D3.1 Guidelines for establishing national biomethane registries

Deliverable: D3.1 Guidelines for establishing national biomethane /renewable gas registries

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1 Purpose of the Guidelines - Functions of the registries

1.1 Executive Summary

The development of a biomethane market is complex and requires professional experts and tools in order to not only establish trust in the market but also expand production. Some of these requirements include but are not limited to the construction of further production facilities, increase of biomethane production, tracking of biomethane via a renewable gas registry and bringing the product to market level. The registry has a responsibility towards market participants for being a neutral and trustworthy platform for biomethane/renewable gas Certificates.

Biomethane, with its characteristics of being a flexible energy carrier, can be applied for a broad set of marketing paths (renewable electricity, renewable gas for heating and cooling and transportation sector, etc). Such different marketing paths require specific characteristics from the product biomethane. 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 registry system as well.

In order 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, the registry system must be able to provide comprehensive and flexible attribute lists to provide necessary information for the respective type of renewable gas and their marketing pathway.

1.2 Introduction

Deliverable 3.1 of the REGATRACE project intends to provide comprehensive guidelines for the establishment of national biomethane/renewable gas registries where they do not yet exist in European countries. It describes the structure and operation of a biomethane/renewable gas registry based on the experience of established national registries in European countries.

1.3 Targets, functions and tasks of a national registries

The functions and performed tasks by a national biomethane/renewable gas registry depend on the domestic regulatory and business environment and may differ from country to country. Generally, the key functions of the registries are as follows:

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- Providing harmonised and transparent electronic documentation of biomethane/renewable gas consignments: A registry is merely a certification system which administers data packages with different types of content (so-called attributes) in an IT-based system providing different types of market participants with accounts including specific, pre-defined roles. In a renewable gas registry, such data packages comprise information and data on three main attribute levels: biomethane plant specific information (production facility, commissioning, injection point, etc), metering data (e.g. data on biomethane quantity from grid operators or the clearing agent to fulfil mass balancing) and audited data (used/treated substrates incl. details on processing, quality, volume, sustainability, GHG characteristics, etc). The characteristics of the attributes are pre-defined (harmonised) to allow certificate transfer between different accounts in the same registry system. Each registry shall provide a high level of transparency and traceability of the quantity and quality of the considered certificates - in the case of a renewable gas registry from the substrate (input material) towards the injection into gas grid, to the withdrawal by the end consumer.
- The central task of a domestic biomethane/renewable gas registry is to generate confirmations for the volumes of renewable gas included in the scope of their activities (e.g.: upgraded biogas, renewable gases from PtG technology, biomethane from biomass gasification, etc.). This can be done through different categories of Certificates, among those Proofs of Origin (PoO), Guarantees of Origin (GoO) and others. In this document the term “Certificate” is used in relation to all electronic documents / data packages verifying the characteristics of biomethane/renewable gas consignments.
- Certificates issued by the registries may have different functions, value and relevance according to different legislations. All of them serve as a proof of certain quality and quantity of the produced biomethane/renewable gas volume. At any point in time, a Certificate only belongs to one owner and always has a unique ID-number. Transfer of ownership (title transfer) is feasible within the registry. In case different biomethane volumes are requested than one specific Certificate represents, the splitting of one Certificate is a valuable option. The registry provides a secure platform for the market participants to transfer their Certificates or split them to provide specific volumes and cancel those Certificates within the registry after final consumption.
- The registry shall document the final consumption by providing a proof of withdrawal, for example a registry excerpt, to the owner of the biomethane. After consumption, the Certificate is cancelled within the registry to prevent multiple use of Certificates.
- Controlling, auditing, verification in relation to both injection and withdrawal.
- Supporting national authorities, services in data management in relation to renewable energy quotas and support schemes.
- Serving as a „lighthouse”, a knowledge centre for project developers, providing a platform for information exchange on topics related to renewable gases.
- Providing input in addressing country specific policy issues in relation to renewable gases (such as meeting the European and national renewable energy targets).
- Connecting the biomethane and natural gas industries.
- Facilitating the market introduction of new products contributing to the use of renewable gases.

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- Participating in the European network of national biomethane/renewable gas registries with the purpose of promoting the cross-border trade and the development of this sector in Europe. Specifically, the registries are encouraged to join the ERGaR RED MB voluntary scheme designed for administering and mass-balancing sustainable biomethane consignments distributed via the European gas network.

1.4 Renewable gas Certificates: reasons and functions

Tracking biomethane consignments is especially challenging in case of transportation through the natural gas pipelines. After biomethane and other renewable gases are injected into the gas grid, the molecules blend with natural gas ones and cannot to be traced physically anymore. The biomethane/renewable gas Certificates contain all information/data concerning the injected biomethane/renewable gas volumes.

The registries handle also those renewable gas consignments which are delivered to the consumers by other (than natural gas pipelines) ways of transport.

The goal of the REGATRACE project is to support the establishment of national biomethane/renewable gas registries in all European states. Biomethane/renewable gas registries are important tools for the development of a biomethane/renewable gas market as they document the respective produced, distributed and consumed volumes. This document focuses on the establishment and operation of registries. Description of issuance and transfer of Guarantees of Origin (GoO) between registries is discussed in a different part of the REGATRACE project.

The set-up of currently existing biomethane registries in Europe has followed the framework of national and European legislation. For example, the Biomethane Registry Austria was inspired by the European CO_2 allowances model. AGCS as the operator of the Biomethane Registry Austria has developed its biomethane registry based on the technologies and processes of the CO_2 model (EU-ETS scheme). The biomethane registry issues Certificates for biomethane which can then be transferred and cancelled by registry users (producers, suppliers, consumers, or others). The model separates the attribute “green gas” from all physical elements of the gas chain (commodity, capacity, and transport) and opens the path to the European biomethane market. Nevertheless, withdrawal of gas can be documented to close a mass-balance between injected and withdrawn volume if required by market participants.

To raise biomethane/renewable gas from the domestic to the European level, it is necessary that standardised interfaces are in place between domestic registries to execute the transfer of biomethane/renewable gas Certificates between European registries. Biomethane/renewable gas registries are the key for the development of domestic biomethane/renewable gas markets and will lead to the European biomethane/renewable gas market as soon as capability to transfer Certificates between registries is available.

The Certificate transfer process has to follow a standardised and clearly defined procedure. This transfer process must facilitate the cross-border transfer of Certificates even if the legal framework and the organisational processes and IT-systems of national registries are different.

The Mass-balancing requirement and its interpretation need clear explanation for application regarding biomethane/renewable gases. Under Directive 2009/28/EC Article 18 (1) (“Mass-balance”) a mass-balance system is interpreted as electronic documentation used to trace the chain of custody

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(injection – trade – withdrawal) of biomethane/renewable gas consignments along the gas grid. Biomethane/renewable gas injections into the natural gas network are recorded but only the withdrawal of natural gas and biomethane/renewable gases blends (in ratios, unknown at the time of blending) is recordable. Due to blending of fossil and renewable gas molecules, the issuance and administration of Certificates provide the only solution to differentiate between biomethane/renewable gas and natural gas. The Certificates reflect the special value of "green" gases, as compared to the fossil equivalents. This special value is related to being renewable and environmentally-friendly to support climate protection and circular economy. This mark-up reflects the deemed value for "green" gases and does not reflect the production costs.

The last owner of a Certificate should be either a gas supplier who provides a mixed product (biomethane/renewable gas + natural gas) to consumers or the final gas consumer. Suppliers or consumers may only claim volumes of consumed gas (expressed in energy unit) to be biomethane/renewable gas volumes equivalent to the Certificates they own.

Each European country shall have at least one national biomethane/renewable gas registry or a dedicated contact point for the generation and the exchange of Certificates. This does not exclude the possibility that more than one registry in a country may exist. Since there are many different purposes and renewable gases, more than one registry can exist in one country or region. In this regard a well-functioning exchange of information is required in order to avoid double counting and double sale of renewable gases.
Established biomethane registries have contributed to the guidelines of this deliverable by providing an overview of their registry and their tasks (see Chapter 1 Annex: Overview of established registries, as of page 73).

The goal of this deliverable is to provide guidelines for the set-up and operation of a domestic biomethane/renewable gas registry for organisations/authorities in countries where registries have not yet been established. The set-up of a new registry requires several preparatory measures, spanning from a planning phase to through to commencement of operation of the registry. The guidelines of this deliverable provide recommendations for necessary actions and processes. The guidelines build-up on the knowhow and input from established biomethane registries which are currently already cooperating on the European level within the ERGaR association. This report shall support to develop a common understanding of the necessary administrational, technical and processual requirements to establish a registry with the ability to tackle the challenges of climate change and provide dynamic options to handle future market developments in the renewable gas sector.

1.5 Terminology

AUDIT

An audit is a documented process for obtaining evidence and its objective evaluation to determine the extent to which specific, pre-set audit criteria are fulfilled. Audit means the examination, evaluation and verification of an organisation and its processes in view of specific, pre-set audit criteria. For the registries the key audit criterion is compliance with the RED (subsequently RED II), FQD and COM 2010/C 160/01, as well as with the internal rules and regulations of national registries and their networks. An audit is the process of examining that compliance obligations have been met, including that the required inspections have been done. duly performed according to national and/or European standards and regulations.

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BIOGAS[1]

Gas produced via anaerobic digestion of organic matter or gasification[2] from biomass sources and without further upgrading or purification.

Biogas comprises mainly methane and carbon dioxide and/or traces of hydrogen and/or carbon monoxide and/or heavier hydrocarbons with two to six carbon atoms.

Biogas produced in an anaerobic digester is referred to as "*raw (or untreated) biogas*". During downstream processing, it is usually dewatered and desulphurised.

The term "*treated biogas*" refers to biogas produced in an anaerobic digester, dried to a water dew point of at least 10 °C and cleared of contaminants such as hydrogen sulphide and siloxanes, but still retaining significant levels of CO_2.

The term "*upgraded biogas*" refers to biogas separated from CO_2 and other components to achieve natural gas properties. Upgraded biogas is also referred to as biomethane.

BIOMASS FUELS

Liquid or gaseous fuels intended for transport produced from biomass.

BIOMASS

The biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.

BIOMETHANE

Biomethane is a gaseous fuel, a blend of gases consisting predominantly of methane produced from biomass with quality corresponding to the national gas standards valid in the country of production or to the European standard prEN16723-1. Biomethane is produced from biogas through the upgrading of raw biogas from anaerobic digestion, or methane synthesis from syngas generated through solid biomass gasification. Methane produced through synthesis of hydrogen and carbon dioxide can be qualified as biomethane only if the renewable electricity used for electrolyses is of biomass origin.

BIOWASTE[3]

[1] *In accordance with ISO/DIS 20675 (en)*
[2] *Including pyrolyze, torrefaction and carbonization.*
[3] *Article 3(4) of Directive 2008/98/EC*

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Biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises and comparable waste from food processing plants.

CERTIFICATE(S)

General term used in this paper for all electronic documents verifying the characteristics of biomethane/renewable gas consignments, as also referred to as Proofs of Origin (further PoO), Guarantees of Origin (further GoO), Green Certificates, etc. Certificates may have different functions, use and relevance in different legislations, all of them serve as a proof of certain quality and quantity of the produced biomethane/renewable gas volume.

CHAIN OF CUSTODY[4]

The methodology by which a connection is made between information or claims concerning feedstocks or intermediate products and claims concerning final products. The chain of custody should cover all stages from feedstock production up to the release of fuels for consumption.

COM 2010/C 160/01

COM 2010/C 160/01 Communication from the European Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (dated 19th June 2010).

CANCELLATION

The final use of biomethane/renewable gas requires a confirmation to the end consumer that the amount biomethane/renewable has been explicitly used for that end consumer and no double counting (multiple usage) occured. Therefore, the biomethane/renewable gas owner must cancel the Certificate in the biomethane registry. Only through cancelling will the owner be granted a confirmation (see “registry statement / registry excerpt”).

DEFAULT VALUE

A value derived from a typical value by the application of pre-determined factors and that may, in circumstances specified in the RED, be used in place of an actual value.

DISTRIBUTION SYSTEM OPERATORS (DSO)

Organisations which operate of a gas distribution network within the European Union.

[4] *In line with 2.2.3. of COM 2010/C 160/01 and Art. 18 (1)*

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DOUBLE COUNTING

Double counting concerns the meeting of national renewable energy quota targets for consumption. If a biomethane/renewable gas consignment has been counted towards meeting the national renewable energy target in its country of production, then such biomethane/renewable gas consignment is not eligible for counting towards meeting the national renewable energy targets for consumption in the (importing) country of consumption.

ECONOMIC OPERATOR

Profit-oriented companies or corporations having title to biomethane consignments as producers, suppliers, consumers, traders, etc.

ERGAR AISBL

International non-profit organisation established under Belgian law with its registered seat in 1040 Brussels, Rue d'Arlon 63-65.

AISBL: 'association internationale sans but lucrative', international association without lucrative purpose;

ERGAR RED MB

Voluntary scheme established by ERGaR aisbl for administering and mass balancing volumes of sustainable biomethane distributed along the European natural gas network, with cross-border transfer of sustainability characteristics attached to the consignments, seeking recognition by the European Commission under the RED.[5]

ERGAR PROOF OF ORIGIN (ERGAR POO)

An ERGaR Proof of Origin (ERGaR PoO) is an electronic dataset including information and attributes relating to a specific biomethane consignment injected into the European natural gas network used within the ERGaR RED MB scheme. An ERGaR PoO must have the Proof of Sustainability inseparably bound to it and may have other documents attached (auditor reports, etc.) confirming or detailing the information contained in the ERGaR PoO.

EUROPEAN GAS NETWORK

The European gas network is the system operated within the territory of the European Union, the EFTA and the European Economic Community, consisting of the natural gas transmission system (as defined in Article 2.3. of Directive 2009/73/EC) together with the natural gas distribution system (as defined in Article 2.5. of Directive 2009/73/EC).

[5] *ERGaR aisbl is the international non-profit organisation handling renewable gases, while ERGaR RED is the name of the gaseous biofuel specific voluntary scheme.*

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EXTERNAL AUDIT

External audits include those generally referred to as second- and third-party audits. Second party audits are conducted by parties having an interest in the organisation, such as customers, or by other persons on their behalf. Third-party audits are conducted by external, independent auditing organisations such as those providing certification/registration of conformity, or government agencies.

FUEL QUALITY DIRECTIVE (FQD)

Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009, amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil; introducing a mechanism to monitor and reduce greenhouse gas emissions; amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels; and repealing Directive 93/12/EEC.

GREENHOUSE GAS EMISSION

The sum of greenhouse gas (GHG) emissions caused along the whole biomethane/renewable gas 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 in the natural gas pipeline system is to be included in the calculation.[6] The generated GHG emission value is expressed in CO_2 equivalent in grams per MJ of Low Heating Value.

Within the cross-border trade administration, the GHG emission value calculated and verified for the given biomethane/renewable gas consignment in the country of production is transferred to the country of consumption.

GOVERNMENT DESIGNATED BODY

A government agency or any other organisation or company appointed by the national Government as issuing body for Guarantees of Origin in accordance with RED II.

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 the latent heat of vaporisation of water in the combustion products is recovered.

[6] *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.*

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INSPECTION (AUDIT IN THE SENSE OF A PLANT INSPECTION)

An inspection is a compliance test with a checklist for the detailed examination of a registry product (the Certificate) and determination of its conformity with specific requirements.

INSTALLATION

The biomethane producing installation is composed of the following components:

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 synthesis 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.

INTERNAL AUDIT

Internal audits, sometimes called first-party audits, are conducted for management review and other internal purposes and are carried out by, or on behalf of, the organisation itself. They can form the basis for an organisation's own declaration of conformity.

LANDFILL GAS

Combustible blend of gases generated through the anaerobic degradation of landfilled organic matter, containing mainly methane, as well as carbon dioxide, hydrogen sulphide and other impurities.

LOWER HEATING VALUE (LHV)

Lower 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 vaporisation of water in the combustion products is not recovered.

MASS BALANCING

Depending on the chosen marketing path of biomethane, documents providing evidence of specific biomethane characteristics must be created. Along the biomethane value chain, from farm to production, treatment and injection of biomethane into the grid up to the withdrawal of gas from the grid, each seller of biomethane has to prove to the buyer or a funding agency the characteristics of the product. When biomethane is used, for example in a power plant, the plant operator must prove that

Related to biomethane, the mass balancing methodology is applied in two ways:

a) in the production phase: raw materials (substrates) of different quality are balanced with the corresponding produced biomethane volumes
b) in the pipeline transportation phase: injected and withdrawn volumes of biomethane (blended with natural gas) are mass balanced.

Within the ERGaR RED MB scheme, the mass balancing is the methodology applied to cover and trace the chain of custody of sustainable biomethane consignments distributed along the natural gas network in Europe. The mass balancing methodology applied by ERGaR RED MB corresponds to Article 18 sec. 1 of the Renewable Energy Directive and to Article 30. of Renewable Energy Directive II too.

NATIONAL BIOMETHANE REGISTRY

An administration system which documents the full chain of custody of biomethane/renewable gas from production to the distribution to the final consumers. A national registry is established either by government mandate or through the voluntary cooperation of market participants and is operated on the domestic market. The major task is to provide harmonised and transparent documentation of injected biomethane/renewable gas including the variable properties and attributes it acquires during the generation of biogas and the upgrading process. The registry provides a platform for market actors to generate, exchange and cancel electronic documents documenting different kinds of biomethane/renewable gas applications.

NEUTRAL AUDIT/INSPECTION

Neutral audits/inspections are carried out by independent, third-party professionals who perform an impartial audit/inspection. The neutral auditors/inspectors do not have a developed relationship with the organisation that they are reviewing, they are not biased in any way and they can be objective throughout their audit/inspection.

NORMAL m3 (Nm3)

The volume of any gaseous material at temperature: 0 °C, and pressure: 1.01325 barA.

PROOF OF SUSTAINABILITY (POS)

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Document verifying sustainability claims for biomethane consignments designated for use as biofuel, in accordance with the relevant EU documents (RED, FQD and Communication 2010/C 160/01).

Biomethane PoS are issued by certification bodies associated with a voluntary scheme recognised by the European Commission under the RED, respectively RED II.

REGISTRY STATEMENT / REGISTRY EXCERPT

The registry statement or registry excerpt is a confirmation of the domestic biomethane registry over cancelled biomethane/renewable gas. It can be made available to market participants as proof for final use of biomethane (after withdrawal from the grid). It serves as a proof to end consumers that the biomethane volume has been cancelled by the biomethane registry and is no longer available (avoidance of double marketing and sale). The confirmation includes the respective attributes of the generated biomethane and is usually available in written form (as pdf or physical document).

RENEWABLE ENERGY DIRECTIVE (RED)

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC of the European Commission, as amended by Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015.

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.

In case the national biomethane/renewable methane registry will acts as issuing body for Guarantees of Origin in accordance with Article 17 of the RED II, the stipulations of this Directive must be followed.

RENEWABLE GAS

Combustible gas produced from renewable (i.e. non-fossil) sources, including

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

RENEWABLE GASEOUS TRANSPORT FUEL OF NON-BIOLOGICAL ORIGIN

According to RED II renewable transport fuels as gaseous fuels which are used in the transport sector other than biofuels or biogas, the energy content of which is derived from renewable sources other than biomass.

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SEWAGE GAS

The combustible gaseous product of the anaerobic digestion of sewage sludge, containing mainly methane (typically 50-60%) and carbon dioxide, dewatered and desulphurised.

SUPPORT CERTIFICATES

Support Certificates are issued with the purpose of obtaining financial support under a state-aid scheme. According to the definition in RED I and RED II, Guarantees of Origin are not Support Certificates. Nevertheless, individual national governments may elect connecting the issuance and handling of GoOs with the administration of national support schemes.

SUSTAINABLE BIOMETHANE/RENEWABLE GAS CONSIGNMENT

Biomethane/renewable gas consignment with a valid Proof of Sustainability (PoS) issued in accordance with the RED.

SUSTAINABILITY CHARACTERISTICS

The sustainability characteristics of individual biomethane consignments – defined and documented in accordance with Article 17 of the RED, respectively in accordance with Articles 27-30 of RED II – are transferred cross-border via the application of mass balancing methodology.

