </ul>	<ul style="list-style-type: none"> <li>▪ transfer-specific information</li> </ul>

**Table 1: Comparison of Renewable Power and Renewable Gas GoOs**

The link between Renewable Power and Gas GoOs will be examined within REGATRACE WP 4 *Integration of GoO from different renewable gas technologies with electric and hydrogen GoO systems*. However, the REGATRACE consortium recommends the CEN Standard Working Group to pay attention to possible applications for sector coupling.

## 7 Attachments

### 7.1 Annex 1 - Glossary

#### **Account Holder**

Person or organisation in respect of whom a Transferables Account or a Cancellation Account is maintained on a BPI Registration Database.

#### **Alteration**

Correction by the Competent Body of any data of a GoO in case that an error is introduced upon issuing of the GoO or in the course of the processing of the GoO.

#### **Approved Measurement Body**

Person or organisation that is responsible for collecting and determining (on behalf of the BPI Registrant) measured values of the Import and Export Meters of a BPI, and which has been approved by a Competent Body to measure gaseous energy.

#### **Attribute**

Information field within the electronic document, comprising different types of information related to the installation (BPI), quantity and quality of the renewable gas product.

Attributes are essential to the overall value of the renewable gas as different marketing pathways require different characteristics/specifications of the renewable gas product according to the legislative framework and consequently lead to different monetary values for renewable gas producers. Attributes shall be harmonised from organisational (audited attributes) and technical (content option of field) point of view to enable Europe-wide harmonisation. Biomethane Certificates are shaped by their specific attributes which have to be designed in a holistic and flexible way to fulfil all requirements of the respective marketing pathway and underlying legislative framework. At the same time, Biomethane Certificates have to be harmonised to allow a transfer between IT-systems of different competent bodies.

#### **Association of Issuing Bodies (AIB)**

AIB is registered in Belgium as aisbl with office in Koning Albert II-laan 20 v bus 19 B-1000 Brussels.

#### **Authorised Issuing Body**

A body operated under governmental mandate to responsible for the issuing of GoO according to Art 19 RED II and the respective national implementation.

#### **Bill of Lading**

Document issued by a third-party company responsible for transport confirming the quantity or weight of the product taken over for transport, based on mutually agreed meter requirements, used for invoicing.

#### **Biomethane**



Renewable gaseous fuel of biological origin, comprising principally methane, the energy content of which is derived from biomass.

### **Biomethane Producing Installation (BPI)**

The biomethane producing installation is defined as follows:

- a) In case of anaerobic digestion of biomass, all components in the production chain must be considered as integral part of the installation when determining the GHG emissions caused in the installation. These components include receipt and storage of feedstocks, pre-treatment of feedstocks, anaerobic digestion, storage and treatment of raw biogas, storage and treatment of digestate, raw biogas upgrading (purification, separation of carbon dioxide), local biomethane storage.
- b) In case of producing biomethane through synthesis from gas generated by gasification of solid biomass all components in the production chain must be considered as integral part of the installation when determining the GHG emissions caused in the installation. These components include receipt and storage of feedstocks, gasification, purification of raw gas, methane synthesis, after-treatment and local storage and biomethane.

### **“Book and claim”**

A term to indicate that the GoO can be transferred, independently of the energy which it related, from one holder to another, i.e. trade of the physical product is decoupled from the transfer of GoOs. A “Book and Claim” Certificate can be transferred, independently of the energy to which it relates, from one holder to another; transfer of the physical energy carrier is decoupled from the transfer of the intrinsic value, described on the “Book and claim” Certificate. Consumption of the physical energy carrier can only be attributed to the source mentioned on the “Book and claim” Certificate, if the corresponding Certificate is cancelled. The mode of delivery for GOOs will be book and claim, as referred to in Art 19 RED II.

### **Cancel**

To remove a Certificate from a Transferables Account at the request of the Account Holder for the purposes of enabling the Account Holder to realise benefits as may be accorded to it and/or to comply with a legal obligation.