SYSTEM USER AT A NATIONAL BIOMETHANE REGISTRY

Economic operators with a customer account at the system of a national biomethane registry.

TRANSMISSION SYSTEM OPERATORS (TSO)

Organisations which operate of a gas transmission network within the European Union. TSOs are responsible for handling exchange volumes between neighbouring market areas/countries within the European natural gas network

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2 Biomethane business cases

The possible end-use pathways of biomethane do not differ from those for natural gas. Biomethane is fully miscible in all proportions with its fossil counterpart, and fully interchangeable from the end user's perspective. Raw biogas may be directly transformed into electricity (in a CHP unit, Combined Heat and Power unit) or upgraded to biomethane (separation of methane from other gases in the biogas such as CO2 and trace gases) and injected into the gas grid. The feeding in of biomethane into the gas grid increases the flexibility for end uses significantly, as this injection allows for the geographical separation of the production and use of biomethane.

Current biogas production plants primarily focus on subsidy schemes of renewable power provision but only recently a transition is being recognised towards subsidy schemes supporting renewable heat provision/utilisation. The Renewable Heat Incentive (RHI) in the UK is one of the most prominent examples. Having entered the gas grid, biomethane can be transported and used decentralised, e.g. it can be converted into electricity at places with direct need for the cogenerated thermal energy.

2.1 Benefits of biomethane

- Climate / environmentally friendly
  - ✓ Biomethane supports the goal of GHG emission reduction
  - ✓ Avoidance and mitigation of GHG emissions treating a great variety of organic materials (substrates)
  - ✓ Silver bullet for mitigating methane emissions in agriculture, the second most harmful GHG after CO2; GHG emissions related to manure represent 3% of all methane emissions in the EU. Perfect circular economy approach, although energy potentials limited
  - ✓ Biomethane may have its role in the field of energy efficiency
- Waste and residue treatment
  - ✓ Biomethane may treat waste materials and give these waste components a value
  - ✓ Biomethane is the energy vector that contributes most to the Circular Economy by providing organic fertilisers (additional GHG emission mitigation thanks to avoidance of industrial fertilisers
- Use of already existing gas grid infrastructure
  - ✓ Biomethane may use an already existing gas grid infrastructure
  - ✓ No additional investments necessary: (neither public nor private) for transformation of the network infrastructure nor of the consumer equipment of users
- Substitution of fossil energy
  - ✓ Biomethane substitutes fossil fuels for providing electricity, gas, heat
  - ✓ Biomethane is renewable ("green") energy carrier; applications in heating & cooling, transportation sector, power generation, etc.
- Mature technology
  - ✓ Mature and resilient biomethane production process: continuous and controllable process versus the production of green energy from photovoltaic and wind

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- ✓ Process controllable and adjustable
- ✓ With 17,783 biogas and 540 biomethane plants significant potential already available in Europe; data status end 2017

- Flexible & dispatchable
  - ✓ Biomethane may provide necessary flexibility in form of control energy
  - ✓ Biomethane does not consume (or if extremely small) control energy in an energy supply system
  - ✓ Biomethane does not require back up generation like weather dependent power sources
  - ✓ Biomethane plants can provide flexibility for the system, be it for the gas or power system, whereas wind and photovoltaic require control energy.
- Non-variable
  - ✓ Biomethane is a weather independent renewable energy carrier
- Storable
  - ✓ Biomethane is renewable ("green") energy that can be stored like natural gas
- Complementary with other technologies
  - ✓ Power-to-Methane technology and biomethane production are synergetic, can be easily integrated and have tremendous potential to utilise existing CO_2 streams from biogas upgrading.
- Economic booster for rural areas
  - ✓ Biomethane supports rural development and employment fixation (and population) in agricultural and livestock environments.

Considering all benefits biomethane offers, the question why it currently does not play a bigger role in the European energy system remains. Production and use of biomethane is at varying stages in different European countries. Consequently, certificated framework and harmonisation are necessary to push biomethane development forward. The benefits of biomethane overtop the risks of low political support: a still unreliable not yet harmonised framework in Europe, risks of increasing feedstock prices, fears of intensification of agriculture. Political support could be won, a framework can be harmonised, and price risks can be managed. The underlying documentation and administrative processes are developed within the REGATRACE project.

Several different subsidy or market schemes in the field of biomethane are established in European countries: tax exemptions, feed-in tariffs for electricity injection or for direct injecting into the gas grid, feed-in tariffs for heat, investment subsidies, preferential financial conditions for investment loans, reduction or exemption of grid tariffs, obligation of grid operator to take over connection costs, exemption for penalties for balance energy, quota systems in different applications (biofuels, heat, electricity) and so on. The following chapter describes such different business cases.

Biomethane registries are very important logistic elements of a domestic biomethane market, a significant facilitator to bring all stakeholders together. Such registries allow the title transfer of the intrinsic, green value of biomethane via certificates. These Certificates help to simplify and standardise the contractual relationships between trading parties. Thus, these registries reduce the complexity of

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the integration of biomethane into the existing gas markets, and the Certificates allow the natural gas and biomethane market to merge and create blended products, which are easily marketable.

2.2 Market-driven business cases

This chapter describes some of the already implemented market-driven business cases. The following cases are built on the readiness to pay a premium for biomethane compared to natural gas or motivate the use of biomethane through the avoidance of any penalties for not meeting national or state fixed target values for GHG emission reduction, biofuel quota, etc.

2.2.1 Labelling

The creation and the transfer of green energy certificates is a common process in Europe. “Labelling” is an established element in the European energy market and has already started to expand into the gas business. Labelling could drive the biomethane market forward. Certificates of biomethane registries could be used for labelling if national regulations permit such labelling.

Using Certificates to create and market blends of natural gas with biomethane is getting momentum in Europe, especially in heating sector. This trend is facilitated by subsidy schemes supporting renewable heat provision/utilisation. The Certificates issued by a biomethane registry make the documentation of such blended products possible.

Cost of biomethane production is normally 2 to 3 times higher than the presently low market price for natural gas (winter product). Due to this fact, only a small biomethane quota as part of gas consumption might be accepted by gas consumers. The quota of the biomethane added to the natural gas depends on the willingness of customers to pay a higher price for the product containing renewable component.

The market to supply biomethane to consumers comprises all European gas customers (household, industry, small companies, etc.) with a connection to the European gas grid (~ 100 million export points). It is expected, that an increasing number of companies and private gas consumers may be willing to pay a premium on a voluntarily basis to use green gas (biomethane) for their energy supply – for example to reduce the CO_2 footprint of a company or comply with internal sustainability requirements.

2.2.2 Biofuels

Biomethane as transportation fuel can be promoted in various ways:

- Mandatory (defined by law) or voluntary (company’s decision) company carpools can promote the use of biomethane.
- Tax reductions for use of biomethane or blending with natural gas as vehicle fuel could motivate buyers.
- The automotive industry itself has the obligation to reduce the CO_2-emissions from new passenger cars as well as light and heavy-duty vehicles (CO_2-regulation). The manufacturing of gas vehicles is one option. If and how renewable fuels can be counted towards the CO_2-emissions from heavy-duty vehicles, will be assessed by the European Commission until the end of 2022 (Regulation EC 2019/631 and Regulation EU 2019/1242).
- Introduction of a cap and trading of CO2-emission allowances for fossil fuels in the transport sector.

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- According to the RED II, Member States must require fuel suppliers to supply a minimum of 14% of the energy consumed in road and rail transport by 2030 from renewable sources.

All three business cases for biofuels are targeted towards an increase in gas vehicles in Europe. The increase of gas vehicles may exceed the currently available volumes of biomethane and could thus become a driving force for biomethane.

2.2.3 Energy efficiency

Biomethane can replace fossil fuels in several applications. In different legislations the usage of biomethane (like other renewable energy carriers) could be credited towards meeting energy efficiency requirements (for example when constructing new buildings).

Austria for instance has implemented fines of 200 EUR/MWh in its energy efficiency legislation for those suppliers who don't reach the consumption reduction goal of 0,6% per year. The burden of a reduction of consumption lies on the shoulders of suppliers who themselves have to motivate consumers to take measures for a consumption reduction. The penalisation of not undertaking energy efficiency measures brings quite hefty costs to those who don't comply.

In such economic environment the use of biomethane could be accepted and credited as an energy efficiency measure. At a fine of 200 EUR/MWh per legislation, or a market value even at half of this for energy efficiency measures, the value of biomethane might kick in and biomethane as renewable alternative may provide value as a market-driven business case.

2.2.4 Imbalance energy

The increase in renewable power generation and the fact of a more decentralised power generation have heightened the need for control energy in the electricity system over the last decade in Europe. The demand for control energy will further raise with the increasing instalment of wind and solar power production units. Control energy covers the gap between production and actual consumption volumes and is thus needed to provide security of supply in the gas and electricity markets.

The European guidelines for control energy generally distinguish three types of control energy: primary, secondary and tertiary. Due to the possibility to store biomethane in the gas grid it can be used for the provision of positive (increasing production of electricity) balancing energy or negative balancing energy (reducing production of electricity). Biomethane powered plants could provide energy for tertiary and secondary control.

Providing control energy is a potential added value for biomethane producers. The use of on-site CHP plants to balance the application of biomethane for control energy will allow biomethane producers to participate in the auction mechanisms for control energy. Such auction mechanisms are performed by gas Transmission System Operators (TSO) as well. The control energy mechanism would not influence the generation of Certificates.

2.3 Subsidy-driven business cases

Subsidies for biomethane would provide the strongest support. Hence, the production costs for biomethane do require in most cases a stakeholder to subsidise the difference between the market price and the production costs. The following business cases are a selection of different subsidy

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schemes. The subsidies have to be based on reliable data which should be documented and provided by national biomethane registries.

2.3.1 Biofuels

In addition to the market-driven business case, there is also the concept of subsidising biomethane as a fuel. This is the case – for example – in Sweden, where biomethane as a transportation fuel has a specified tax advantage in comparison with natural gas used for the same purpose. The Certificate can document the chain of custody from the production installation to the biomethane fuelling station.

Another option of subsidising biomethane is the direct payment for injected biomethane into the national gas grid. The biomethane producer is directly supported via a feed-in tariff under the assumption that - on the country basis - the injected biomethane volumes are supplied to vehicles as a biofuel.

An example for biomethane in transport sector is provided in Italy. Italy is one of the first countries to embrace direct subsidies for biomethane used as sustainable fuel in the transport sector. A biomethane registry handling Certificates is of utmost importance to support the transparent documentation of the achievement of national targets (climate targets, biofuel quotas, or others).

2.3.2 Electricity generation

The versatility of biogas and especially the unbundling of production and consumption are primary reasons for the application of biomethane as a gaseous product and hence its storage and transportation via the gas grid.

Today biogas is produced and usually directly transformed into electricity at the location of biogas production (note over 17,000 biogas plants providing renewable electricity vs ~ 540 biomethane plants providing renewable gas). Numerous European countries currently provide, or had provided in the past, a subsidy for renewable electricity from biogas which is/was paid out for the produced kWh electricity. For countries without any direct subsidy for biomethane, the mentioned subsidy system for renewable electricity may also be applied for the conversion of biomethane to electricity at another location than at the production site. A functioning Certificate transfer scheme provides the necessary documentation for biomethane injection into the natural gas grid and withdrawal from the gas grid at another geographical point to produce electricity and/or heat. The Certificate transferred to and cancelled by the electricity producer's account in the national biomethane registry provides the proof for the use of biomethane. Such proof is the basis to qualify for financial subsidy.

2.3.3 Biomethane injection into gas grid

Another way to push the production of biomethane and other downstream technologies is by paying a feed-in tariff for the direct injection of biomethane into the gas grid.

It is the solution to address the problem of timely balance of production and demand that the rest of the renewable energies have: biomethane can be injected into the gas grids, and therefore can be stored for long periods in the natural gas storages.

The subsidy for directly injected biomethane is the most efficient promotion for project developers, investors and producers because feed-in tariffs eliminate risks for the plant operator. The market risk is eliminated and only the feedstock risk remains to be managed. In some legislations, investment

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subsidies are granted to biomethane project developers under relevant tenders (usually with defined overall budget).

2.3.4 Certificates as a basis of subsidies in different areas

Beside the known subsidy-driven business cases, there are individual city/country-driven subsidy programmes with regards to biomethane. Subsidies may be given when using biomethane for heating purposes.

Individual subsidies may be provided for transport vehicles which use methane (compressed or liquified) as fuel. Such subsidies will indirectly support the consumption of biomethane in case the gaseous fuel suppliers of the country provide either pure biomethane or biomethane/natural gas blend at the retail station. The Certificates cannot be applied on a motorist-by-motorist or station-by-station basis, they can be applied only in relation to the company operating the network of stations.

The receiver of the subsidy usually has to provide proof of the use of biomethane (gas supplier). Today, either locally established systems with generation of Certificate or just individual forms are used. The standardised Certificate scheme of a domestic biomethane registry could kick in to support these individual Certificate schemes.

2.4 Environment protection related values

The market driven business case is possible if the consumer of green gas can avoid costs due to using the renewable fuel. The value of the avoided cost will be reflected in the price the consumer is willing to pay for the green gas. The most obvious externality is the GHG emission intensity, which may have a market value dependent on national regulations (incentives or penalties). It is expected that the planned reform of the European ETS system will improve the conditions for generating income for the biomethane producers – in view of the excellent GHG characteristics of biomethane (especially if produced from manure and organic waste).

Another field that can assist the biomethane sector is the waste recycling obligation or incentive. Depending on the national regulations and circumstances, biomethane producers may generate additional income from processing different organic waste streams.

2.5 Conclusion

Biomethane relies on various subsidy and business cases in the fuel, heat and power generation sectors. The applications can be based on a subsidy scheme or market model. These schemes and models rely on transparent and trustworthy documentation spanning over the whole chain of custody, from the biomethane injection to the end use and have to include the title tracking of Certificates. National biomethane registries are established to fulfil exactly this purpose and have thus the perfect requirements to manage such tasks. Certificates are the reliable and transparent documentation set to facilitate the biomethane market and the integration of biomethane into the national and European gas markets.

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3 Status quo of biomethane in Europe

3.1 Biomethane Status

The main process of upgrading biogas to biomethane of natural gas grade is the separation of CH_4 and CO_2 with the aim of achieving high methane purity, low methane losses and low energy consumption. Biogas upgrading methods have been intense research topics in the past years and consequently there are several reliable process types available at market quality: membrane separation, scrubbing (absorption methods), pressure swing adsorption and cryogenic separation. The practical upgrading of raw biogas to biomethane at biogas production plants is however, still at an early stage of development in Europe. At the end of 2017, there were around 540 biogas upgrading plants in operation, which is merely 3% of the total number of ~ 17,800 biogas producing installations (including sewage and landfill gas). The majority of the existing biogas plants generate electricity as the main product and not biomethane. In 2018, biomethane is being produced in 17 European countries (AT, BE, CH, DE, DK, EE, ES, FR, FI, HU, IS, IT, LX, NL, NO, SE, UK). In 2017, the total European biomethane production (from 15 European countries) in was 1,94 billion m^3. (EBA Statistical Report 2018).

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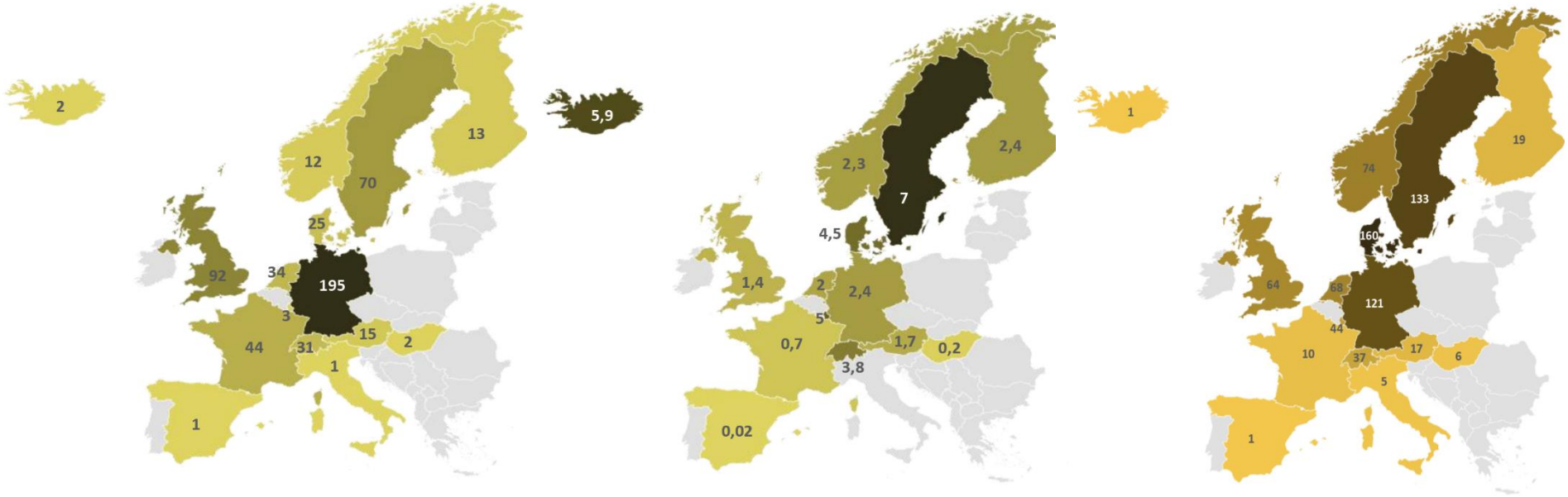

Figure 1: European biomethane production; source: EBA Statistical Report 2018

Number of European biomethane production plants

Number of European biomethane production plants per 1 Mio capita

European per capita biomethane production (kWh/head)

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The injection of biomethane into the national natural gas network is directly supported in DK, FR, IT, NL and UK in different forms (fixed feed-in tariffs, feed-in premiums, other types of national certificates, etc.). In all five countries, the financial incentive is granted to domestic producers and is not available for biomethane imported from other EU member states.

The use of biomethane as biofuel in transportation is supported via different means (tax benefits, GHG emission reduction commitments, blend-in commitments, certificates traded on the market etc.). Although some of these financial incentives are available for imported biomethane in some countries, such cross-border movements are still very low. This is due to the fact that biomethane (like liquid biofuels) is subject to mass-balancing if it is to be counted towards the national biofuel commitments. On the other hand, the mass-balancing of biomethane transported through the European natural gas network is not yet solved. Under this situation, only direct physical movements (mostly by trucks) can be accounted for as biofuel supplies. This limitation to direct (trackable) cross-border movements results in small trade volumes.

Thus the European biomethane market today is scattered, characterised with small volumes and lack of transparency because of a lack of Europe-wide spanning of domestic retistries. A major breakthrough can be achieved only after the administrative preconditions for the use of the European natural gas network as biomethane distribution system are provided.

A special case is the import of biomethane from Germany to Switzerland which is based on the application of the Swiss “Naturemade biomethane” labelling system. Under this system, the individual German biomethane producing installations are audited and certified, the sustainability of the biomethane production is properly certified and the physical cross-border movements are tracked. Although this works between the South of Germany and Switzerland, this – due to its complexity – cannot be a workable scheme for the rest of Europe.

3.2 Relevant European Provisions

DIRECTIVE 2009/73/EC of the European Parliament and European Council of 13 July 2009 concerning common rules for the internal market in gas and repealing Directive 2003/55/EC

Due to insufficient competition in the energy sector, the EU decided to provide clear provisions with regard to the admissibility of integrated energy companies with the third legislative package. This became necessary because the connection between the network operators, the suppliers and the producers had been identified as an obstacle to the development of the internal gas market of the EU. Therefore, the EU stipulated in Directive 2009/73/EC to implement a clear separation between system operators, producers and suppliers. Different models have been introduced which are intended to ensure the independence of network operators. This separation of the different areas should ensure non-discriminatory network access and lead to greater competition. Furthermore, the member states were obliged to set up independent regulatory bodies monitoring the implementation of the guidelines set out in the regulation.

DIRECTIVE 2009/73/EC has not only led to profound changes both in the legal framework and the structure of energy companies, but also was the basis for significant changes in national legislations with respect to gas industry laws or electricity laws. The unbundling requirements for the energy companies led to a significant need for adjustment to the existing structures of the network operator.