After final consumption of a GoO for purpose of end consumer disclosure it is cancelled to prevent double use or double counting.

### **Cancellation Account**

Record on a BPI Registration Database incorporating Cancelled GoOs and relating to a particular person or organisation.

### **Cancellation Statement**

Electronic receipt, which provides evidence to a National GoO Scheme Participant and the respective beneficiaries of the cancellation of the GoO at the time of cancellation of one or more GoOs and which is not transferrable to any other National GoO Scheme Participant or beneficiary.

### **Cancelling Body**

Body which cancels GoOs in order to confirm the final consumption of the entity owning the cancellation account and to prevent further transfer between National GoO Scheme Participants.



### **Competent Body**

Body duly authorised under the laws and regulations of any state to exercise or discharge any legislative, governmental, regulatory or administrative function associated with the administration of a National GoO Scheme designated by the government in accordance with Article 19 of the RED II.

### **Competent Body's Agent**

Person or organisation engaged by the Competent Body to perform on its behalf any of its obligations relating to the administration of GoOs.

### **Consumption Declaration**

Declaration with respect to the gaseous energy inputs of a BPI, corresponding to the own gaseous energy consumption of the BPI.

### **Core principles**

To be formulated in relation to all Competent Bodies, Issuing Bodies and transfer schemes following the example of EECS, which is attached in Annex 6.

### **Disclosure**

Process whereby a supplier provides to its customers information about gaseous energy that has been supplied. The disclosure information must equal the cancelled GoOs.

### **Domain**

Geographic area containing BPIs with respect to which a Competent Body is responsible for issuing GoOs.

### **Energy Input Factor**

Proportion (expressed as a factor of not more than one) of the Net biomethane production of a BPI which is from a single type of Input, as specified in the GoO Issuing Request for the period over which biomethane has been produced by that BPI and for that single type of Input.

### **ERGaR aisbl**

ERGaR (European Renewable Gas Registry) aisbl is an international non-profit organisation established under Belgian law with its registered seat in Rue d'Arlon 63-65, 1040 Brussels.

### **Expiry**

The prevention of transfer and cancellation of a GoO as a consequence of the passing of a given period of time since the production of biomethane. Expiry ends the lifetime of the GoO.

### **Export Meter**

A device, or collection of devices, and supporting arrangements for determining the quantity of gas flowing from a Production Device to a distribution or transportation system:

- a) Pipeline transportation: One or more device(s) and supporting arrangements for determining (in whole or in part) the quantity of gaseous energy flowing from a BPI to a distribution or transmission system.
- b) road, rail, waterway transportation: the metering device or equivalent to it applied for determining the volume indicated in the respective Bill of Lading



### **External audit/inspection**

External audits/inspections are carried out by independent, third party professionals who perform an impartial audit/inspection of the BPI and biomethane consignments produced within a dedicated time period. The external auditors/inspectors do not have a developed relationship with the organisation that they are reviewing and therefore are not influenced in any way. This secures objectiveness throughout the audit/inspection. External audits are specifically conducted to prove qualitative attributes of renewable gas volumes produced, upgraded to natural gas quality and injected into the natural gas network. An audit in general results in additional information added to the biomethane consignment such as usage of substrates, acknowledgement of volumes and calculation of emissions.

### **Greenhouse gas emission**

The sum of greenhouse gas (GHG) emissions caused along the whole biomethane supply chain, including all relevant emissions from biomass production and conversion processes, up to delivery to the final user. The GHG emission resulting from forwarding biomethane/renewable gas in the natural gas pipeline system is to be included in the calculation<sup>4</sup>. The generated GHG emission value is expressed in CO<sub>2</sub> equivalent in grams per MJ of Low Heating Value.

### **Gross Gaseous Energy**

Total Gross gaseous energy production of a BPI as evidenced by measured values collected and determined by an Approved Measurement Body with reference to its Import and Export Meters (adjusted by meter amendments and the outcome of any disputes).

### **Guarantee of Origin (GoO)**

The RED II<sup>5</sup> defines the purpose of Guarantees of Origin as follows (recital 55):

*“Guarantees of origin issued for the purposes of this Directive have the sole function of showing to a final customer that a given share or quantity of energy was produced from renewable sources.”*

Specifically, according to Article 19 paragraph 7 RED II, a **Biomethane Guarantee of Origin (BGO)** is an electronic document certificate, containing the purpose of the GoO, issued by:

- (a) a Competent Authority; or
- (b) by a Member acting as the duly authorised agent on behalf of a Competent Authority, under the laws of a State

as a guarantee of the nature and origin of energy for the purpose of providing proof to the final consumer of energy that a given share or quantity of energy, as the case may be:

- (i) was produced from the energy source to which the guarantee relates; and/or
- (ii) was produced by the specified technology type to which the guarantee relates; and/or
- (iii) has, or the Production Device(s) which produced it has (or have), other attributes to which the guarantee relates;

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<sup>4</sup> The default value for GHG emission during pipeline transportation is to be determined as corresponding to the average methane loss factor in the European natural gas transmission system, as soon as such an average loss factor has been fully defined by Marcogaz, the Technical Association of the European natural gas industry and through further consultation with the natural gas transportation industry

<sup>5</sup> The 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)



### **Higher Heating Value (HHV)**

The higher heating value, HHV – also known as the gross calorific value (GCV) or higher calorific value (HCV) of a fuel – is defined as the amount of heat released by combusting a specific quantity and returning the temperature of the combustion products to 25°C, which assumes that the latent heat of vaporization of water in the combustion products is recovered.

### **Internal audit**

Internal audits, sometimes called first-party audits, are limited in scope to a single organisational unit and are conducted for management review and other internal purposes and are carried out by, or on behalf of, the organisation itself. Upon conclusions by internal audits external audits may be ordered.

### **Import Meter**

One or more devices and supporting arrangements for determining the quantity of gaseous energy flowing into a BPI from a distribution or transmission system or onsite production.

### **Input**

Amount of a specific type of raw material (identified in accordance with Annex 2.) consumed by a BPI during the production of biomethane as Output.

### **Issue of biomethane GoO**

Process of creating the biomethane GoO and recording it in a Transferable Account in a Registration Database.

### **Low Heating Value (LHV)**

Low heating value, LHV, also known as the net calorific value (NCV) or lower calorific value (LCV) of a fuel, is defined as the amount of heat released by combusting a specified quantity and returning the temperature of the combustion products to 150°C, i.e. assuming that the latent heat of vaporization of water in the combustion products is not recovered.

### **Net gaseous energy production**

Gross biomethane production of a BPI minus the consumption of gaseous energy in course of the production of biomethane.

### **Originating BPI**

BPI which produced the Output to which a biomethane consignment relates.

### **Output**

Amount of biomethane produced by a BPI and measured by an Approved Measurement Body in units of 1MWh.

### **Production Auditor**

Approved Body, independent of a Registrant, which has been appointed by the relevant Competent Body to examine the information provided by that Registrant in a GoO Issuing Request, in order to confirm the accuracy of the Production and, where appropriate, the Consumption Declaration in relation to that GoO Issuing Request.



**Production Registrar**

Person or organisation responsible for assessing applications to register BPIs for the purposes of the national GoO Scheme.

**Public Support**

Extent to which financial Support (other than through the sale or Cancellation of GoOs) has been received or is receiving for investment in qualifying BPIs or for their current production of Output.

**Registrant**

Person in whose name a BPI is registered in a Registration Database, being the owner of the production device or the party duly assigned by this owner.

**Registration Database**

Database operated either by a Competent Body or by a third party on its behalf, comprising:

- a) Transferable and Cancellation Accounts and the GoOs in those Accounts;
- b) details of BPIs and information provided to the Competent Body or a third party on its behalf in connection with the registration of those EGIs; and
- c) details of GoOs which have been transferred in or out of that Registration Database

**Registration Functions**

Registration of BPIs and the issuing and registration of GoOs in respect of their Output, and the maintenance of records regarding such processes.