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DIRECTIVE 2009/28/EC of the European Parliament and the European Council of 23 April 2009 to promote the use of energy from renewable sources and to amend and subsequently repeal Directives 2001/77/EC and 2003/30/EC.

Directive 2009/28/EC defines mandatory national targets for the overall share of energy from renewable sources in terms of gross final consumption. Agricultural materials such as manure and slurry along with other animal and organic waste are already used for purposes including the production of biogas and biofuel to be used as heat and electricity. Due to the decentralised nature and regional investment structure, biogas facilities can contribute significantly to sustainable development in rural areas and offer farmers new income opportunities.

In accordance with the directive, it is necessary to promote strategic cooperation between member states and, where appropriate, involve regional and local authorities. Member states should be encouraged to pursue all appropriate forms of cooperation in order to achieve the objectives of this directive. Such cooperation projects may be rolled-out on all levels, bilaterally as well as multilaterally.

Guarantees of Origin for electricity, which are issued in accordance with and for the purpose of RED, are intended exclusively for a final customer of the electricity grid; they prove that a certain percentage or a certain amount of energy was produced from renewable sources. A Certificate can be transferred from one owner to another regardless of the energy to which it relates. Double counting and double designation of guarantees of origin should be avoided in order to ensure that a unit of electricity that has been produced from renewable sources can only be transferred one time. It is important that green certificates, which are used by the funding agency, can be differentiated from guarantees of origin.

Directive 2009/28/EC also constitutes an important basis for the legalisation of a mass balancing methodology in Europe. In principle, the Directive stipulates, that according to the mass balance method, a physical connection exists between the production and the consumption of biofuel and bioliquid in the community. This task is interpreted very differently among EU member states.

Biogas and bioliquids can be considered for the assessment of compliance with national targets and for the possibility of financial support only if certain sustainability criteria are met. These biofuels may not be the product of raw materials taken from land where there is a high value placed on biodiversity. These include for example primary forests, conservation areas and highly biodiverse grasslands. A mass balance system with strict requirements is to be used as criteria for verifying sustainability.

REGULATION (EU) NR. 994/2010 of the European Parliament and European Council of 20 October 2010 Concerning Measures to Safeguard the Security of the Gas Supply and Repeal Directive 2004/67/EC of the Council.

This regulation aims for the security of the gas supply in Europe. As an analysis of the security of supply of a member state, the failure of the largest natural gas infrastructure, the so called N1-principle, should be examined as a benchmark for what member states should be able to balance. This will be accomplished by expanding of natural gas infrastructure in the various member states, improving integration of individual Member States with each other, and by objectives of this directive. This cooperation can take place on all levels bilaterally or multilaterally among the various member states, improving integration of individual Member States with each other, and by diversifying the energy

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supply. Through these steps the necessity of integrating renewables into the natural gas network infrastructure will be facilitated.

This regulation brought about many changes in the national legislations, among others the national implementation of the control measures and the creation of preventative and emergency planning. In Austria the regulation led to a change in GWG 2011 (gas economy law) and a revision of the Energy Intervention Powers Act of 2012.

DIRECTIVE 2014/94/EU of the European Parliament and European Council of 22 October 2014 on the Construction of Infrastructure for Alternative Fuels.

This directive establishes a common framework for the construction of infrastructure for alternative fuels. The goal is to decrease dependence on crude oil as much as possible and to limit the environmental impact of transportation. According to Article 2, biomethane is an alternative fuel. The directive requires each Member State to define a national strategy framework for the development of the alternative fuel market in the transport sector. This strategy framework includes an inventory of the existing infrastructure and information on how this can be further improved, to be forwarded to the Commission on 18 November 2016.

The European Parliament in its resolution of 25 October 2018 on deployment of infrastructure for alternative fuels in the European Union called for actions.

STATE AID DIRECTIVE

The Communication from the Commission „Guidelines on State aid for environmental protection and energy 2014-2020" (2014/C 200/01) set the general rules for national renewable energy support schemes, among them:

- Aid is considered to be proportionate if the aid amount per beneficiary is limited to the minimum needed to achieve the environmental protection or energy objective aimed for.
- Where aid to the beneficiary is granted in a competitive bidding process on the basis of clear, transparent and non-discriminatory criteria, the aid amount may reach 100% of the eligible costs.
- Substantial changes in national support measures to be approved by the Commission.

RED II DIRECTIVE

The RED II introduced the Guarantees of Origin for renewable gases: „Guarantees of origin, which are currently in place for renewable electricity should be extended to cover renewable gas. This would provide a consistent means of proving to final customers the origin of renewable gas such as biomethane and would facilitate greater cross-border trade of such gas. It would also enable the creation of guarantees of origin for other renewable gas such as hydrogen."

ARTICLE 19. OF RED II is dedicated to Guarantees of Origin for energy from renewable sources.

ARTICLE 19 PARA 1

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For the purposes of demonstrating to final customers the share or quantity of energy from renewable sources in an energy supplier's energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources, Member States shall ensure that the origin of energy from renewable sources can be guaranteed as such within the meaning of this Directive, in accordance with objective, transparent and non-discriminatory criteria.

ARTICLE 19 PARA 2

The guarantee of origin shall have no function in terms of a Member State's compliance with Article 3. Transfers of guarantees of origin, separately or together with the physical transfer of energy, shall have no effect on the decision of Member States to use statistical transfers, joint projects or joint support schemes for compliance with Article 3 or on the calculation of the gross final consumption of energy from renewable sources in accordance with Article 7.

ARTICLE 19 PARA 6

Member States or the designated competent bodies shall put in place appropriate mechanisms to ensure that guarantees of origin are issued, transferred and cancelled electronically and are accurate, reliable and fraud resistant. Member States and designated competent bodies shall ensure that the requirements they impose comply with the standard CEN - EN 16325.

ARTICLES 25-30 are dedicated to renewable energy in transport:

- **ARTICLE 25**: Mainstreaming renewable energy in the transport sector;
- **ARTICLE 26**: Specific rules for biofuels, bioliquids and biomass fuels produced from food and feed crops;
- **ARTICLE 27**: Calculation rules regarding the minimum shares of renewable energy in the transport sector;
- **ARTICLE 28**: Other provisions on renewable energy in the transport sector;
- **ARTICLE 29**: Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels;
- **ARTICLE 30** Verification of compliance with the sustainability and greenhouse gas emissions saving criteria.

3.3 Conclusion

With 17,783 biogas and 540 biomethane plants there is already significant know-how and expertise on technical as well as on policy level available in Europe. The considerable potential is ready to be exploited, provided there will be a suitable framework and harmonisation made available.

The European legal framework includes many regulations regarding biological energy sources but nothing with respect to the establishment and operation of biomethane registries. Nevertheless, Article 19 of RED II is directly relevant to the registries in case they are granted the status of „designated competent body" by their government for issuing Guarantees of Origins for renewable gases.

In relation to the distribution of biomethane through the national and European natural gas networks, the application of the mass balancing methodology offers the appropriate administration.

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3.4 Overview of established registries – Reference to Annex 1

See Chapter 1 Annex: Overview of established registries as of page 73.

a) Austria
b) Denmark
c) Estonia
d) France
e) Germany
f) The Netherlands
g) Switzerland
h) United Kingdom

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4 Biomethane in the gas market model

4.1 Integration of biomethane

In order to feed biogas into an existing natural gas grid, it must be upgraded to biomethane before injection. After this process of upgrading biogas to biomethane of natural gas quality, it may enter the grid where it is blended with the volumes in the grid. A great advantage for biomethane injection is that biomethane is entering an already existing transportation infrastructure. Taking a biomethane production plant "online" and injecting biomethane does in general not imply an investment in transportation infrastructure (except for a gas network connection).

Biomethane entering the grid adds to the value of biomethane because it can be used for different end consumer purposes, e.g.: to generate electricity, to provide for heating purposes or for withdrawn from gas grid for biofuel application. The optionality in the use of biomethane increases when injected into the grid compared to the option of generation power on-site of a biogas production plants.

A biomethane production plant is usually connected to a distribution grid and the plant operator has to apply for access capacity towards the grid operator. But there are cases (e.g. in UK and FR) where biomethane is injected into the transmission network directly. Metering the volumes and quality is the responsibility of the grid operator, who may reject injection if quality criteria are not met. The metering point records the injected quantities. Metering data at injection point are the essential information to generate Certificates.

4.2 Gas market balancing

Biomethane is part of the domestic gas market model. In Europe different gas market models with several characteristics exist and these models differ substantially. Market participants are just as diverse. Several entities may have certain roles in a market area (market area manager, distribution area manager, operator of virtual trading point, balance group coordinator, gas exchange trader).

As market models are different, network codes and European regulations are working towards better market integration and harmonisation of market rules. The European Regulation therefore sets out harmonised Union-wide rules on balancing with the objective to give network users the certainty that they can manage their balance positions in different balancing zones throughout the Union in an economically efficient and non-discriminative manner. Cross-border cooperation is an important point for the European gas market.

The transmission system operators coordinate the technical operation of the entire grid in the domestic market area and are responsible for physically balancing the gas market area. The market area's balancing mechanism keeps the system in balance, thus the TSO permanently takes care of injecting or withdrawing gas volumes to keep the system in balance.

The clearing activities may be operated by the TSO or such activities are performed by a Clearing Agent, the balance group coordinator. Such own independent entities exist where the domestic jurisdiction sees a necessity to manage commercial data separately from technical data in a separated fully unbundled organisation.

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Apart from TSO or balance group coordinators in such market area, several players are active: balance group responsible parties, suppliers, traders, grid/distribution operators, balance energy providers, gas exchanges, OTC platforms, storage operators, producers of natural gas, last but not least producers of biomethane.

For all these parties, metering data (consumption, production, grid to grid, grid to storage, etc.) and schedules are registered on an hourly basis at either the TSO or the balance group coordinator. TSO or balance group coordinator operates an account-based IT-system with a credit and debit side where all the injected, withdrawn, sold volumes within the market area are booked on either credit or debit side of the respective account (balance group). This system of volumes and balance energy allows to calculate and settle all credits/debits differences on these accounts (balance groups) hourly or daily. Balance energy is settled with the so-called balance responsible parties.

A market area or virtual trading point is like a lake of gas where injection and withdrawal are metered and change of ownership of volumes is registered centrally.

Each grid user must be registered with a TSO or balance group coordinator and is subject to the applicable balancing rules. There may be a distinction in balancing between different groups (households, industry, grid, cross border, control energy providers, biomethane, etc.). Each grid user must be member of a balancing group. There are no exceptions; membership of balancing groups is not optional; there is an obligation for contracting. Balancing groups supplying consumers will inevitably need to balance the differences between supply and actual demand. This means that also for biomethane a balance group (in form of a dedicated account) is registered at the Clearing Agent (TSO or balance group coordinator). The balance group responsible party is the company/person who is responsible for the biomethane account. This balance group responsible party registers its balance groups and enters into a contractual relationship with the Clearing Agent.

The balance group is an account with a debit and credit side. If natural gas is produced and injected into the grid, the metered volume per time unit (hour) is booked at the credit side of a balance group. If gas is transferred from the balance group to another balance group, there is a booking of the sold volume on the debit side. If volumes on credit and debit side are not identical in an hour, then there is an imbalance for that hour. The balance group may be over- or undersupplied. This difference is called ‘balance energy’ which is charged by the TSO or balance group coordinator. If more gas was sold then was produced, the balance group is undersupplied, and part of the sold volume is obviously stemming from a different source. The imbalances on biomethane may be determined on an hourly or a daily basis. Prices may be dependent on a reference price (market price) where the imbalance price may be a marginal price, an exchange traded price with or without surcharges.

The general terms and conditions of TSO or balance group coordinator define the rights and obligations of the balance group responsible parties. The balance group responsible party may be a supplier or trader of natural gas.

After injection, the physical flow of biomethane is treated the same way as all other natural gas volumes. Metering data from the biomethane injection point are sent to from the grid operator the Clearing Agent. The two levels of physical flow and Certificate flow are decoupled from time of injection on. From there on gas and attribute “travel” separately and have different value, the attribute biomethane (the Certificate) may be a few times more expensive than the physical natural gas volume. The metering data about gas volumes enter the balance group system whereas the respective information about the injected biomethane enters the system of the biomethane registry which

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represents the information for the creation of the biomethane certificate. Possibilities to prove the gas volumes are information from metering data from grid operators or Clearing Agents, audited data or other recognised systems.

Legal frameworks for the "biomethane market model" and the "gas market model" are different.

4.3 Balancing biomethane production

Biomethane is an element of the gas market area and its regulation and has to be fully integrated into the domestic gas market model. The definition of a biomethane registry handling the clearing of biomethane volumes and also the definition of biomethane as component in the domestic gas market framework are essential prerequisites.

Due to the low volumes of biomethane available and/or the lack of support, there is the danger that biomethane, as an element of the domestic gas market model, is overlooked and no provisions are taken to integrate biomethane injection. It is fair to require that the regulation for biomethane balance groups should not hinder but promote green energy. The regulations should furthermore be advantageous to promote green energy versus fossil energy.

Before biomethane may enter the grid, there is a registration procedure for a biomethane plant required which is coordinated by the TSO or/and Clearing Agent. In that registration procedure contracts are signed, and a balance group is set up for the biomethane injection plant in the clearing system. It should also be possible to add a biomethane plant to an already existing biomethane balance group. The balance group responsible party manages the balance group and the transfer of physical gas to third parties. The balance group responsible party has to pay for the differences between its balance groups credit/debit sides (= imbalance energy).

4.4 Imbalance price mechanisms

The question has to be answered if biomethane should be daily, hourly or even yearly balanced and what the imbalance price mechanism of biomethane should be. The best solution for the biomethane market is that biomethane should be balanced on a daily basis and that the imbalance price should be the exchange traded price for natural gas (reference price) of the day. Thus, the biomethane balance group pays the market price of gas and no additional penalties for being imbalanced. Balance energy should be at zero risk for the biomethane balance group. In Austria, balance energy for the gas grid and balance energy for biomethane is charged the same price, whereas balance energy for commercial balance groups is more expensive.

The main purpose of the daily imbalance charge mechanism is to incentivise shippers to balance their inputs and offtakes. The objective is to induce shippers to trade as close to a balanced position as possible, in order to limit their individual exposure to a daily imbalance charge. The daily imbalance charge mechanism is calculated considering the sales and purchases of title products thereby determining a marginal sell and buy price of a given day plus a small adjustment. In cases when the marginal sell and buy prices cannot be calculated, a default rule can be applied.

Within-day-obligation (WDO) is a tool that can be applied to securely operate the network. The balance network code provides for specific rules and their consequences relating to shippers' inputs and withdrawals, which are derived to ensure flows consistent with those necessary to maintain system integrity during the gas day. WDOs may comprise either specific obligations or incentivise mechanisms on shippers' behaviour to minimise the need for balancing actions to keep the system within

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operational limits during the day. In view of the small volume share in the natural gas network, the Within-day-obligations should not be implemented for biomethane.

The transmission system operator is entitled to take necessary measures including financial security safeguards to reduce default in payment for the imbalance charges. As the safeguard measures have to be on an equal basis, the balance group responsible party operating the biomethane balance group will be obliged to provide bank guarantee or cash as collateral to cover the risk of its default on an imbalance invoice.

4.5 Gas market model integration - example: Balance Group Model in Austria

A balance group model exists in all countries with different country-specific characteristics. Injected biomethane must be an element in each balance group model. In the following, handling of biomethane flows in the Austrian balance group model and the Austrian gas market model are described.

The biomethane injection into the Austrian gas grid is regulated as follows: Biomethane injections are recorded in the distribution area and the injecting plants are registered with the Clearing Agent (AGCS Gas Clearing & Settlement AG). AGCS, in its role as a balance group coordinator, sets up a balance group for the injection plant. On one side of the account (credit), the production and on the other side (debit) the sale of the gas is registered. The so-called balance group responsible (BGR) is responsible for imbalance between production and sale of gas.

Once the renewable gas has been fed into the grid, it becomes (physically and chemically) indistinguishable from the other gas volumes. The transactions relating to this quantity of gas do not differ from other gas quantities. The individual biomethane molecules are not treated differently and there is no second biomethane grid. The biomethane injected into the grid is accounted for on a daily basis just like normal natural gas. Gas production is forecasted for the next day and the corresponding sale schedules have to be made in advance**.**

Grid capacity for entry of quantities of biomethane into the gas grid is necessary. The plant operator has to apply for this access capacity which is provided by the grid operator in advance. Plant operator pays for the access capacity.

In the Austrian practice, only the property of injected biomethane is recorded and may be transferred via Certificate (including inspection report) from the biogas plant to traders, suppliers or consumers. The step from injection to the Certificate is as follows: At the end of the month all grid operators transmit the metering values of biomethane injected into their grid on an hourly basis. The metered values are recorded in the biomethane balance group run by the balance group coordinator. These values are then taken over by the biomethane registry and the registry generates a monthly block of Certificate per plant.

Table 1: Creation process of biomethane Certificates following the Austrian example

Working days within the months of injection					
5	11	11	12	13	from 13 on

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Submission deadline for additives	Provision metering data of injection volumes	Clearing deadline Clearing Agent AGCS	Creation Biomethane Certificates	Creation Biomethane Certificates	Biomethane Certificates are tradable
By biomethane producer	By grid operator	By AGCS Cas Clearing & Settlement AG	By AGCS Biomethane Registry Austria	By AGCS Biomethane Register Austria	By owner (Biomethane producer)

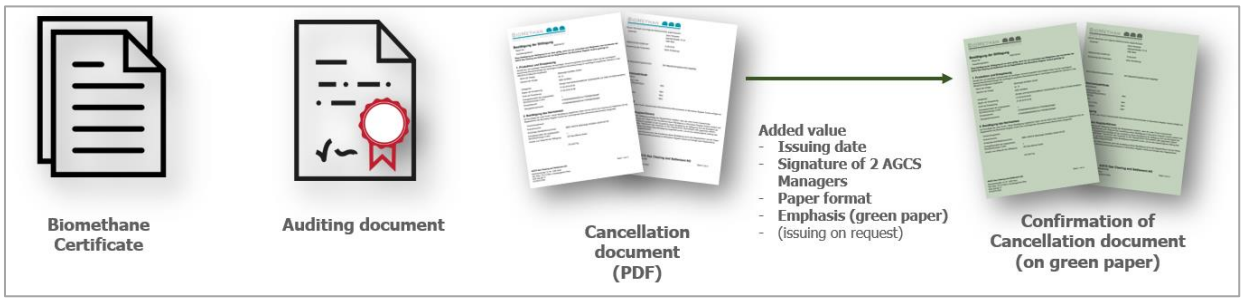

Figure 2: Process of creating and cancelling Biomethane Certificates following the Austrian example

The procedure may be different from country to country but everywhere the TSOs and DSOs are the reliable sources of the grid injection data. In case the registries rely on other sources of information, adequate audit procedures must be defined and applied.

The biomethane registry operated by AGCS does not track prices paid for a Certificate, or if the Certificate is used to obtain a subsidy. The Certificate represents a value which can be monetised but the Certificate itself.

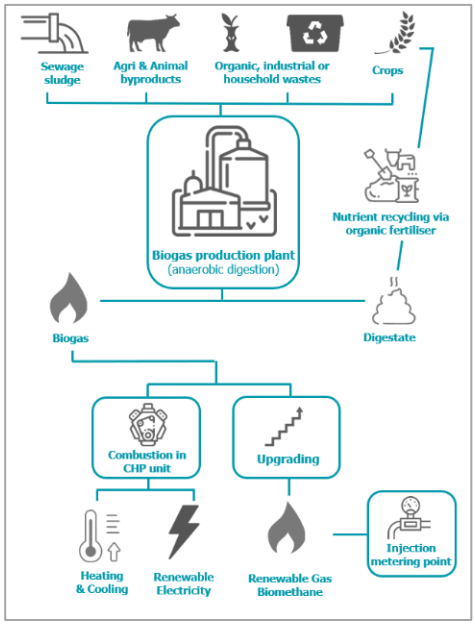

Figure 3: Biomethane production process

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The term mass balancing system of biomethane from AGCS perspective means that the injected biomethane is metered and the claim of biomethane is allowed only by those who possess the Certificate. When a household is located a few hundred meters from the biomethane injecting plant this household is not automatically a biomethane consumer that may claim it had consumed biomethane. To be supplied with biomethane, the commercial consumer has to receive a Certificate and pay the full biomethane price (gas price and Certificate price). Transparency and traceability are the crucial base requirements for mass balancing and thus it is necessary that public authorities and technical auditors are enabled to access the complete documentation along the whole supply chain from one central position.