**Renewable Energy Directive (recast) – RED II**

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).

**Renewable gas**

Combustible gas produced from renewable non-fossil sources, including:

- biogas/sewage gas/landfill gas upgraded to natural gas quality;
- methane produced via methanation of syngas from gasification of solid biomass;
- methane produced from other renewable sources, such as synthesis of hydrogen (using renewable electricity) with carbon dioxide of biologic or non-biologic origin.

„Renewable gas of biologic origin” is produced from biomass, landfill gas, sewage treatment plant gas and biogas.

The energy content of „Renewable gas of non-biologic origin” is derived from renewable sources other than biomass (wind, solar, hydropower, etc.).

**Transfer request**

Request to transfer one or more GoOs which specifies:

- a) the identity of the relevant GoOs;



- b) the identity of the Transferables Account in which such GoOs are held;
- c) the identity of the Transferee's Transferables Account; and
- d) the Registration Database on which such Transferables Account is held, and which is made by the Account Holder of that Transferables Account or the operator of a trading exchange which the Account Holder has notified the relevant Competent Body is authorised to make such a request in relation to GOOs held in its (relevant) Transferables Account.

### **Transferables Account**

Record on a Registration Database relating to a particular Account Holder incorporating:

- a) GoOs Issued to that Account Holder by the Competent Body operating that Registration Database; and
- b) GoOs transferred to that Account Holder which in either case have not
  - been transferred to another Transferables Account on this or another Registration Database; or
  - been Cancelled; or
  - Expired; or
  - been Withdrawn.

### **Transferee**

Account Holder whose Transferables Account has been nominated in a Transfer Request.

### **Transferor**

Account Holder who has requested the Competent Body in whose Registration Database a GoO is held on its Transferables Account to transfer that GoO to another Transferables Account.

### **Type of installation**

Type of technology used in the conversion of Input into Output.

### **Withdrawal**

Removal of a GoO from a Transferables Account or the amendment of its status by the Competent Body on whose Registration Database a GoO resides, with the intention to correct an error in Issuing it.



7.2 Annex 2 - Biomass Codes

Level 1: Biomass category		Level 2: Biomass		Full code	Remarks
Description	Code	Description	Code		
<b>Food/feed crops</b>	<b>01</b>	Maize silage	01	BM0101	
		Sorghum bicolor silage	02	BM0102	
		Sugar and fodder beat	03	BM0103	
		Cereal whole plant (GPS) silage	04	BM0104	
		Grass silage	05	BM0105	cultivated and harvested on agricultural fields
		Other food/feed crops	06	BM0106	
<b>Co-products</b> (the main production process has been deliberately modified to increase the economic value, or produce a larger quantity or another quality of a secondary material)	<b>02</b>	Second (catch) and cover crops	01	BM0201	see worksheet "Cover crops"
		DDGS	02	BM0202	usable as animal feed
		Rape seed cake	03	BM0203	usable as animal feed
		Other agricultural by-products	04	BM0204	
		Unspecified	05	BM0205	
<b>Agricultural, aquaculture, fisheries and forestry residues</b> (the material has any marketable uses other than energy generation)	<b>03</b>	Liquid pig manure (slurry)	01	BM0301	
		Solid pig manure with bedding	02	BM0302	
		Liquid cattle manure (slurry)	03	BM0303	
		Cattle manure with straw	04	BM0304	
		Chicken and turkey manure	05	BM0305	
		Cereal straw	06	BM0306	
		Corn and sunflower stover	07	BM0307	



## D2.2 Report on content and attributes of GoO

		Bagasse	08	BM0308	
		Corn/maize cobs	09	BM0309	cleaned of kernels of corn
		Forestry residues	10	BM0310	residues that are directly generated by forestry (not including residues from related industries or processing)
		Aquaculture/fisheries residues	11	BM0311	residues that are directly generated in fisheries (not including residues from related industries or processing)
		Other agricultural, aquaculture, fisheries and forestry residues	12	BM0312	residues from related industries and processing
		Grape marcs and wine lees	13	BM0312	
		Unspecified	14	BM0213	
<b>Processing residues</b> (the material has any marketable uses other than energy generation)	<b>04</b>	Residues from food processing plants	01	BM0201	incl. sugar beet tops, tails, chips and residues from processing sugar beet
		Slaughterhouse waste	02	BM0102	
		Spent grains (from breweries, distilleries)	03	BM0203	
		Stillage from bioethanol production	04	BM0104	
		Crude glycerine	05	BM0105	
		Sludge from pulp and paper mills	06	BM0106	
		Other organic processing residues	07	BM0107	
		Unspecified	08	BM0208	
<b>Wastes</b> (the material is discarded, intended to be discarded or is required to be discarded)	<b>05</b>	Sewage sludge	01	BM0101	
		Source separated municipal organic waste	02	BM0202	
		Biomass fraction of MSW	03	BM0103	without source separated household waste
		Biowaste from private households subject to separate collection	04	BM0204	



## D2.2 Report on content and attributes of GoO

		Biomass fraction of industrial waste	05	BM0105	not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish- and aquaculture industry
		Food waste	06	BM0106	unsuitable for human and/or animal consumption
		Roadside grass cutting	07	BM0207	Contaminated, not suitable for animal feed
		Used cooking oil of vegetable origin	08	BM0208	used to cook food for human consumption
		Used cooking oil of animal origin	09	BM0209	used to cook food for human consumption
		Other organic wastes	10	BM0210	
		Unspecified	11	BM0211	
<b>Algae/seaweed</b>	<b>06</b>	Algae cultivated	01	BM0601	if cultivated on land in ponds or photobioreactors
		Algae non-cultivated	02	BM0602	harvested from natural environment
		Seaweed	03	BM0603	
		Unspecified	04	BM0604	
<b>Unspecified</b>	<b>07</b>	Unspecified	01	BM0701	

### Cover crops

Winter barley	Hordeum vulgare
Winter triticale	Triticum x Secale
Winter oat	Avena sativa
Sunflower green	Helianthus annuus
Rye green	Secale cereale
Mustard green	Sinapis alba
Summer barley	Hordeum vulgare
Summer oats	Secale cereale



### 7.3 Annex 3 - Technology Codes

Level 1 First stage		Level 2 Second stage		Full code	Remarks
Description	Code	Description	Code		
<b>Anearobic digestion</b>	<b>01</b>				Biogas production through anaerobic digestion of biodegradable organic matter under controlled temperature in closed bioreactors
		Unspecified	01	T0101	
		Water scrubbing	02	T0102	Biogas upgrading and separation of methane from carbon dioxide
		Chemical absorption	03	T0103	Biogas upgrading and separation of methane from carbon dioxide
		Pressure Swing Adsorption	04	T0104	Biogas upgrading and separation of methane from carbon dioxide
		Membrane separation	05	T0105	Biogas upgrading and separation of methane from carbon dioxide
		Cryogenic separation	06	T0106	Biogas upgrading and separation of methane from carbon dioxide
<b>Biomass gasification</b>	<b>02</b>				Synthesis gas production through thermocatalytical gasification of solid biomass
		Unspecified	01	T0201	
		Catalytical methanation	02	T0202	Catalytical methanation of syngas
		Biological methanation	03	T0203	Biological methanation of syngas
<b>Landfill gas collection</b>	<b>03</b>				collection of methane rich gas from In-situ anaerobic degradation of organic matter in landfill
		Unspecified	01	T0301	
		Water scrubbing	02	T0302	Landfill gas upgrading and separation of methane from carbon dioxide
		Chemical absorption	03	T0303	Landfill gas upgrading and separation of methane from carbon dioxide
		Pressure Swing Adsorption	04	T0304	Landfill gas upgrading and separation of methane from carbon dioxide
		Membrane separation	05	T0305	Landfill gas upgrading and separation of methane from carbon dioxide
		Cryogenic separation	06	T0306	Landfill gas upgrading and separation of methane from carbon dioxide
<b>Unspecified</b>	<b>04</b>	Unspecified	01	T0401	

## 7.4 Annex 4 - GHG emission reduction calculation

to REGATRACE Deliverable 2.2.