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5 Biomethane production units

5.1 Biomethane production

The production process of biogas/biomethane is complex but based on a mature technology. The production is flexible, allowing the treatment of a wide range of organic materials, e.g.: different agricultural or animal substances, organic municipal or industrial wastes such as unusable (expired) food.

The term "biomethane production plant" encompasses a biogas production plant with a downstream "upgrade" installation, or a technical unit for processing biogas to natural gas grade. Biomethane is physically equivalent to the gas in the natural gas grid.

5.2 Functionalities of registries - clearing and settlement of biomethane in the balance group model

A registry should be able to cover the following for levels (see also Figure 4):

- Level of Registry functionalities and relations
- Level of physical transfer
- Balancing level
- Level of Certificate transfer

The two levels of physical flow and Certificate transfer are decoupled from time of injection on.

LEVEL OF REGISTRY FUNCTIONALITIES AND RELATIONS: All market participants are registered (see Figure 5) at the Biomethane Registry via a specified account, access secured via personalised account information.

LEVEL OF PHYSICAL TRANSFER: The quantity of biomethane produced and injected by the plant operator is metered by the grid operator via the injection point. Grid operators are responsible for metering these values on an hourly interval and for transferring the values to the Clearing Agent who records them in the respective biomethane balance group. Also, the withdrawal data by end consumers are metered. Biomethane plants injecting into the gas grid are fully integrated elements of the gas market models. The dimensions of the plants are usually built on the basis of the maximum amount of materials that are available for the use of biogas production.

BALANCING LEVEL: Metering data are sent by the grid operator to the Clearing Agent or TSO. The metered values are used for grid control actions at TSO level and are booked on a credit side of a balance group on balance group coordinator level. The imbalance energy of the biomethane balance group is calculated as the difference of metered physical injection (measurement from network operator) and the nominated (scheduled gas) values. The imbalance energy consumed in the biomethane balance group is charged to the BGR (balance group responsible party). The imbalance costs for the biogas/biomethane balance groups should be as close to the market level price and therefore constitute no risk for the biomethane balance group.

LEVEL OF CERTIFICATE TRANSFER: The Biomethane Registry creates biomethane Certificates for the metered biomethane volumes to which auditing documents can be attached. These biomethane Certificates can be split, transferred to other market participants and cancelled by the respective

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owners. These Certificates can be applied to prove the fulfilment of requirements for different applications on national as well as on European level.

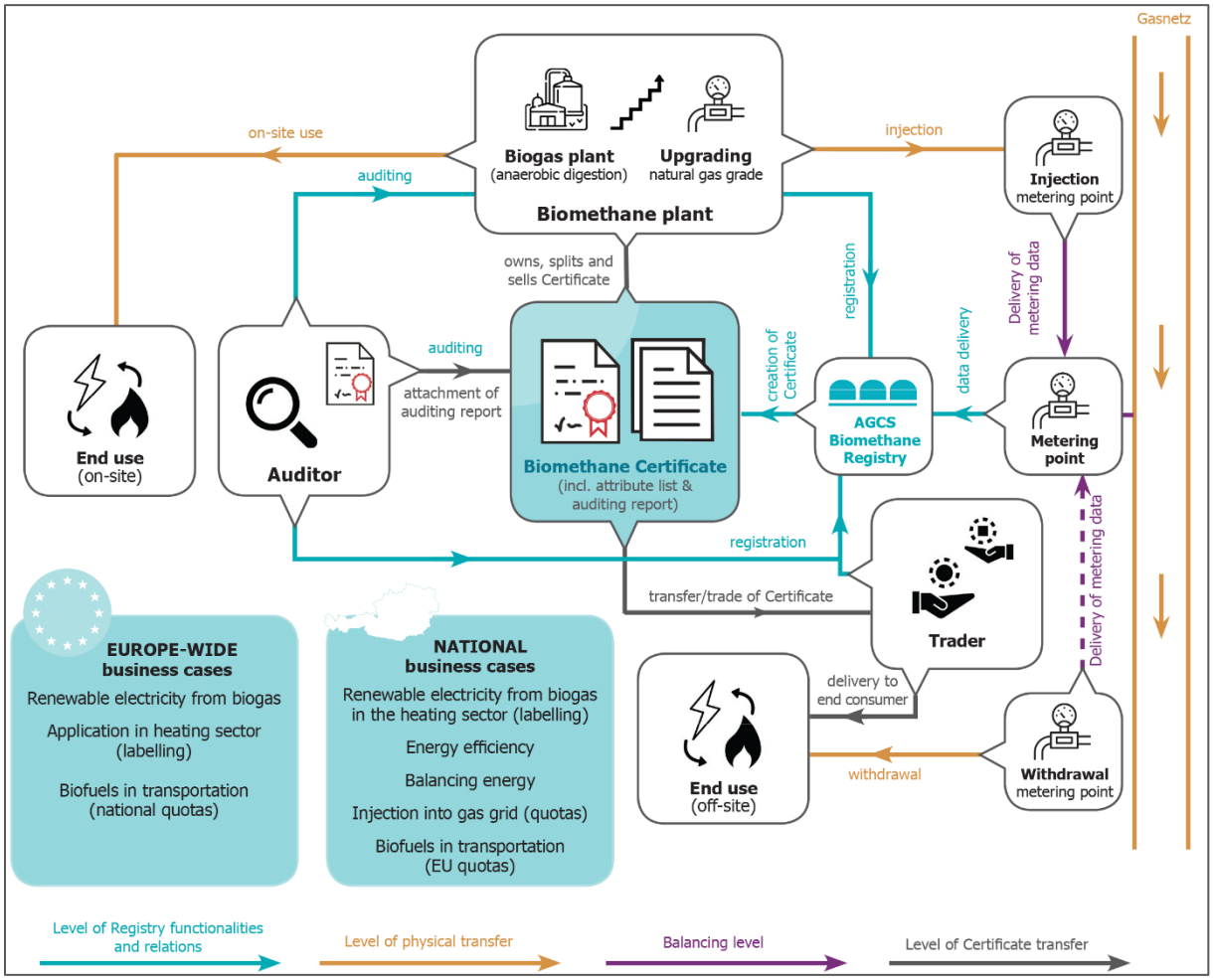

Figure 4: Functionalities of Biomethane Registries on the example of the Biomethane Registry Austria

5.3 Biomethane Certificates

The production of biomethane and the generation of Certificates require reliable documentation. Such Certificates contain various attributes, which on the one hand provide information about the quality of injected biomethane, its sources, auditor statement and on the other hand information about the biomethane production plant.

The following attributes play a primary role in the product information and should be attached to the biomethane Certificate:

- biomethane plant specific information (production facility, commissioning, injection point, etc)
- metering data (e.g. data on biomethane quantity from grid operators or the clearing agent to fulfil mass balancing)
- audited data (used/treated substrates incl. details on processing, quality, volume, sustainability, GHG characteristics, etc).

The list of information can be expanded or reduced reflecting the changes in regulations, support systems and market requirements.

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The plant information should include at least the following:

- Name and location of plant,
- Country of plant,
- Address information
- Maximum production capacity
- Starting date of operation
- Raw Materials processed for production of biomethane
- Applied upgrading technology (optional)

5.4 Registration

5.4.1 Description of process for initial plant approval

The biomethane production plant may apply for registration at the biomethane registry by submitting respective forms, documentation (gas grid operators, authorised auditors, …) and signing a contract with the registry administrator. The registry administrator sets up accounts for the plant operator and provides the plant operator with a log-in to the registry.

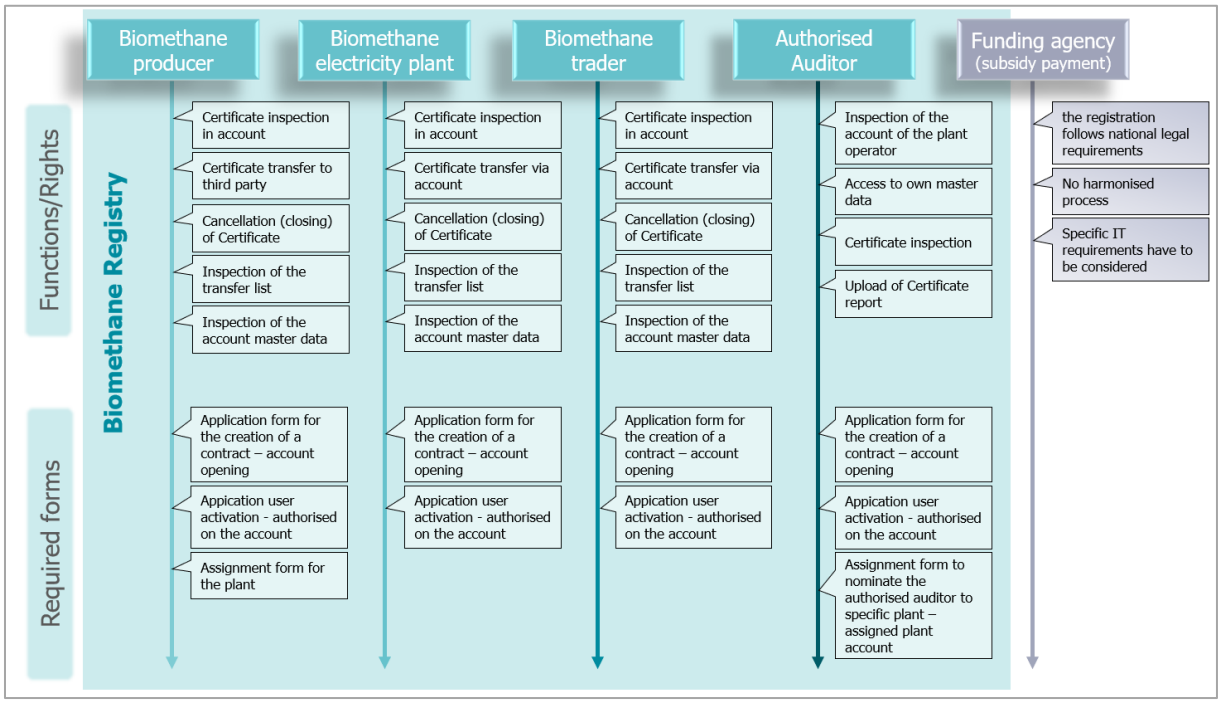

Figure 5: Registration process for market participants of a biomethane registry on the example of the Biomethane Registry Austria

In order for a biomethane plant to be recognised and permitted to operate on the market, various requirements need to be met and registrations steps accomplished. If the plant already exists, is close to operation and has access to the gas grid, the following steps must be completed (national variations are possible).

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a) National permission for the biomethane plant operation, in some countries additional certificates are necessary to be labelled an “eco-plant”
b) Allocation of injection metering point by the operator
c) Registration by the distribution area manager for the physical clearing and settlement of the injection
d) Registration as balance group at the responsible body for the settlement of the physical injection, or balancing energy quantities
e) Registration of the biomethane plant in the national biomethane registry.

Ad a) Because the locations of biogas production plants and biomethane injection plants are scattered, regional authorities are often responsible for issuing permits as well as granting recognition as an “eco-plant” (terminology according to Austrian Renewable Electricity Act). Permissions can be granted either by regional or by national institutions, for example the regional or the national environmental departments. Due to their scattered locations, regional agencies are usually granting permits.

The appropriate state agency sends an expert to inspect the plant according to set standards and if the standards are met, the plant is granted a permit and labelled as an eco-plant. This test follows criteria set by regional laws, but often is equal to a national recognition. With this permit the plant is prepared for further steps in the registration process with the clearing and settlement agency as well as prepared to receive funding for biomethane injection.

Ad b) The gas grid operators are responsible for establishing a gas grid connection. The cost distribution is different in each Member State. Connection costs may be paid either by the grid operator (limited or unlimited duration) or by the applicant or costs may be divided between both parties.

In most European countries, the grid operator is responsible for the connection regardless of who covers the costs. The operator of the plant can carry out the next registration steps only after the installation of a meter and the assigning of the corresponding meter as a result of the network connection. The meter code usually is the unique identifier for the biomethane production plant.

Ad c) Each biogas injection plant has special registration steps as the physical injection has an effect on the grid, and thus an effect on the physical flow in the pipeline. This is projected by the distribution area operator and in the case of failure, handled and controlled (in coordination with the grid operator). Registration with the national distribution area manager is essential. Aside from the technical information about the plant and grid information, the registration also includes instructions for the mention of projection and production data, which are necessary for the daily business interactions of the national gas market.

Ad d) The balance group coordinator (BGC) is responsible for the clearing and settlement of the gas market, that means the offsetting between the projection inaccuracies and physical production. The offsetting of the cost for balance energy, which accrues each month, and other relevant system costs are distributed among and monthly accounted for the market participants according to a defined formula. There are several reasons why there is inevitably going to be a difference between the projected and actual production at the injection plant, e.g. an unexpected disturbance. The registration of a balance group at the BGC is necessary, where the physical quantities are shown on the balance sheet. This balance sheet carrying the costs for all energy balancing. Registration is also coupled with data sharing, or coordination with the distribution area manager so that the establishment of the plant for the physical injection is completed and all market participants have the necessary information.

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Ad e) Registration at the biomethane registry can take place once the biogas plant has completed the national registration for the actual injection. Points a) to d) should be a requirement for registration with the biomethane registry.

The establishment of national biomethane registries is not directly stipulated in the European legislation, therefore existing registries are either in place voluntarily or through national legislation. If there is national legislation, it is likely that the Government also designated one body entrusted with issuing Certificates. In countries where there is no national legislation for registries, voluntary registries may exist.

The biomethane registry checks each plant regarding access to the national gas market and their status as an eco-plant. Upon completion of a successful examination, Certificates can be automatically or manually issued into registry accounts.

5.4.2 Registration process at AIB

The registration process at the Association of Issuing Bodies (AIB), handling Guarantees of Origin in for renewable electricity, has been reviewed for purpose of comparison and shall be mentioned briefly at this point too. Detailed information on the registration process can be found on the AIB website[7]. The following paragraphs represent an excerpt from the information provided online by AIB:

- *If you are an issuing body for GOs or voluntary certificates and would like to see how AIB works for yourself for a trial year at no cost, then you may apply in writing for "Observer" status. As an observer, you will naturally not be entitled to take part in decision-making, but your views will always be welcome.*
- *If you are an issuing body for GOs or voluntary certificates and wish to join, then you must make formal application to the Association. Applicants have no voting rights and can remain an applicant for one year (paying no membership fee) after which they must pay the membership fee. Once you have been granted membership of the AIB, you will be able to vote, and must pay the membership fee. Applicants and members have access to the public part of the website plus the relevant parts of the members section.*
- *Download the brochure 'How to join AIB' for a high level explanation of the work of AIB, and of the EECS Rules. This document describes the process of gaining membership in more detail and explains how the membership fee is calculated.*
- *If you wish to apply for membership, then you should do so by writing to the AIB Secretariat, and including a completed application form and questionnaire, which can be downloaded below too.*

5.5 Auditing - continuous plant monitoring processes

The Certificates are issued by the biomethane registry. Certificates issued by the registry are usually specific to the plant, time and quantity (detailed information provided in attribute lists of Certificates). In order to check the qualities of the Certificate, it should be inspected by an independent auditor as this is not necessarily the task of the biomethane registry. This inspection is carried out in coordination and agreement with the plant operator. The results maybe be assigned to the registry in the form of an auditing report, where all corresponding attributes are recorded directly into the Certificate.

[7] https://www.aib-net.org/aib/how-join

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This examination is a standard procedure and is conducted regularly, usually after the Certificate registration for the previous calendar year. The expert examines the facility and the ingredient monitoring book including further parameters. The result of the inspection is an expert statement from an authorised auditor. This expert statement is a part of the Certificate and is never separated from the Certificate. The expert statement is documented in the biomethane registry in electronic form and is an attachment to the Certificate.

The expert statement(s), which could be several documents, "travel" with the Certificate if the Certificate is transferred domestically or internationally.

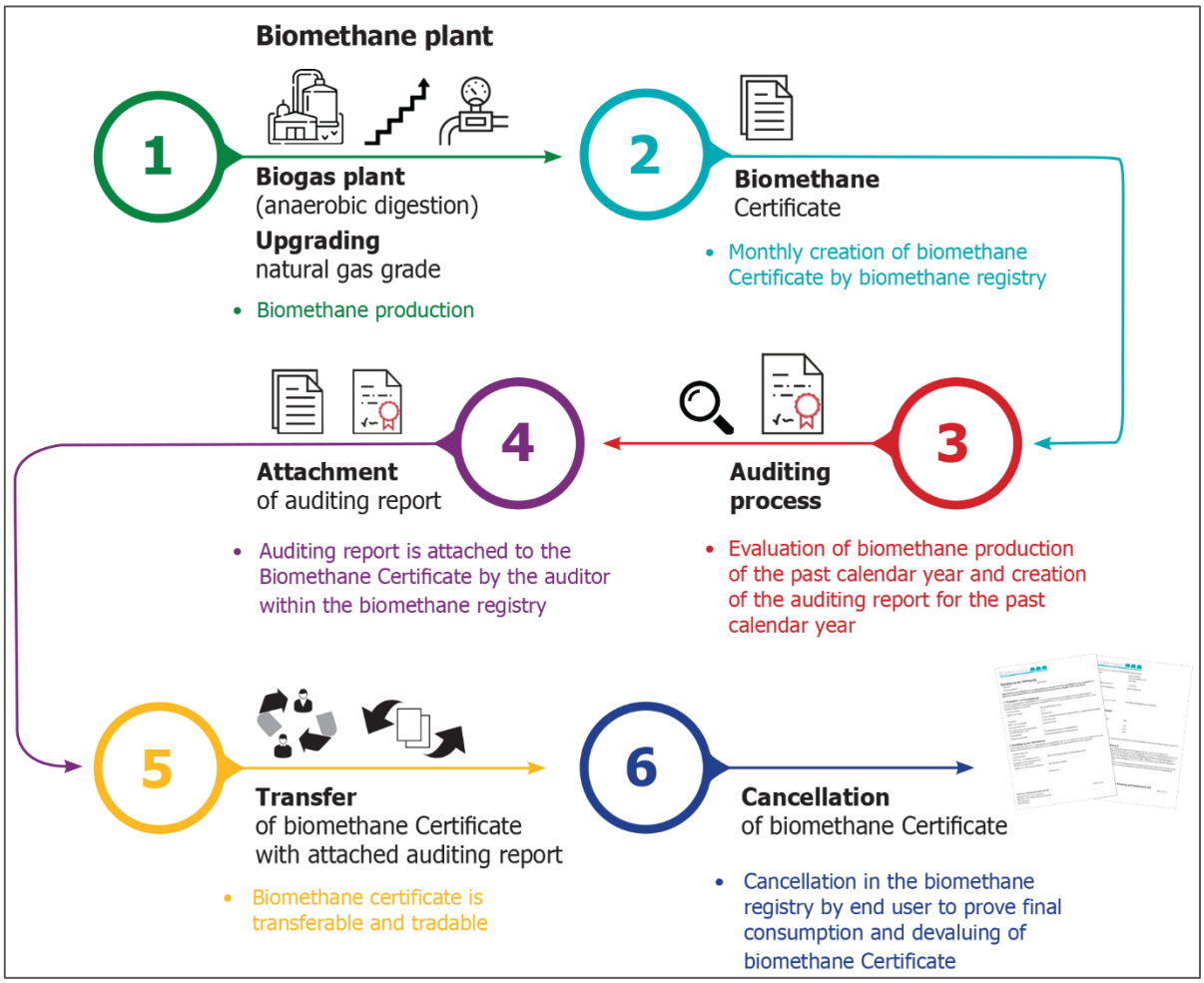

Figure 6: Auditing process and attachment of auditing report to biomethane Certificate

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6 Set up of a renewable gas registry

6.1 Purpose of a renewable gas registry

The development of a biomethane market is complex and requires professional experts and tools in order to not only establish trust in the market but also expand production. Some of these requirements include but are not limited to the construction of further production facilities, increase of biomethane production, tracking of biomethane via a biomethane registry and bringing the product to market level. The registry has a responsibility towards market participants for being a neutral and trustworthy platform for biomethane/renewable gas Certificates. More specifically, these responsibilities entail necessities such as registration process and preparation of a unified platform for the settlement process within the registry. This also includes the generation, inspection and transfer of Certificates when necessary. Various technical and organisational steps must be taken to develop, establish and operate a facility.