### **RULES FOR CALCULATING THE GREENHOUSE GAS IMPACT OF BIOMASS FUELS AND THEIR FOSSIL FUEL COMPARATORS (according to Annex VI. of RED II.)**

#### **B.METHODOLOGY**

Greenhouse gas emissions from the production and use of biomass fuels, shall be calculated as follows:

(a) Greenhouse gas emissions from the production and use of biomass fuels before conversion into electricity, heating and cooling, shall be calculated as:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr},$$

Where

$E$  = total emissions from the production of the fuel before energy conversion;

$e_{ec}$  = emissions from the extraction or cultivation of raw materials;

$e_l$  = annualized emissions from carbon stock changes caused by land-use change;

$e_p$  = emissions from processing;

$e_{td}$  = emissions from transport and distribution;

$e_u$  = emissions from the fuel in use;

$e_{sca}$  = emission savings from soil carbon accumulation via improved agricultural management;

$e_{ccs}$  = emission savings from CO<sub>2</sub> capture and geological storage; and

$e_{ccr}$  = emission savings from CO<sub>2</sub> capture and replacement.

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

(b) In the case of co-digestion of different substrates in a biogas plant for the production of biogas or biomethane, the typical and default values of greenhouse gas emissions shall be calculated as:

$$E = \sum_{1}^n \cdot E_n$$

where

$E$  = greenhouse gas emissions per MJ biogas or biomethane produced from co-digestion of the defined mixture of substrates

$S_n$  = Share of feedstock n in energy content

$E_n$  = Emission in g CO<sub>2</sub>/MJ for pathway n as provided in Part D of this Annex (\*)

$$S_n = \frac{P_n \cdot W_n}{\sum_1^n \cdot W_n}$$

where



$P_n$  = energy yield [MJ] per kilogram of wet input of feedstock n (\*\*)

$W_n$  = weighting factor of substrate n defined as:

$$W_n = \frac{I_n}{\sum_1^n I_n} \cdot \left( \frac{1 - AM_n}{1 - SM_n} \right)$$

where:

$I_n$  = Annual input to digester of substrate n [ton of fresh matter]

$AM_n$  = Average annual moisture of substrate n [kg water/kg fresh matter]

$SM_n$  = Standard moisture for substrate n (\*\*\*)

(\*) For animal manure used as substrate, a bonus of 45 g CO<sub>2</sub>eq/MJ manure (– 54 kg CO<sub>2</sub>eq/t fresh matter) is added for improved agricultural and manure management.

(\*\*) The following values of  $P_n$  shall be used for calculating typical and default values:

P(Maize): 4,16 [MJ<sub>biogas</sub>/kg wet maize @ 65 % moisture]

P(Manure): 0,50 [MJ<sub>biogas</sub>/kg wet manure @ 90 % moisture]

P(Biowaste) 3,41 [MJ<sub>biogas</sub>/kg wet biowaste @ 76 % moisture]

(\*\*\*) The following values of the standard moisture for substrate  $SM_n$  shall be used:

SM(Maize): 0,65 [kg water/kg fresh matter]

SM(Manure): 0,90 [kg water/kg fresh matter]

SM(Biowaste): 0,76 [kg water/kg fresh matter]

(c In the case of co-digestion of n substrates in a biogas plant for the production of electricity or ) biomethane, actual greenhouse gas emissions of biogas and biomethane are calculated as follows:

$$E = \sum_1^n S_n \cdot (e_{ec,n} + e_{td,feedstock,n} + e_{l,n} - e_{sca,n}) + e_p + e_{td,product} + e_u - e_{ccs} - e_{ccr}$$

where

E = total emissions from the production of the biogas or biomethane before energy conversion;

$S_n$  = Share of feedstock n, in fraction of input to the digester;

$e_{ec,n}$  = emissions from the extraction or cultivation of feedstock n;