Biomethane, with its characteristics of being a flexible energy carrier, can be applied for a broad set of marketing paths (renewable electricity, renewable gas for heating and cooling and transportation sector, etc). Such different marketing paths require specific characteristics from the product biomethane (e.g. sustainability criteria according to RED II, criteria for mass balancing along the gas grid, or others), which must be reflected in the attribute list of a biomethane Certificate. 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 registry system as well.

In order 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, the most sensible option for one European country is to opt for one centralised registry, one central clearing agent, with the ability to cover all types of renewable gases, all types of applications. A centralised system will on the one hand provide simplicity in the operational processes and on the other hand, maximum trust and transparency for all market participants as well as prevent any options for double counting and claiming.

The registry system must be able to provide comprehensive and flexible attribute lists to provide necessary information for the respective type of renewable gas and their marketing pathway.

In several countries, the option for one centralised registry system was/is not decided upon. In such cases, it is still recommendable to have a detailed administrational system prepared as any possibilities for double counting must be prevented. A non-harmonised national system with several isolated solutions is not recommended and might lead to significant non-technical barriers for achieving climate protection targets and the future integration of further CO_2-mitigation measures/systems. Such expected measures will be dynamic and will require systems with the ability to grow with future applications. One efficient remedy measure is to implement a central organisation acting as data provider and transferring national biomethane certificates via interfaces to each respective registry handling the different end uses. An example for the interaction of different registries is given in Figure 7.

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Austria depicts the example of having different registries interacting on the national market. AGCS, as balance group coordinator, operates the national biomethane registry, especially to create Certificates acceptable by the national electricity funding agent which manages the national renewable electricity subsidy budget. The Environmental agent (UBA, Umweltbundesamt) operates the national registry for sustainable biofuels. The Regulator, E-Control, will be responsible for the issuing of Guarantees of Origin for the purpose of labelling according to RED II. Each registry operates based on a separate IT-system. Differences in national legislative frameworks, in the organisational set-up of registries for respective end uses and in the organisational processes require the communication of different registries via interfaces and hubs.

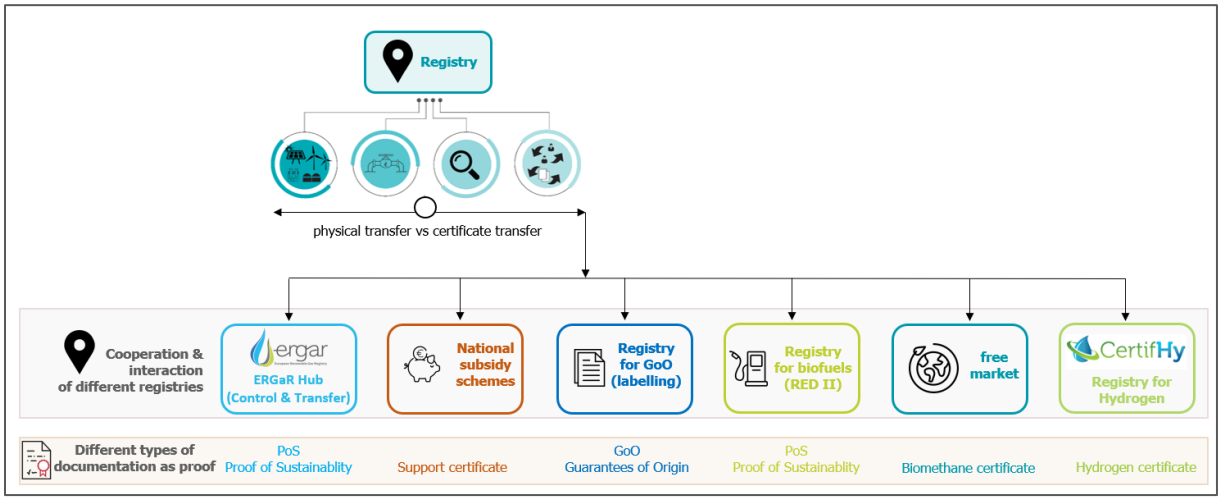

Figure 7: Interaction of registries covering different end uses of renewable gases

The following chapters will provide an overview of the specific organisational and technical aspects required to establish a successful registry system. To evade further centrifugal forces of decentralised systems in a common renewable gas market, this report shall support to develop a common understanding of the necessary administrational, technical and processual requirements to establish a registry with the ability to tackle the challenges of climate change and provide dynamic options to handle future applications developments. The following information is meant to be of assistance to European countries in their mission to newly establish registries. The information is based on knowhow of existing European biomethane registries and therefore contains valuable content that is recommended to be considered during the establishment process.

6.2 General principles of a registry

6.2.1 General principles

The IT-system, on which a registry is based, is account-based allowing different market participants to fulfil specific, pre-defined roles. Each role provides the market participant with specific permissions and obligations within the IT-system (see Figure 8).

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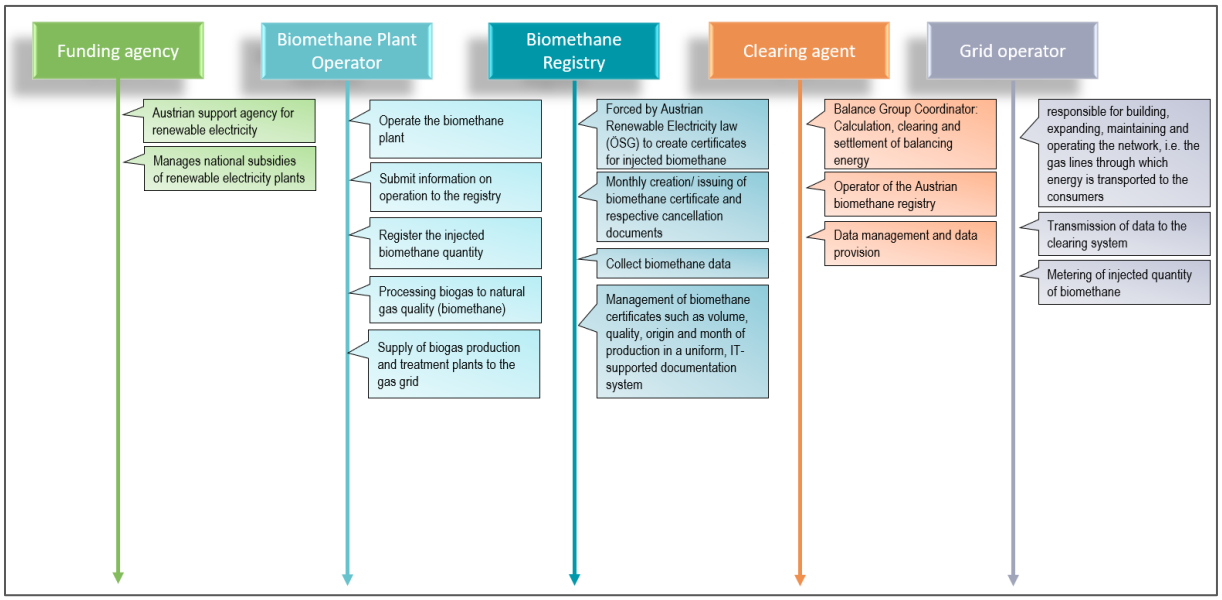

Figure 8: Roles and accounts within a biomethane registry

The participants are provided by the administrator with a personalised account with individual log-in details at the biomethane registry (see Figure 9). The biomethane registry should be an electronic account-based system for the registration of biomethane quantities fed into the gas network, allowing the generation of a corresponding Certificate, as well as the transfer of Certificates between registered account holders and subsidy agencies, among other institutions.

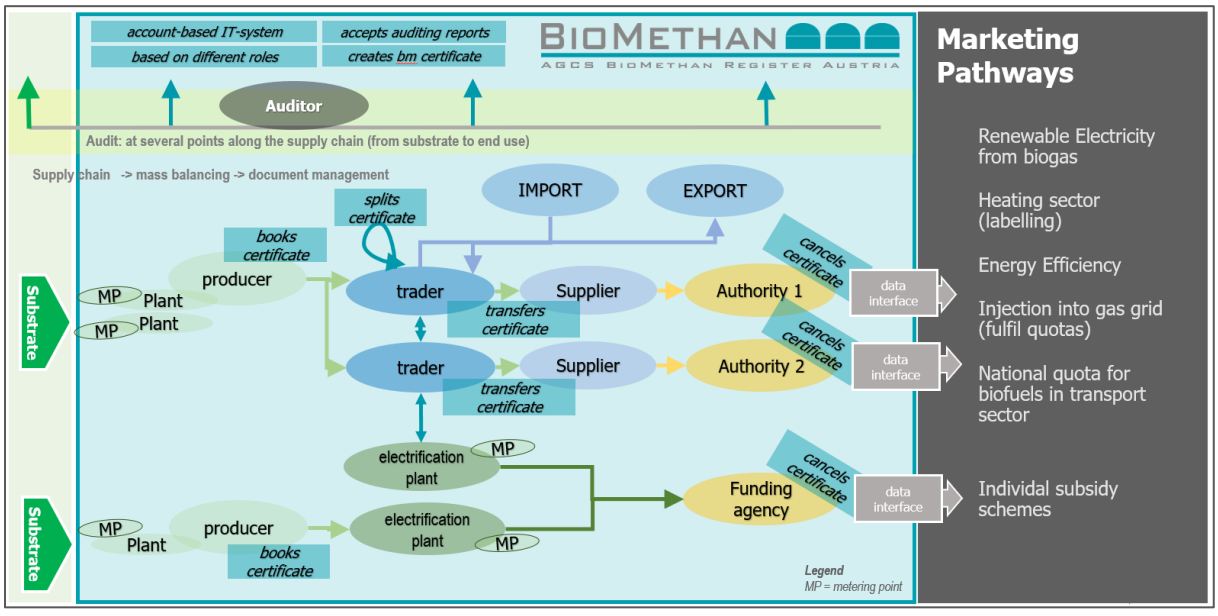

Figure 9: Registry is an account-based IT-system allowing the market participants to fulfil specific roles

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The biomethane registry offers its users the opportunity to manage biomethane Certificates in terms of scope, quality and origin in a central IT-supported documentation system. Through the account system of the registry, the produced biomethane volume can be separated into more than one Certificate to be passed along respecting the 1 Certificate (=> minimum 1 MWh in size). The buyers and sellers of Certificates execute the transactions in the registry themselves without the assistance of administrators.

The production unit and the already created Certificates are evaluated by authorised auditors who are registered at the registry. With their expert statement (auditing documents), they incorporate and attach notes/reports to the Certificates. In some registries the Certificate generation process is based on the auditor statement and therefore interlinked.

The registry may individually adapt to national demands when it comes to roles and authorities. This is necessary to allow registry entities to have individual rights, views and actions within the registry. Due to the continuous development of a market, its processes and tasks such flexibility is very important.

At the request of authorised participants, the registry also generates printable confirmations of the cancelled Certificates, which can then be used by the participants in business with third parties (business partners, other recipients). The confirmation features a structured documentation about injected biomethane quantities and identifies which marks or notes an authorised auditor has made on the corresponding Certificate.

TWO LEVELS MUST BE DISTINGUISHED: LEVEL OF PHYSICAL TRANSPORTATION AND LEVEL OF CERTIFICATE TRANSFER

The physical level shows the gas grid injection and the volume of biomethane in a balance group. In the target model the physical gas flow is metered by grid operator, booked into the biomethane balance group by balance group coordinator and transferred to the biomethane registry.

The Certification level is based on the accounts of the biomethane registry. This level is depicted in the biomethane registry.

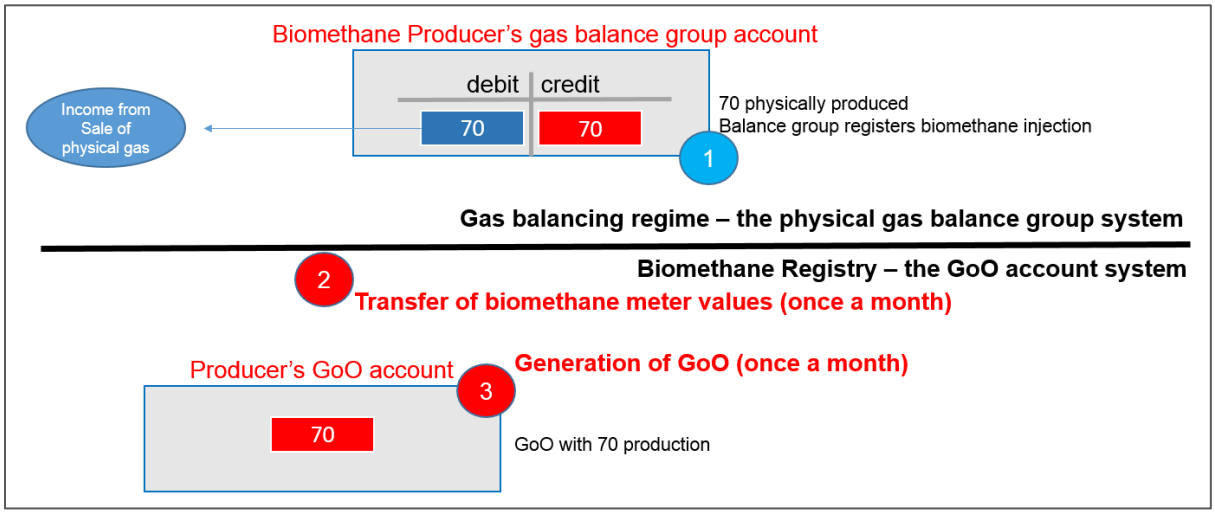

Figure 10: Level of physical transportation and level of balancing data

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6.2.2 Level of Balancing data

Produced quantities of biomethane are fed into the natural gas grid. The injection of biomethane will be recorded in established balance groups by the respective balance group coordinator or the national TSO. The biomethane is blended with natural gas as soon as it is brought into the natural gas grid.

The biomethane Certificate is transferred within the national biomethane registry, the physical methane quantity is handled separately from the biomethane Certificate. The price for the physical gas quantity is left to be agreed upon by the participants themselves, the administrator has no influence; the price is neither documented nor shown in the registry.

On the balance group level, the production volumes are set against the sales volumes. Deviations correspond to a balance of energy, and the accounts are settled by the balance group coordinator. The balance group coordinator is outside of the national biomethane registry and is not a signee of the contract between the administrator and corresponding biomethane registry participants.

6.2.3 Level of Certificate transfer

The national biomethane registry works only on the level of Certificate transfer and not on level of transportation of physical volumes. Certificates can be transferred between participants and cancelled by the respective owner. The national registry records the corresponding Certificate transfers for each participant.

Biomethane injection facilities will be inspected by experts/auditors before operation begins and as a consequence of any facility changes (for example repowering). In the case that a subsidy agency conducts their own inspection, the expert/auditor will conduct the inspection in accordance with the criteria of that agency. The national biomethane registry allows inspectors to grant approvals/reports for certain biomethane batches of each injection period. The approval remarks for each partial quantity and Certificate generated by the facilities are automatically transmitted. The registry itself does not add the data of the participants or inspectors, remove anything or evaluate anything. The registry merely takes the data provided and documents the results. The registry also offers the account holders a report so that they may see and understand what has taken place.

6.2.4 Biomethane Marketing Options

According to the registry administrator, the operator of a facility is free to market the biomethane together with the Certificate or separated from the physical quantity. In any case, regardless of the intended purpose, the pricing is determined by the participants. Because the administrator also has no influence on the pricing, the price is usually neither documented nor shown in the registry – the approach may be different in different Member States.

6.2.5 Advantages for market participants

The Certificates facilitate the trade of biomethane, however the biomethane registry is not a trading platform. Registries create trust, especially since the producer of the biomethane may not know the consumer who purchases biomethane but the provided documentation via a biomethane Certificate creates the necessary trust to close a business deal.

The buyer of a Certificate, which is a registry user, can trust that the Certificate represents data and documents describing volumes and attributes of injected biomethane. The Certificate of the registry replaces the personal knowledge of the contract partners and production circumstances because it

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provides a trustworthy, transparent and reliable documentation package (biomethane certificate including list of attributes and auditing documents).

Biomethane registries contribute significantly to liquid biomethane trading by supporting account to account trading of biomethane Certificates. Trades of biomethane are possible without producers and consumers knowing each other personally. The Certificate is standardised and audited according to standard terms and conditions, so producers do not need to present specific documentation directly to all trading partners of the trading chain. All necessary information is attached as document package or within the attribute list to the Certificate.

6.3 Set-up of a registry

6.3.1 Introduction

The biomethane registry can have different functions depending on the country. The national legal frameworks are quite different. Registries have to operate in accordance with national laws and regulations. However, the primary task of a biomethane registry is a harmonised generation of Certifications for injected biomethane in the national gas grid. Registries can be of a voluntary (private companies) or mandatory (public body) type. Both types have advantages and disadvantages which will be illustrated in the following sections. In case of voluntary action, it is advisable to keep the competent government bodies informed about the development to enable a future recognition by the Government.

6.4 Stakeholder Analysis

When setting up a registry, it is important to take the different interest groups and organizations into consideration. Communication is essential to ensure a smooth establishment and operation of the registry project from the very beginning. A comprehensive stakeholder analysis, including the pros and cons from the perspective of the stakeholders is necessary. The potential of positive or negative influence from the stakeholders should be evaluated. The results of this analysis should show which parties would vote positive, negative or remain neutral. It is important to attempt to sway the negatively minded parties through personal meetings etc. so as to convince them to vote at least neutral.

The following parties should be considered in the stakeholder analysis for the establishment of a biomethane registry at least:

- Ministries, national agencies involved in energy and climate
- Interest groups from the gas and energy sector
- Producers of facility equipment (suppliers, manufacturers)
- Producers of the biogas (plant operators)
- Suppliers (waste industry, farmers interest group)
- Gas suppliers
- Ultimate customers (representatives)
- National and international Biomethane Registry
- Previous international partners and projects (for example green gas grids project partners).

Below is an illustration of the stakeholder analysis, including groups and parties with potential interest in a biomethane registry. This illustration is fictional as the analysis depends on the conditions of each

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registry. The parties have to be added to each section according to their mindset by each registry differently:

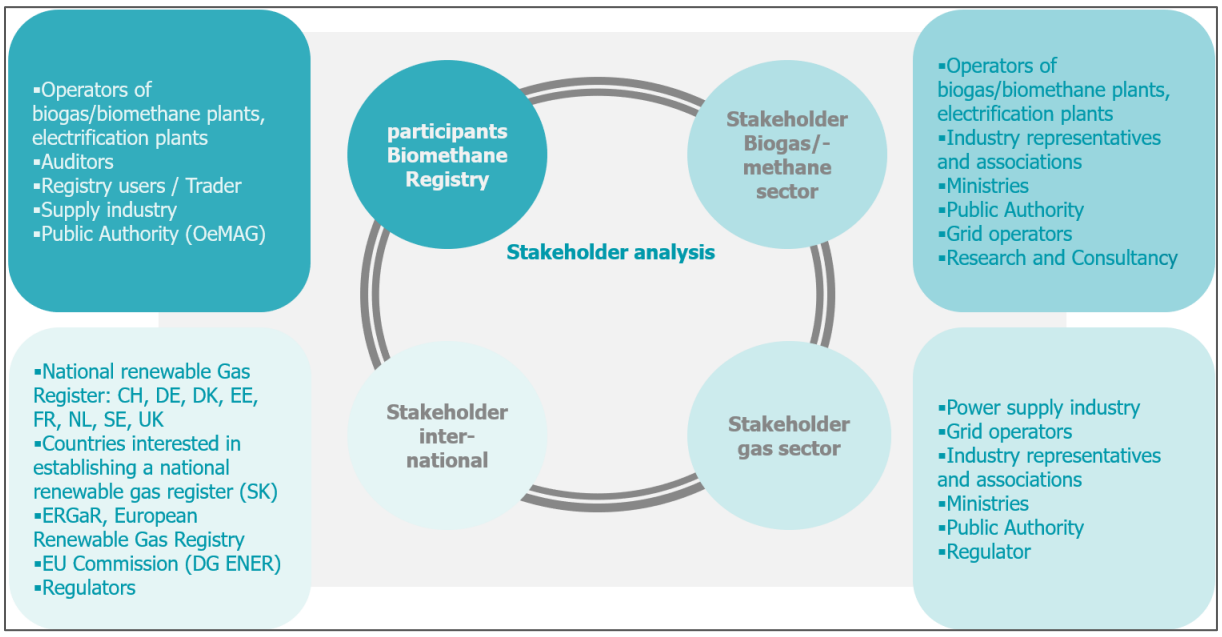

Figure 11: Stakeholder analysis

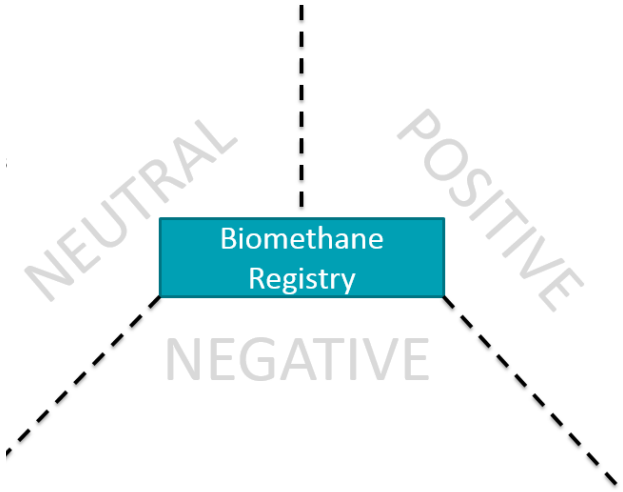

Figure 12: Categorisation of stakeholders should be performed regularly

The negatively minded parties require special attention. Their opinions and influence should be carefully examined, and communication plan should be prepared. Most of the time the negative vote stems from a lack of information or a misunderstanding, both of which can be easily remedied through the following actions:

- Personal meetings and conversations
- Hold events to answer any open questions and provide further information
- Involvement in the establishment and development of the registry (observational role without decision making ability)
- Publication of newsletters and emails

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- Internet website to allow for easy access to information.

Stakeholder analysis should take place on a regular basis. It is more important that they take place more often during the development of the registry rather than later in the process. These parties can develop varying opinions and new groups can come into play at any time. The analysis is a helpful tool in keeping track of the groups and where they stand on the issues.

6.4.1 Revenues

Apart from the cost side, revenues must be ensured. The registry can be financed either through a government agency or through yearly fees or transaction fees. We do not consider registries as profit centres.

The following costs can be charged to the registry users when the registry is financed by the market:

- Entrance fee/connection fee
- Annual fees for participating/supporting companies
- Annual fees for accounts
- Annual fees for individuals (ex. RSA tokens)
- Transaction fees (per transfer or per kWh)
- Administrative fees (changes to master data, return of transfers, issuance of written Certificates).

An adequate fee structure has to be developed to safeguard the financing of the establishment and operation of the registry. There are different scenarios possible depending on the expected numbers of users and companies participating at the registry.

The fees should create a reliable and not volatile revenue stream as the operational cost base is quite stable. Fees should not create a barrier for potential registry users, nor should the fee structure be complex. The fees should be acceptable for the potential registry users. Proposals from the user side should be considered in defining the fee structure to increase acceptance. Before the project is started it is recommendable to ask for a commitment of interested parties/stakeholders to register to guarantee a user base at the beginning of operation.

6.5 Contractual framework

6.5.1 General conditions

Each market participant must enter into a legal contract with the registry. The registry administrator must have a contract available, which all market participants must sign regardless of their role.

The general conditions should illustrate at least points described in the next chapters.

6.5.2 Definitions

BIOGAS	reference to the specific domestic regulations on biogas
BIOMETHANE	reference to the specific domestic regulations on biomethane
TIME OF TRANSFER	The point in time at which the guarantee of origin is transferred from one registry user to another

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REGISTRY SYSTEM	The technical system operated by the biomethane registry for the transfer and storage of guarantees of origin
REGISTRY PARTICIPANT	Registry user who has signed the Contract and is therefore subject to the general terms and conditions
REGISTRY OPERATOR	Operator of the registry in the given country
CONTRACT	Agreement between the Operator and the Registry Participant, which is to be concluded based on the general terms and conditions.

6.5.3 Preamble

Description of the legal basis of the registry in the specific country and the legal rights and obligations of the registry in the specific country.

6.5.4 Contractual object

Description of the scope of services covered by this contract. This scope is substantially determined by the legal basis and therefore the rights and obligations of the registry in the specific country.

6.5.5 Condition for admission to the registry

This also mainly depends on the national regulations. In many countries, the regulations vary depending on the operation conducted by the registry user. For instance, the process of withdrawing biogas for the production of subsidised electricity has very strict regulations.

6.5.6 Rights and duties of the registry

- To be at the disposal of the users
- To communicate information about changes/information upgrading process that may cause non availability to the registry
- To communicate changes with respect to international and national regulations
- To protect data against the access of third parties
- Ensure an access at the registry most part of the time

6.5.7 Rights and duties of the registry users

The rights and duties of the registry users vary from registry to registry, but the following general principles should be maintained:

To protect individual log in data

To perform no actions that may cause harm

To ensure the accuracy of data (master data, facility data)

To meet the standards of the Data Protection Act

6.5.8 Guarantee and liability

The Registry Operator is liable to the notification requirement in the framework of the use of the registry system under the agreement for any damages, only if intent or gross negligence by their

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institutions or assistants is proven. Liability for consequential damage or lost profits is excluded and exists only in the case of intentional conduct. The Registry Operator is not liable for no-fault damage, operation disruptions resulting from force majeure or events for which they are not responsible. The Registry Operator is liable for damage, which disrupts the operation when caused through intent or gross negligence.

All services offered by The Registry Operator are provided with the utmost care. The Registry Operator will put forth its highest personal effort to provide a quick and flawless delivery of the agreed upon services. Furthermore, in this agreement warranty claims of the customer, for whatever legal reason whatsoever are excluded.

6.5.9 Data protection/use of data

All information and data which the Registry Operator receives pursuant to this contract, and which is not to be forwarded to third parties, is to be treated confidentially. The Registry Operator and its contract partners are committed to the proper handling confidential information. Access to this confidential information is granted only to employees who require it to fulfil a task outlined under the agreement.

This confidentiality obligation does not pertain to information which has been communicated to the Registry Operator or its contract partners by third parties without restrictions.

Confidential information made available by the Registry Operator is to be used only for the fulfilment of tasks outlined under this agreement.

Registry participants hereby give consent that confidential information and data may be transmitted to a regulatory body or any other body or company by the Registry Operator if the Registry Operator is obliged to transmit this information by law or due to a legal notice of a court or other legal bodies.

6.5.10 Payment accounting/billing

Depending on the registry, a fee structure can exist which is constituted of various components. This structure can range from a one-time payment to an annual overuse-based charge. In such cases, diverse additional internal and administrative processes are required, for example accounting and invoicing.

Billing is done depending on the fee structure once a year or in more regular intervals. In this case the registry must issue an invoice.

The registry user is under the obligation to meet its financial obligations including taxes arising from their membership.

In the case of an automatic debit of a payment due via a SEPA business-to-business direct debit transaction the Registry Operator is obligated to inform the registry user of the automatic debit of the amount due at least three workdays prior to the due date of the respective receivable. This notification must include the amount to be automatically debited and the date of the execution and may be sent in by letter or electronically (e.g. E-Mail, Fax). Invoices shall be considered notifications in the meaning of these provisions provided these include the amount to be debited automatically and the date of execution.

In the event of delay in payment, interest on arrears shall by charged in the amount of the base interest rate (*depending on national legislation*) plus a fixed percentage points p.a.

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6.5.11 Certificates - transfer of ownership

The transfer of ownership of Certificates is initiated by the seller in the registry. The transfer is completed with confirmation from the buyer and the corresponding identification code in the registry. The registry also has to control that the transfer is valid (GOs lifetime, stock of GOs on the seller account…).

6.5.12 Entry, duration and termination of contract

This contract enters into force with the signatures of both parties and is concluded for a pre-determined duration with automatic renewal at the end of the originally stipulated time frame (unless either of the parties terminates).

The contract can be terminated by any party by means of a letter for any reason with one-month notice. Furthermore, the contract can be terminated immediately if a valid cause arises. A valid cause for termination is the ongoing violation of contractual obligations despite written warning.

In the case of termination under compliance with the contract, no party is entitled to compensation from resulting damages or compensation for costs despite the termination due to a valid cause.

6.5.13 Written form and working language

Contracts and communications of involved parties must come in written form. A waiver of this requirement must also come in written form. This also applies to electronic communications with electronic signatures or faxes.

The contract is written in [Language] and business will also be conducted in [Language]. All communications by the contract parties must be presented in country-specific languages, as long as there is no other agreement with the respective country.

6.5.14 Governing law and jurisdiction

This contract is subject to [country] law (except for the international private law provisions). The contract parties agree to exclusive jurisdiction of [name of court] for all disputes relating to the contract, including the validity of the contract.

6.5.15 Severability clause

The invalidity of one provision of the contract does not void or effect the validity of other provisions. Parties to the contract are obligated to replace invalid provisions with valid replacement provisions with equal content.

6.5.16 Changes to the terms and conditions

In the case that changes to the terms and conditions are necessary, the Registry Operator will immediately notify the contract party of the amendment of the contract appropriately, publishing this on the internet so that the party to the contract has access.

Changes to the terms and conditions enter into force at a predetermined time after the change has been noticed to the registry user as long as the registry user does not present a written objection to the changes within a pre-defined period. In the case of an objection, the Registry Operator reserves the right to terminate the contract within 1 month of the objection.

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6.5.17 Other

The registry reserves the right to utilize third parties in the pursuit of fulfilling its contractual obligations. The Registry Operator has the right to exchange such third parties or to make use of new third parties without giving notice to the registry user.

Additional agreements, changes and additions to this contract must be submitted in writing. This also applies to the waiver of this requirement.

6.6 Additional agreements

The legal framework can include in addition to general conditions further agreements which have to be accepted by the registry participants. This might be the case for chapters or passages which are abstracted of the general conditions due to the necessity to have this clearly differentiated. This is the case for documents or areas of the framework which are subject to be changed on a regular basis (for example fee structure). Additional agreements could be for example:

- Security agreement (necessary for the clear definition of user's obligations according to the usage of their account or credentials)
- IT treatment agreement (this is to oblige the user to examine the IT-system in an appropriate manner)
- Fee structure (accepting the fees published and accounted by the registry)
- Individual agreements (necessary due to the provision stipulated by the national legislation which are the registry users subject to, for example data archiving regulation)

6.6.1 Forms

The registry participants have to give the administrator respective information on their company, users and respective biomethane plants.

This information is usually transmitted via forms within the registration process of the entity to be registered. The form can be either a document which has to be filled out manually or directly (online). The online form is to be preferred due to a normative entering of data.

Following forms are applicable in most of the registries:

- Application Form
- Company Registration Form
- User Registration Form
- Assignment Form (authorized auditor to plant)
- Acceptance Form (acknowledgment of additional agreements)
- Request Form
- Termination Form

6.7 Registry users

6.7.1 Registry users – description of roles

The process of biomethane injection into the natural gas grid is one in which many different actors have roles to fulfil. In the simplified picture, biomethane is produced in a biomethane production plant where it is injected into the natural gas grid. Once injected into the natural gas grid, biomethane is usable at locations other than the place of production. Certificates are issued to prove that biomethane

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has in fact been injected into the grid. These Certificates are issued by the national biomethane registries and have been inspected by authorised auditors. The inspection report of the authorised auditors helps to create an atmosphere of trust in the market. The Certificate can be acquired from the producer and used by various registry users. The Certificate can also be delivered to buyers and/or sellers or used as a means to receive funding from appropriate funding agencies.

The Austrian and German biomethane registries for example include a role concept. The roles which users may occupy defines their obligations and rights within the registry. It is also possible to assign multiple roles to a user. Another advantage of this concept is that new roles can be created at any time, allowing to adapt easily to future developments.

Only administrators may register users and grant access rights.

Each biomethane registry must clarify in advance which roles and corresponding rights and obligations exist. The registries should at least provide the following roles:

- Biomethane Producer
- Other economic operator (supplier, trader, consumer)
- Inspector/Authorised Auditor
- Administrator

Additional roles can be created, for example a “special purpose user” who is not a trader, but a representative of a state authority or institution involved in green energy providing subsidies or grants.

In the following pages the interaction between actors and the specific roles will be described in detail.

6.7.2 Biomethane producer

The role of the biomethane producer is to operate the biomethane plant and usually the biomethane producer submits the information on operation to the registry. Each plant operator has an account in the registry where Certificates are generated according to the physical injection of biomethane into the natural gas grid.

A biomethane producer can operate one or more plants, therefore it must be possible to register each plant separately but link each plant to an account. Certificates are generated on the credit side of producers account.

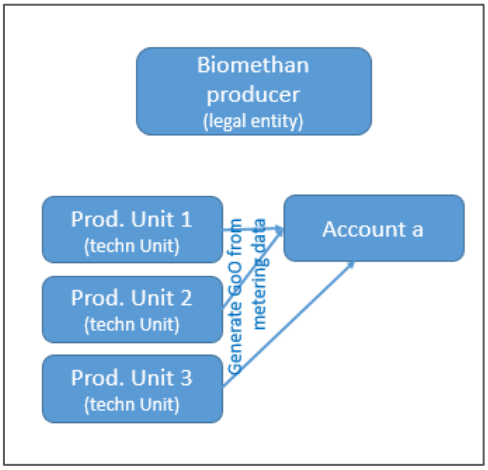

Figure 13: Account structure depicting one account for three biomethane production plants

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Figure 13 shows three production plants and one account. In this example the plant operator has decided for such a set up as it was his decision that all injections are booked on one account. The number of Certificates generated is based on the quantity of biomethane injected into the grid by the individual plants. The Certificates differ as each Certificate carries the information of its production plant and also the authorised auditor expert statement.

Each biomethane registry decides for itself which additional information is carried by the biomethane registry. It is of course recommended to carry such information as name and location of the production plant and the feedstocks/inputs used for the biomethane production. However, it is also recommended that information about the injection line, materials used, and other various quality characteristics are documented. The authorised auditor opinion is part of the Certificate and is carried along during transfer of Certificates.

There is necessity to offer flexibility to plant operators to organise their Certificates within the registry. We assume that for multi-plant operators there may be the need for more than on account.

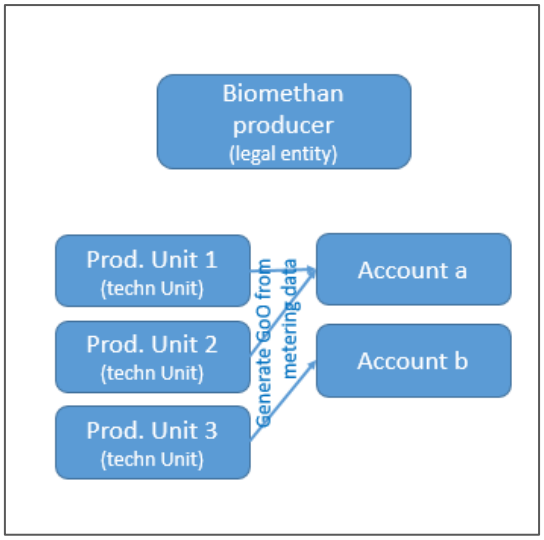

Figure 14: Account structure depicting production units linked to different accounts

In the example above the plant operator can choose which production plants are assigned to which one of his two accounts. A system which allows multiple accounts per plant operator or trader provides flexibility. Flexibility in the account structure is also needed when changes of corporate structures take place.

In order to generate a Certificate, the injected biomethane quantity must first be registered at the biomethane registry. This registration can be done by the plant operators themselves, by other economic operators either through an independent body or through the locally responsible network operator. The injected biomethane quantity is indicated in MWh (registries using kWh will adapt due to European standard MWh) and can be reported in different ways.

The simplest way of registration of the biomethane production volumes is a form. The plant operator submits the filled-out form to the biomethane registry, after which the administrator manually records the received amount into the system. The accuracy of the data must afterwards be inspected by an

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authorised auditor. After a successful inspection, the Certificate is available in the account of the plant operator and can be transferred, cancelled, etc.

The most efficient way of generation is that the injected quantity of biomethane is metered by the grid operator and meter values are directly forwarded to the biomethane registry or is forwarded to an organisation like balance group coordinator (e.g.: AT) or TSO (e.g.: DK) and further on forwarded from one of these organisations.

Similarly, in Estonia all gas (including biomethane) production/consumption data is metered by the grid operator and grid operators are responsible for uploading all the metering data on time at TSO Elering Gas Data HUB and the Registry retrieves all the necessary data (biomethane production and consumption) from this Data hub each month.

In Denmark the national TSO, in Germany the registry user or auditor, in Austria the balance group coordinator registers the injected biomethane quantity which is an element within the national balance group model. The grid operator meters the quantity injected and communicates the meter readings to the balance group coordinator. In Austria, the balance group coordinator is also the biomethane registry administrator. At the one hand the balance group coordinator receives the metering values to calculate and charge the balance energy for the biomethane balance group, on the other hand this data is used to generate the corresponding Certificate. In Austria the generation of Certificates automatically occurs in the month following the production period (the period can vary from daily to yearly or just a time from / to). Thus, a transfer of Certificates among registry users is possible following their generation in the biomethane registry. A subsequent verification of further attributes of the Certificate is also possible and may further influence the value of the Certificate.

The method of registration or uploading the injected biomethane depends on the individual biomethane registry and its rules.

6.7.3 Biomethane consumer

A biomethane consumer usually has no role (no account) in the biomethane registry but this may be different on different registries. A Biomethane consumer is a gas consumer who owns cancelled Certificates or whose supplier owns cancelled Certificates. The cancelled Certificate provides proof of quantity of biomethane consumption.

There is no need for consumers to register at the biomethane registry if they buy a biomethane product directly from a supplier (for example gas with 5% biomethane).

However, an end user's information (name, address, and also the delivery point etc.) should be possible to be entered into the system and generated as a Certificate on PDF by the biomethane supplier before the Certificate is cancelled. This personalised Certificate can be transferred to the consumer through the supplier if consumer wishes to have such Certificate document which a kind of proof.

In some cases, big gas consumers, who don't want to buy a biomethane product from their gas supplier, will purchase Certificates for themselves to label their natural gas consumption. In that case they have to register with the biomethane registry.

The owner of a Certificate should also have the option of verifying the authenticity of the Certificate. This should be possible directly via the homepage of the biomethane registry or at least via a customer

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service request. For this purpose, a mechanism should be created that ensures each Certificate has a unique identification number with which its validity can be verified.

6.7.4 Biomethane registry trader

The role of a biomethane trader is limited exclusively to registering the transfer Certificates within the registry. The biomethane registry is not a trading platform. In reality the company registered as a trader within the registry may act on the market in different roles (trader, supplier, consumer…). The trader may in reality be a legal entity which is absolutely focused on trading or a supplier who trades Certificates or cancels Certificates for his gas consumption.

For example: trader enters into a contract with a producer to buy Certificates. This bilateral contract is not known or registered at the registry. The trade of Certificates and any associated financial compensation takes place outside of the registry. Only the transfer of ownership of the Certificate is recorded.

The transfer is executed by a booking on two accounts. A debit booking for the Certificate on producers account and a credit booking of the Certificate on traders account. The action of booking is initiated by the two parties without intervention of the registry administrator.

After the Certificate has been transferred into the account of the trader, the trader is the owner of the Certificate and is free to use it for any desired purpose (splitting, cancellation, further transfer etc.).

The transfer process changes ownership.