$e_{td,feedstock,n}$  = emissions from transport of feedstock n to the digester;

$e_{l,n}$  = annualized emissions from carbon stock changes caused by land-use change, for feedstock n;

$e_{sca}$  = emission savings from improved agricultural management of feedstock n (\*);

$e_p$  = emissions from processing;

$e_{td,product}$  = emissions from transport and distribution of biogas and/or biomethane;

$e_u$  = emissions from the fuel in use, that is greenhouse gases emitted during combustion;

$e_{ccs}$  = emission savings from CO<sub>2</sub> capture and geological storage; and

$e_{ccr}$  = emission savings from CO<sub>2</sub> capture and replacement.



(\*) For  $e_{sca}$  a bonus of 45 g CO<sub>2</sub>eq/MJ manure shall be attributed for improved agricultural and manure management in the case animal manure is used as a substrate for the production of biogas and biomethane.

(d) Greenhouse gas emissions from the use of biomass fuels in producing electricity, heating and cooling, including the energy conversion to electricity and/or heat or cooling produced, shall be calculated as follows:

(i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

(ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

where

$EC_{h,el}$  = Total greenhouse gas emissions from the final energy commodity.

$E$  = Total greenhouse gas emissions of the fuel before end-conversion.

$\eta_{el}$  = The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input, based on its energy content.

$\eta_h$  = The heat efficiency, defined as the annual useful heat output divided by the annual fuel input, based on its energy content.

(iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left( \frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

(iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left( \frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

$EC_{h,el}$  = Total greenhouse gas emissions from the final energy commodity.

$E$  = Total greenhouse gas emissions of the fuel before end-conversion.

$\eta_{el}$  = The electrical efficiency, defined as the annual electricity produced divided by the annual energy input, based on its energy content.

$\eta_h$  = The heat efficiency, defined as the annual useful heat output divided by the annual energy input, based on its energy content.

$C_{el}$  = Fraction of exergy in the electricity, and/or mechanical energy, set to 100 % ( $C_{el} = 1$ ).

$C_h$  = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency,  $C_h$ , for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where:

$T_h$ =Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.

$T_0$ =Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C).

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin),  $C_h$  can alternatively be defined as follows:

$C_h$  =Carnot efficiency in heat at 150 °C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the following definitions apply:

- (i)'cogeneration' shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;
- (ii)'useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;
- (iii)'economically justifiable demand' shall mean the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.





## 7.5 Annex 5 - Core Principles of EECS

### A1 INTRODUCTION

A1.1.1 The Core Principles provide guidance to Members, Members Representatives, Member's Agents and the AIB (and their servants and agents) as to the manner in which they should discharge their responsibilities with respect to the development of the EECS Rules.

A1.1.2 The Core Principles constitute the long-term objectives of Members for the development of the EECS System. The Core Principles are not in themselves binding on Members or the AIB.

### A2 UNIQUENESS

A2.1.1 The arrangements for Issuing, transferring and Cancelling EECS Certificates should be such as to eliminate the possibility of more than one EECS Certificate bearing the same Purpose being Issued, registered or Cancelled in respect of the same unit of Output, unless that Purpose is Public Support.

A2.1.2 The arrangements for Issuing EECS Certificates should be such as to eliminate the possibility of EECS Certificates being Issued in respect of the same unit of Output and attributes for which other transferrable Certificates (other than EECS Certificates of a different type where specifically permitted by the EECS Rules) have been or will be issued for the same Purpose.

The arrangements for Cancelling EECS Certificates should ensure that EECS Certificates in respect of the relevant Output are used as the sole proof of the qualities of the associated Output according to the relevant Product Rules and that no form of Disclosure is used in relation to Output to which such an EECS Certificate relates other than in connection with the cancellation of that EECS Certificate.

A2.1.3 Where several EECS Certificates, each of which has a different Purpose, are issued for the same Output, then each such EECS Certificate shall uniquely identify each of the other such EECS Certificates.

A2.1.4 The Purpose of an EECS Certificate shall not conflict with the Purpose of any other Certificate issued for the same unit of Output.

A2.1.5 Scheme Members shall clearly communicate the Purpose of an EECS Certificate to the Account Holders using their registries in order that they may better inform consumers.

A2.1.6 An EECS Certificate may only be used in accordance with its Purpose.

### A3 IMMUTABILITY

A3.1.1 The certificate data specified by the EECS Rules shall not change in any way once an EECS Certificate has been properly issued, except to indicate that it has expired, cancelled or withdrawn.

### A4 OWNERSHIP OF EECS

A4.1.1 Subject to Section A4.1.2, to the fullest extent possible under relevant national and regional law, the Account Holder of a Transferable Account should be treated (as between the Account Holder and that Member) as the owner of the EECS Certificates in that Transferables Account.

A4.1.2 The principle of ownership should not prevent the exercise by a Member in whose EECS Registration Database an EECS Certificate is held of any rights with respect to that EECS Certificate granted to it under its contract with the relevant Account Holder. Furthermore, the principle of ownership should not impair or undermine a Member's obligations under the EECS Rules, or the obligations of an Account Holder under its contract with a Member or under the relevant Product Rules.

### A5 OPERATIONAL RELIABILITY



A5.1.1 Operational risks arising in the Issue, transfer and Cancellation processes for EECS Certificates should be identified and mitigated through the development of appropriate systems, controls and procedures.

A5.1.2 Systems should be reliable and secure and have adequate capacity.

A5.1.3 Contingency plans and backup facilities should be established to allow for timely recovery of records and operations and completion of the transfer process

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### **A6 PROTECTION OF ACCOUNT HOLDERS**

A6.1.1 Accounting practices and safekeeping procedures should be employed that fully protect the EECS Certificates in Account Holders' Transferables Accounts.

A6.1.2 Members and Account Holders should co-operate in seeking to minimise the risk of an unauthorised instruction with respect to an EECS Certificate being acted upon.

A6.1.3 EECS Certificates should as far as practicable be protected against the claims of a Member's or CMO's creditors.

A6.1.4 Members are responsible for complying with applicable Data Protection legislation.

### **A7 GOVERNANCE**

A7.1.1 The governance arrangements for the EECS Rules and Domain Protocols should fulfil public interest requirements and promote the objectives of Members, Registrants and Account Holders.

### **A8 ACCESS AND TRANSPARENCY**

A8.1.1 Participation in EECS should be based on objective and publicly disclosed criteria so as to achieve fair and open access to existing and potential Members, service providers and EECS Market Participants.

A8.1.2 Access to details of EECS Certificates should be made available to EECS Market Participants.

A8.1.3 EECS Market Participants should be provided with sufficient information for them to identify and evaluate accurately the risks and rewards of transferring Certificates between Members' EECS Registration Databases.

### **A9 COST EFFECTIVENESS**

A9.1.1 While maintaining safe and secure operations, Members should be cost-effective in meeting the requirements of EECS Market Participants.

A9.1.2 Members should be entitled to charge EECS Market Participants on a commercial basis for the provision of services in connection with the EECS Rules.

### **A10 COMMUNICATIONS**

A10.1.1 Members' Systems should use or accommodate appropriate international communication procedures and standards in order to facilitate effective, efficient and secure cross-border transfers.

### **A11 REGULATION AND OVERSIGHT**

A11.1.1 Members should be subject to transparent and effective regulation and oversight at a national level in relation to performance of their obligations under Legislative Certification Schemes.

A11.1.2 Members should be subject to transparent and effective regulation and oversight under the auspices of the EECS Rules in relation to their compliance with the EECS Rules (including the



requirements of the relevant Section of PART IV of the EECS Rules in respect of EECS Schemes of which they are Scheme Members).

**A12 RECORDS**

A12.1.1 Records which are sufficient to enable resolution of disputes relating to such matters as ownership of and eligibility for EECS Certificates should be kept of all material communications between Members and EECS Market Participants regarding the registration of Production Devices and the Issue, transfer and Cancellation of EECS Certificates.