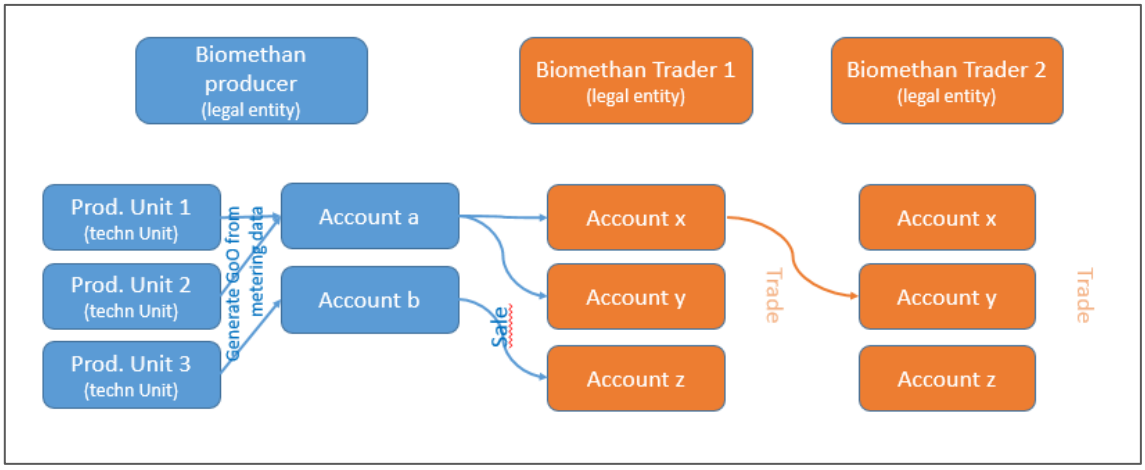

Figure 15: Certificate transfer / sales to a trader

If a trader sells a certain amount of biomethane volume to an end consumer not having an account on the registry, no Certificate transfer takes place in the biomethane registry. Instead, the biomethane quantity is cancelled by trader and written proof, if required, may be generated for the biomethane consumer or chartered accountant of supplier or consumer.

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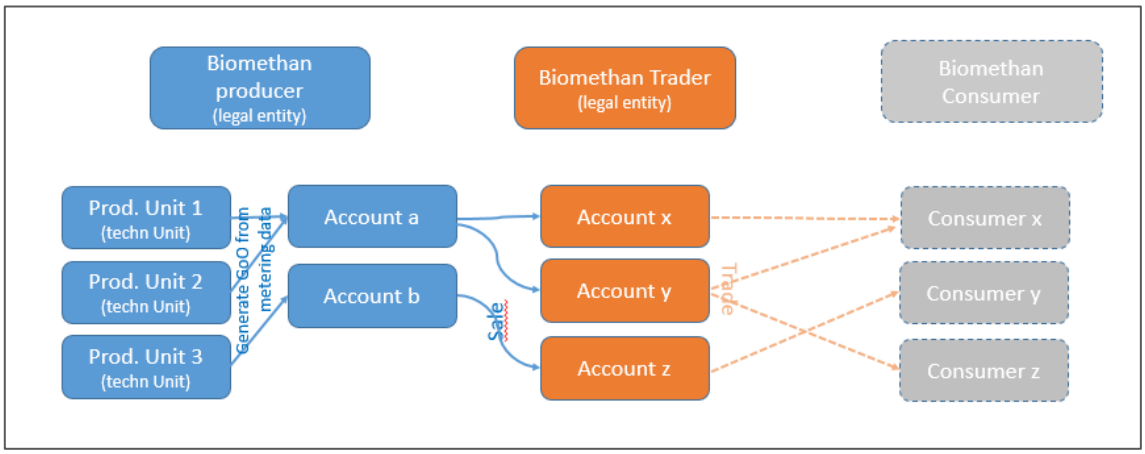

Figure 16: Certificate transfer to end consumer

6.7.5 Authorised auditor

Authorised auditors should check biomethane production plants in certain time intervals to validate the quality and quantity of biomethane together with the generated Certificate.

In the run up to being registered in the registry, it is important to clarify which requirements the authorised auditor has to fulfil. In Austria, for example, natural and legal persons which are certified accountants, sworn and judicially certified experts, civil technicians, certified experts or technical offices in special areas defined by national law are accredited.

In Germany, inspection companies can register with the registry administrator. Each of these companies must name at least one inspector who can perform the required inspection. Only the registered inspector with the necessary qualifications can carry out any actions in the registry on behalf of these companies. The inspectors from the German accreditation authority (DAkks), the Chamber of Commerce (IHK), the approved inspection agency (ZÜS) as well as environmental experts and accountants meet the necessary qualifications.

The authorised auditors must present their qualifications (especially accreditations) before registration at the biomethane registry takes place.

The authorised auditors should be assigned to the biomethane production plants they are authorised/contracted to audit. The biomethane administrator links the authorised auditor to the plant on behalf of the plant operator.

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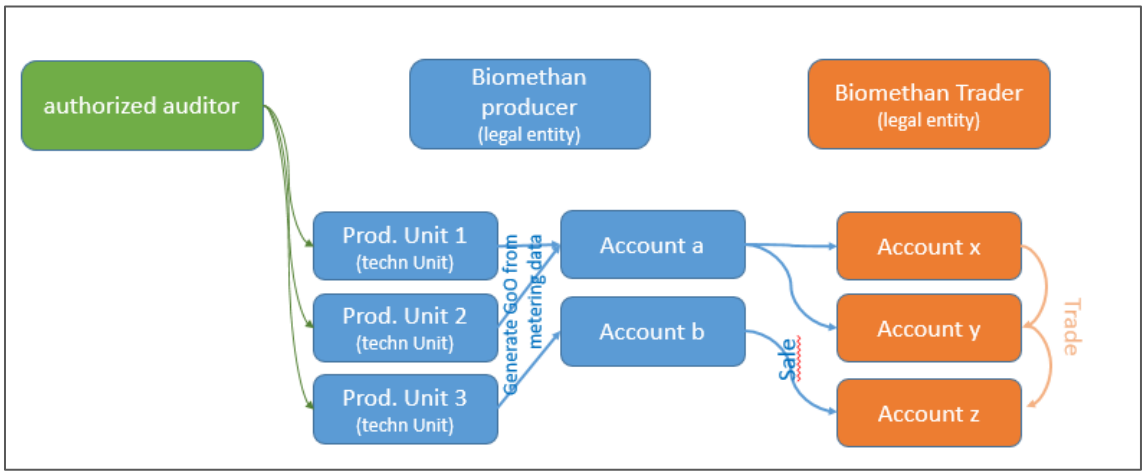

Figure 17: Assignment of the authorised auditor to a specific biomethane production plant

The area of responsibility of the authorised auditors is limited to entering and uploading of reports and assigning remarks upon inspection of a Certificate.

In order to preserve time and effort, it should be possible to upload reports for multiple Certificates at one time.

Since audit reports in principle can vary in content and scope, it could be supportive to have standardised audit reports where specific criteria are outlined. This kind of standardisation of the audit report could help to make audit reports easier to read and Certificates more readable.

6.7.6 Special purpose users

The biomethane registry can also serve as a platform for special purpose users who are linked to the biomethane market. As an example, national funding agencies can become involved with the biomethane registry in order to obtain Certificates directly from a trusted source.

Another function for the so-called special purpose user could be the monitoring of the data, where such a special purpose user could be a regulatory authority, a national ministry or other public authorities. These special purpose users could demand special access rights to the biomethane registry.

6.7.7 Administrator of registry

The administrator has a special role – oversight of the management and assignment of user rights and permissions. The administrator also follows and observes the processes and can make modifications. For this purpose, the administrator is granted global rights, in other words has all reading and writing permissions.

The administrator has a great amount of responsibility regarding the registry and its users. The administrator must not only possess the proper qualifications and education but also the ability to handle and assess risk. The administrators within the registry should be nominated by the management of the biomethane registry.

Aside from the responsibilities, the administrator is also active in the customer service area. The administrator creates an interface to be used between the users and the biomethane registry.

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6.7.8 European registries

Taking a common European (renewable) gas market into account, registries should be able to participate in the cross-border Certificate transfer. Before cross-border transfer of Certificates is possible to transfer Certificates, registries have to enter into a contractual relationship and enhance their registry system by the necessary interface to be ready for the transfer of Certificates.

Import and export accounts have to be set up in the home registry. An import account is created for the incoming Certificates and an export account established for the outgoing Certificates. The cross-border exchange takes place through these external accounts.

A Certificate transferred from a foreign biomethane registry to the home biomethane registry is booked in the corresponding import account, from where it will be transferred to the buyer's account. Vice versa, if the Certificate is transferred to the foreign biomethane registry, it is booked in the export account of home registry from where it is forwarded to the corresponding foreign registry.

The graphic shows the transfer of Certificate between registries.

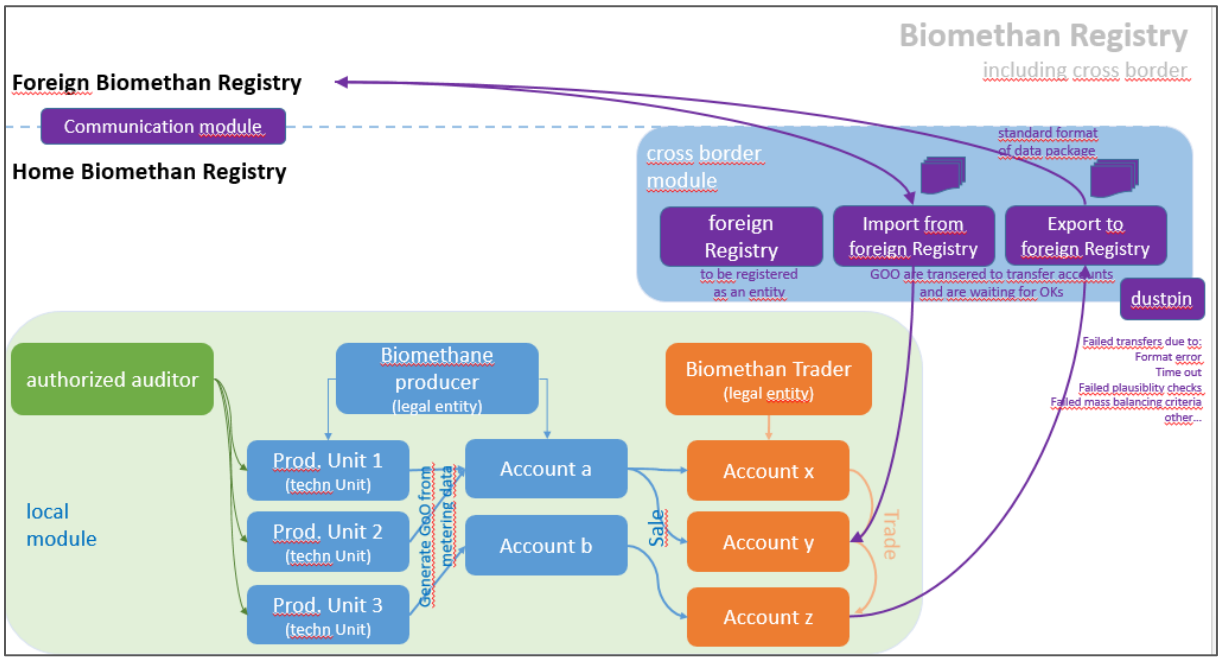

Figure 18: Approach to cross-border exchange of biomethane Certificates

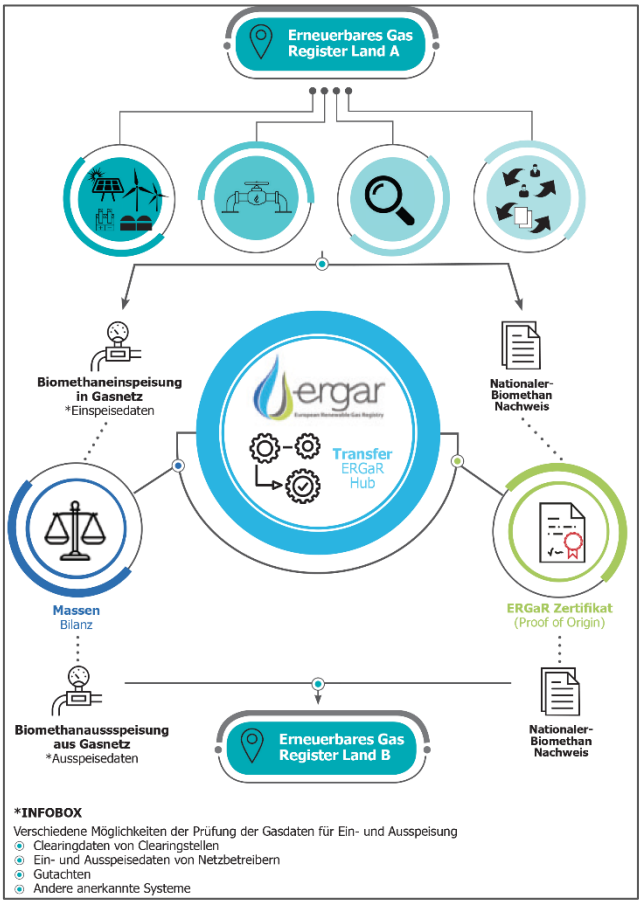

Figure 19: Cross-border transfer of biomethane Certificates via the ERGaR hub

6.8 Business processes

The following chapters will describe the main processes of a biomethane registry. Even if the registries differ, there are core processes and functionalities which exist in nearly every registry. These core processes are described below.

6.8.1 Registration of entities

DESCRIPTION OF ACCOUNTS

Before registration of account holders each legal entity, according to its role, has to fill out a registration form and present documents in order to establish his role and account. Accounts that hold the Certificates are set up for registry users (plant operator, trader, special purpose companies, …).

After a detailed examination of the original application documents by the registry administrator, an account is created in the IT-system. The examination should include at least the following:

a) Verification that documents are complete
b) Verification that documents are readable
c) Verification of the identification of the applicant
d) Verification that applicant has the authority to sign
e) Examination of additional documents, such as:

- Decisions from funding agencies or ministries

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- Competence approval for the permission of an auditor review
- Internal authorisation for big enterprises via an authority to sign

Market participants receive a personalised access, which is assigned to the corresponding company. It is possible that one person is assigned to multiple companies. The assignment is performed by registry on basis of an application form. For example, authorised auditors can be assigned numerous accounts/biogas production plants. Furthermore, persons could be employed at the production unit and another entity for example a trading company of biomethane. Therefore, a person could be assigned to more than one entity in the IT-system.

The biomethane registry registers various types of registry users:

- Plant operator
- Registered user (suppliers, end consumers, traders…).
- Inspector/auditors
- Funding agencies or other agencies/ministries

6.8.2 Contracts

In order to cover the legal framework in the biomethane registry it is recommended that the registry user agrees to the general terms and conditions when signing the application form. If changes are necessary, it will be only necessary to adapt the general terms and conditions. Changes to the terms and conditions must be released publicly for all account holders, and if an account holder objects to the proposed changes, he can terminate his account within a certain time period.

Further details are described in chapter Contractual framework and its sub chapters.

6.8.3 Update of master data

Master data should be updated according to a standardised process. For an update of sensitive master data such as company name or billing address a similar process to the registration of the whole entity should be established. The changes in the system are executed only by the registry administrator.

Minor master data changes such as the users telephone number can be changed via a written user request for example email notification to the registry administrator.

6.8.4 Generation of certificates

Certificates, documenting biomethane production volumes, should be generated at a defined day. If the generation is done by the national clearing authority (like Denmark or Austria), the Certificate are generated at a specific day within a calendar month. In cases the generation is done manually by a registry user, the generation time is individual (also in terms of injection period of biomethane production for example in Germany).

The metering of biomethane production data is done by the national grid operators. Either grid operators transmit the production data to the registry directly or production data is provided by a central organisation like TSO or balance group coordinator to the registry. Based on this production data, Certificates are generated with a specified date of issue.

One possibility could also be that an authorised operator would enter the yearly production quantity into the registry.

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After the generation of the Certificates, they can be transferred between registry users. The smallest amount is MWh (with 3 commas = kWh). For more specifics see Section Handling of Certificate.

IMPORT OF BIOMETHANE PRODUCTION DATA

The biomethane production data are sent to the biomethane registry by either the grid operator, the balance group coordinator or more likely the plant operator. The data transmission takes place via an electronic interface (e.g. web service or e-mail). As a back-up alternative, a manual process of uploading the data should be available.

The unit of measurement used is MWh. In order to get a sum of biomethane in MWh per period and plant, a Certificate is generated in registry's database and credited to the account of the plant operator. The assignment is done according to the master data of the biomethane registry. The attributes of each Certificate must correspond to the existing power plant details.

After the inspection / expert statement by an authorised auditor, the generated Certificate can be changed or altered due to a difference between the reported and the actual injected biomethane volume. In this case Certificates can be reduced due to auditor's inspection. The reduction would cover all split Certificate sub blocks adequately and would apply to all legal entities being in ownership of such Certificates.

ALLOCATION AND DISPOSITION OF BIOMETHANE CERTIFICATE

The registry administrator assigns the amount of Certificate to the plant operator's account depending on the meter value of production of the biomethane injection plant.

This amount is substantiated through the Certificate. The Certificate should be created with a unique serial number and stored with details such as plant information, date of issue, etc. Each period a Certificate *block* (once per production period and plant) with a corresponding number is generated and available for processing by the registry users. The serial number makes it easy to keep track of generated Certificates. The Certificate *blocks* can be split into smaller *blocks* so that parts of the Certificate can be decommissioned or transferred (always keeping the 1 Certificate => 1 MWh minimum size.

Certain feedstock from which biogas is produced may be a precondition for the grant of subsidies. Details concerning feedstock are an information element of the Certificate provided by plant operator/auditor. This information is permanently attached to the Certificate. This information report contains all details that would be necessary for possible subsidies from funding agencies. These reports must be entered manually into the system by the registry administrator and are linked with the Certificate. It should also be possible to manage multiple reports.

SPECIFICATION CERTIFICATE

The unique identification number for all generated Certificates within a registry is essential. Information of the power plant for example can be incorporated in this ID.

A Certificate ID could include the following information:

- General Identification
- Production Country
- Production Period

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- Information on plant (for example name)
- Unique number

For example, a German Certificate ID of the dena Biogasregister is composed of:

- Identification on production country
- Identification on the power plant (number)
- Unique number

The Austrian Certificate ID is composed of the following:

- General Identification
- Production Period
- Information on plant (name)
- Unique number

The number of digits in the serial number is dependent on the amount of plants registered in the biomethane registry and the number of generated Certificates in the registry.

In order to allow for a reliable European wide Certificate documentation system, each registry must place high value on the quality and security of the registry structure and the generation of Certificate.

Registries should focus on quality, security and user-friendly IT-interfaces, on reliable efficient registry processes. This is a precondition for the development of a European biomethane market.

Hence, the Certificate identification scheme is not harmonised in Europe yet. It is not necessary to have the same ID generation principle in all registries as the ID is a unique identification without the need to have the same structure. Nevertheless, it is a future goal to harmonise it European wide.

VALIDITY TIME OF CERTIFICATE

There are different ways to approach and handle the validity of Certificates. The definition of validity also differs between countries, but a uniform intra-European standard should be established.

In spite of the fact that biomethane injected into the natural gas grid can be stored, the Certificates must have an expiration date. The Certificates should be cancelled if required by law. Because the information about the production period is published, the buyer is also aware of the time of production.

6.8.5 Handling of Certificates

6.8.5.1 Introduction

The biomethane registry has many procedures that make the interaction of exchanging Certificates very simple, including splitting, transferring and cancellation.

All registries generate Certificates on a regular basis (month, year, …). A functionality of a registry is that a Certificate may be split into smaller parts to satisfy demand for certain quantities.

Transferability of Certificates within a registry is an important functionality and corresponds to a transfer of ownership of Certificates between two registry users.

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Another functionality is the cancellation of Certificates because after cancellation a Certificate is taken out of circulation.

As a neutral body the biomethane registry must make sure that Certificates are not used more than once, and duplicating is impossible. The registry must undertake efforts to exclude misuse and to be granted trust and confidence of market participants. In case of misuse, certain security measures and legal steps must be followed to prevent risks for market participants and the registry.

The procedures mentioned above will be described in the following paragraphs.

6.8.5.2 Splitting of blocks of Certificate

The splitting of Certificate volumes is necessary to define the specific Certificate volume dedicated for transfer to a different account (could be an own account, a buyers account, a traders account, funding institution, …).

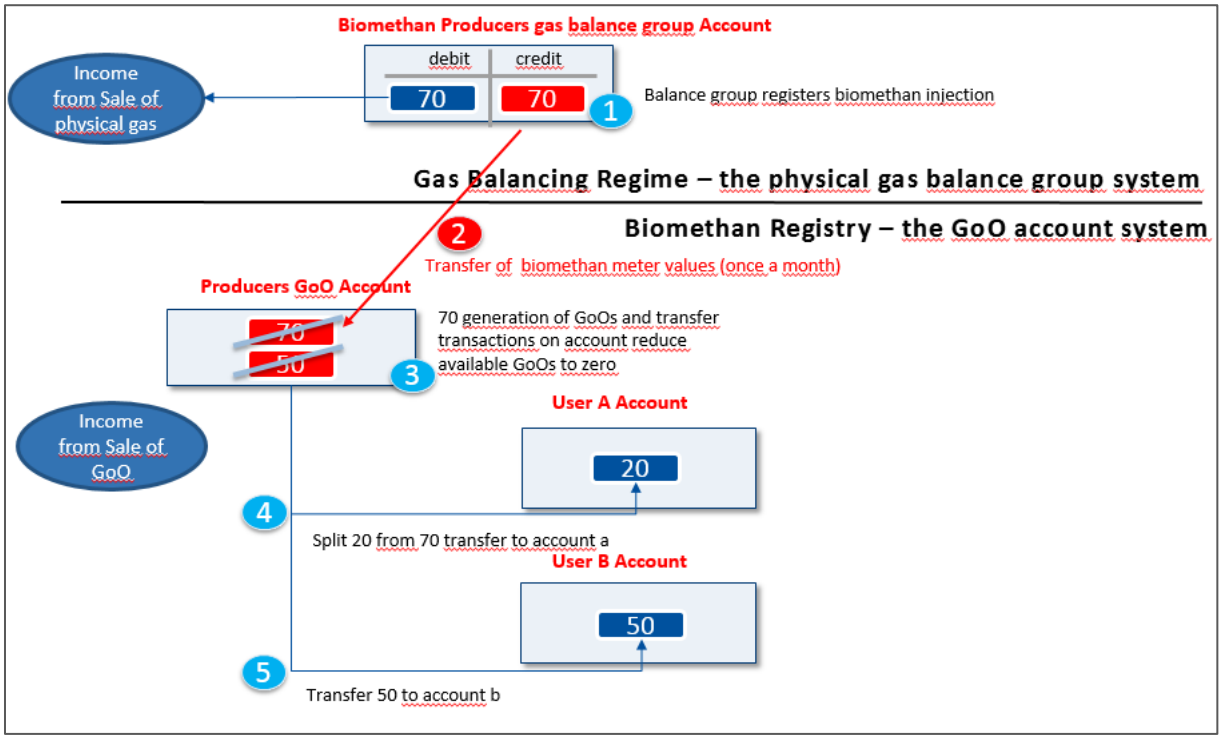

Figure 20: Example of splitting of biomethane Certificates, including the two levels of balance groups and registry accounts

The number of Certificates generated per month/year is based on how much biomethane has been injected into the grid. After injection Certificates are assigned to an account of a biomethane producer.

After being entered into an account, the Certificate may be transferred by account owner to a different account. In the example, shown in Figure 20, 70 MWh of biomethane were produced and the plant operator wants to sell 20 MWh. This amount of 20 MWh is split within the transfer process from the 70 MWh. The 20 are transferred to account A. Transfer is executed. Owner of A accepts the transfer. 50 MWh are still on the plant operator's account. Later on, the residual 50 MWh are transferred to account of owner B. Trader A and B can transfer further on or utilise the Certificate. A utilisation of a

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Certificate is only possible after it has been cancelled. Utilisation means using the Certificate as proof for biomethane consumption.

The IT implementation of a transfer is explained in 6.5.11 Certificates - transfer of ownership.

When a Certificate is split, all information of the original Certificate is copied to the newly generated Certificates. Both Certificates (the original and the new one) carry the same information content except for the Certificate-Identification-number and the Certificate-Volume.

The information of a Certificate includes among others: Volume, injection period, injection point, specific attributes of the plant. Every Certificate whether it is the original with the entire production amount or just a part of the original, contains the same attributes (feedstocks mix, GHG emission intensity) and is identified via a unique identification number. This allows the registry to trace the Certificate from its generation on.

6.8.5.3 Transfer of Certificates

With a Certificate transfer, a transaction takes place between two accounts within the same registry or between two different registries. A transaction between two different registries is a cross border transfer. In this section the focus is on the Certificate transfer process within the same biomethane registry.

Owners of Certificates can transfer Certificates from their account to the account of their respective trading partner within the registry. A biomethane registry has to provide a user-friendly interface that gives registry users a transparent overview of his accounts and Certificates so that registry user may select Certificates for transfer.

This basic Certificate information includes, for example the ID, the period of production, the status (active or decommissioned), the production plant (especially feedstocks), the quantity (original and remainder available) and the report from the inspection by experts/auditors.

User access depends on the user's role. Users with administrator access have unrestricted access to the overview of all Certificates, biomethane plants and biomethane traders. Biomethane traders, or users that are assigned to one plant, only have access to their own account and the Certificates which they own.

In the case that a Certificate has already been split and part of it has already been transferred, this information is available in the rubric of original quantity or quantity available. The original quantity is the one which was generated in the registry and the available quantity is the amount which is available after a part has already been transferred. This remaining quantity can be transferred again or decommissioned.

The transfer process is started by the seller, who selects the Certificate from the aforementioned overview. Certificates may be transferred with or without the inspection report. Seller and Buyer have to be aware that the Certificate may not have been inspected. Certificates that do not have inspection report attached pose a risk to the buyers because they do not have a guarantee of accuracy of attributes. However, the buyers can decide individually whether or not this is an important factor.

Once the Certificate has been chosen out of the overview to be transferred, the seller must provide the details of the transfer. The seller must specify who the trading partner is and the amount that will

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be transferred. The splitting process could take place manually before transfer or take place automatically within the transfer process.

6.8.5.4 Cancellation of Certificates

In order to utilise a Certificate, it is essential that it is first cancelled in the biomethane registry. This process ensures that the same Certificate cannot be traded again. Thus, the Certificate is effectively removed from circulation. This is a very important process in the effort to gain trust and integrity in the market. Only after cancelling the last owner should have the option to print the Certificate on paper.

Certificates can be cancelled in the biomethane registry by Certificate owners themselves. For this purpose, an appropriate overview should be available to the Certificate owner displaying all his records.

It is also important to note that both Certificates that have been inspected by an auditor and those that have not, can be cancelled. After a Certificate has successfully been cancelled the status in the overview will be changed. The status change means that the cancellation is confirmed, and the Certificate cannot be transferred again. The owner of the cancelled Certificate may view the confirmation as a PDF in the registry.

As mentioned in section Generation of certificate, there is the possibility of automatic cancellation of a Certificate after a certain time period has expired. After a period of n (e.g. 12 or more) months, the Certificate booked in the account but no transferred, could be marked with a special status for example “unused Certificate”. The other Certificates that have already been transferred, but not cancelled, will be cancelled at the respective date and no longer be available for transfers.

6.8.5.5 Approval/adjustment of Certificate by expert/auditor

The registry administrator checks the plausibility of Certificate information and documents submitted for the Certificates.

Market participants are free to have the Certificate inspected by an auditor. In order for the auditor to carry out inspection and provide a report on the Certificate, the person/company performing inspections of Certificates must register in the role as an auditor within the biomethane registry.

Registered auditors can inspect the Certificate information in the registry directly and make their respective notes confirming the origin and the quality. The experts are also free to upload their inspection reports, or sections of their reports, directly into the registry, where the owners of the Certificates have access to them.

In Austria, the attachment of an authorised auditor’s report is optional, and the owner of the Certificate may decide about auditing of the Certificate. It is clear that a missing auditor’s opinion may substantially influence the value, transferability and utilisation of the Certificate. It is buyer and seller’s decision to transfer Certificates with missing auditor’s opinion. However, in many cases on national level, buyer and seller have a personal relation and trust between both exists. Therefore, a generated Certificate in the Austrian Biomethane Registry can be transferred without waiting for inspection by an auditor. If the Certificate is inspected, the auditor may attach his audit report to the Certificate, and it will remain attached even when the Certificate is split in subparts.

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6.8.5.6 Electronic Certificates

After a Certificate is cancelled, an electronic statement should be automatically generated in the registry. Certificate owners can see this cancellation document in PDF form, which also serves as proof that the statement of cancellation exists. The PDF can be printed.

Each of these statements should have a unique ID number so that the validity of the Certificate can be checked. For this purpose, a model can be implemented on the website of the registry that allows that the validity of a Certificate is checked with the ID number. The validity can also be checked by contacting the administrator, or customer service. The ID number must be provided by email, after which the administrator or service team can provide information on the validity of the Certificate. In addition, the registry should summarise the following information about the Certificate:

- The plant in which the biomethane was produced
- The quantity of biomethane used
- Injection location and production period
- A list of the documented qualities of the biomethane quantity
- The delivery point and consumption period

Additional information may also be included in the registry extract. For example, in the German registry statements the following information is included:

- Name of plant
- Registry statement recipient
- Place of transfer
- Purpose of use
- Time of use

Taking international transfers into account, a special focus is on information:

- Whether and which kind of financial support was given to the biomethane production (investment support, feed-in tariff, tax reduction, others)
- Whether the biomethane volume has been counted towards national renewable energy targets.

Figure 21 and Figure 22 provide visuals of what the registry statement looks like. The standard statements of both the Austrian and German registries are used as an example. The documents can be downloaded as PDF after cancellation in each registry.

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BIOMETHAN
AGCS BIOMETHAN REGISTER AUSTRIA

Bestätigung der Stilllegung

Report-Nr.: *0000000003156*
Ausstellungsdatum: *31.07.2012*

Diese Bestätigung der Stilllegung ist nur dann gültig, wenn sie von zumindest einem Mitglied des Vorstandes der AGCS Gas Clearing and Settlement AG als Registerführer des Biomethan Register Austria gefertigt und mit deren Firmenstempel versehen ist.

1. Produktion und Einspeisung

Gemäß den vom jeweiligen Netzbetreiber der jeweiligen Verrechnungsstelle übermittelten Daten hat die nachfolgend bezeichnete Biomethananlage die nachfolgend angeführte Biomethanmenge im nachfolgend angeführten Zeitraum in das öffentliche Erdgasnetz eingespeist:

Name der Anlage:	*Musteranlage*
Standort der Anlage	*1000 Ort*
	Muster Straße 123
Anlagentyp:	*Einsatz landwirtschaftlicher Substratstoffe*
Produktionsperiode:	*06/2012*
Beginn des Einspeisezeitraumes:	*01.06.2012, 00:00*
Ende des Einspeisezeitraumes:	*30.06.2012, 23:59*
Energieäquivalent der eingespeisten Biomethanmenge in kWh:	*1.392.043*
Einspeisepunkt:	*AT900123000000000000000ORTRZIMP*
Übergabekomponente:	*AT 00500 10000 00000 00000 00000 12345*

2. Bestätigung des Nachweises

Auf Grundlage der unter Punkt 1 dieser Bestätigung angeführten Daten hat die AGCS Gas Clearing and Settlement AG als Registerführer des Biomethan Register Austria den nachfolgenden Biomethanherkunftsnachweis ausgestellt:

Eindeutige Identifikationsnummer.:	*BMN--042014--Musteranlage 00001*
Energieäquivalent der eingespeisten Biomethanmenge in kWh:	*1.392.043*
Inhaber zum Zeitpunkt der Stilllegung:	*Musterfirma GmbH*
	Muster Straße 12/46
	FN 23456x

AGCS Gas Clearing and Settlement AG
Alserbachstraße 14-16, 1090 Wien
Sitz Wien, FN 217593 x Handelsgericht Wien
DVR 210 86 42
ATU53721502

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BIOMETHAN
AGCS BIOMETHAN REGISTER AUSTRIA

Diesem Nachweis sind folgende Meldevermerke angeschlossen:

Gutachter:	*Peter Mustermann*
	Adresse 5
Meldevermerk erstellt am:	15.07.2012
Anmerkung des Gutachters:	Die Musteranlage wurde unter Berücksichtigung aller erforderlichen und betriebsrelevanten Faktoren begutachtet.
Name Begutachtungsdokument:	kein Begutachtungsdokument beigefügt

3. Stilllegung

Die Stilllegung des unter Punkt 2 bezeichneten Biomethanherkunftsnachweises im Biomethan Register Austria erfolgte am: 30.07.2012

Hinweise des Registerführers

Mit dieser Bestätigung der Stilllegung bestätigt der Registerführer lediglich, dass der unter Punkt 2 bezeichnete Biomethanherkunftsnachweis zum Zeitpunkt der Ausstellung dieser Bestätigung im Biomethan Register Austria existent und stillgelegt war. Der Registerführer bestätigt mit der Ausstellung dieser Bestätigung der Stilllegung nicht die Richtigkeit der vom jeweiligen Netzbetreiber, Teilnehmer oder Gutachter an den Registerführer übermittelten oder gegenüber diesem gemachten Angaben, auf deren Grundlage diese Bestätigung ausgestellt wurde, und ist eine diesbezügliche Haftung des Registerführers jedenfalls ausgeschlossen.

Mit der obig angeführten Report-Nummer kann die Ausstellung dieser Bestätigung durch den Registerführer und der Status des obig bezeichneten Biomethanherkunftsnachweises im Biomethan Register Austria auf Anfrage beim Registerführer überprüft werden.

Sachbearbeiter/In

AGCS Gas Clearing and Settlement AG

AGCS Gas Clearing and Settlement AG
Alserbachstraße 14-16, 1090 Wien
Sitz Wien, FN 217593 x Handelsgericht Wien
DVR 210 86 42
ATU53721502

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Figure 21: registry excerpt "Confirmation of Cancellation" of Biomethane Registry Austria

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Biogasregister Deutschland

Biogasregister-Auszug über ein Biogas-Zertifikat

Nr. BioP20150812103008924 98

1 Produktion und Einspeisung

Nach Angaben des Biogasproduzenten und bestätigt durch ein (oder mehrere) Sachverständigen-Gutachten (Auditberichte) wurde in der Anlage

Biogasanlage West
Westartaße 12
12345 Westlingen
Inbetriebnahme der Anlage: 01.03.2014

eine Menge Biogas wie folgt produziert und in das Erdgasnetz eingespeist:

Menge:	2.000.000 kWh
Einspeisezeitraum Beginn:	01.04.2014 06:00
Einspeisezeitraum Ende:	01.05.2014 05:59
Zählpunkt Einspeisung:	DE12345612345112233445566778899000
Zählernummer:	ABCD-1234

Zu dieser Produktionsanlage wurde folgende, für die Nachweisdokumentation relevante Zusatzinformation hinterlegt:

Anlage verfügt über weiteren Einspeisepunkt DE12345...

Biogasregister-Auszug BioP20150812103008924 98 Erstellt am: 12.08.2015 1 / 4

Biogasregister Deutschland

Biogasregister-Auszug über ein Biogas-Zertifikat

Nr. BioP20150812103008924 98

2 Kriterien

Einem (oder mehreren) Sachverständigen-Gutachten zufolge wurden für diese Biogasmenge und die Produktionsanlage das Vorliegen folgender Kriterien gemäß des Kriterienkatalogs des Biogasregister Deutschland bestätigt:

Kriterien:

01 Biomasse i.S.d. BiomasseV	02 Ausschließlichkeit
04 Maisgemenge plausibel	05 Einsatzstoffnachweis
06 Einspeisemenge in Erdgasnetz	07 Erdgasqualität für gesamte Menge
09 max. Stromverbrauch (EEG 2009/2012 und EEWärmeG 2009/2011)	10 regenerative Prozesswärme (EEG 2009/2012)
12 Kapazität bis 350-700 Nm³/h	13 Verkümmerung von Grandfathering-Anlagen lag nicht vor
16 eine Anlage/Betriebsgelände	17 Gärrestabdeckung/Gasdichtel
27 Massenbilanzierung bis zur Einspeisung in das Erdgasnetz	28 Einsatzstoffvergütungsklasse 0
29 Einsatzstoffvergütungsklasse 1	31 Einsatzstoffvergütungsklasse 2b (Gülle)
32 Hemdelerung 0-700 Nm³/h	35 Gärrestlager, Verweildauer, Gasverbrauchseinrichtung
37 Maisdeckel (max. 60%)	38 max. Methanemissionen (EEG 2012 und EEWärmeG 2011)

Dokumentation von gemischten Einsatzstoffen

28 Einsatzstoffvergütungsklasse 0	200.000 kWh	10,0000 %
29 Einsatzstoffvergütungsklasse 1	1.400.000 kWh	70,0000 %
30 Einsatzstoffvergütungsklasse 2n	0 kWh	0,0000 %
31 Einsatzstoffvergütungsklasse 2b (Gülle)	400.000 kWh	20,0000 %

Abtrennungserklärung

Laut Eigenerklärung vom 12.08.2015 eines Vorbesitzers (Zwischen-Lieferant) des Biogases wurden die oben dokumentierten Eigenschaften von der Commodity Gas abgetrennt und das Gas als Nicht-Biogas ohne biogene Eigenschaft veräußert.

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Biogasregister Deutschland

Biogasregister-Auszug über ein Biogas-Zertifikat

Nr. BioP20150812103008924 98

3 Entnahme und Verbrauch

Die Ausstellung dieses Biogasregister-Auszugs wurde von folgendem Nutzer des Biogasregister Deutschland vorgenommen (Ausbucher):

BioProd GmbH
Bio-Prodstr. 7
12345 Bio-Prodnau

Gemäß der Angaben dieses Nutzers wurde dem Empfänger

Therme Baden GmbH
Badenweg 12
66780 Baden
am Ort der Übergabe

Therme Baden GmbH
GASPOOLBK1234545667890

die oben dokumentierten Eigenschaften im Umfang der genannten Menge Biogas für den folgenden Zeitraum und mit folgendem Verwendungszweck zugeordnet:

Verwendungszeitraum Beginn:	01.01.2015
Verwendungszeitraum Ende:	30.06.2015
Verwendungszweck:	Grüngasprodukt -Biogas Beimisch Produkt 10%

Diese Eigenschaften wurden gemäß Abtrennungserklärung von der oben dokumentierten Menge Biogas abgetrennt.

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Biogasregister Deutschland

Biogasregister-Auszug über ein Biogas-Zertifikat

Nr. BioP20150812103008924 98

4 Hinweise des Registerführers

Dieser Biogasregister-Auszug wurde am 12.08.2015 um 10:30:08 erstellt und trägt die Nummer BioP20150812103008924 98. Mit Hilfe dieser Nummer können die Existenz und der Status dieses Biogasregister-Auszuges unter www.biogasregister.de überprüft werden. Zudem erlaubt sie eine eindeutige Rückverfolgung durch den Registerführer.

Dieser Biogasregister-Auszug dokumentiert die Angaben des Biogasproduzenten und ggf. weiterer Nutzer des Biogasregisters sowie die Angaben der Gutachten eines oder mehrerer Sachverständigen. Unter www.biogasregister.de finden Sie weitere Informationen hierzu, insbesondere in Form der "Allgemeinen Grundsätze zur Funktionsweise" des Biogasregister Deutschland (in ihrer aktuellen Fassung).

Die Nutzer des Biogasregister Deutschland haben sich verpflichtet, bei einer Vermarktung von Biogas mit Hilfe des Biogasregister Deutschland keine weiteren Nachweis- oder Dokumentationssysteme zur Vermarktung derselben Biogasmenge zur Erlangung von Vergütungs- oder Nachweisatbeständen gemäß EEG und EEWärmeG zu nutzen. Weiterhin haben sich die Nutzerunternehmen des Biogasregister Deutschland zur Einhaltung der Anforderungen an das Doppelvermarktungsverbot gemäß §56 EEG 2009/2012 verpflichtet.

Dieser Biogasregister-Auszug ist kein Gutachten über biogene Eigenschaften und kann die unmittelbare Vorlage eines Gutachtens als Nachweis über Biogaseigenschaften nur ersetzen, wenn dies zwischen den Handelspartnern vertraglich vereinbart wurde. Die Einsicht in die diesem Auszug zugrunde liegenden Gutachten kann beim Registerführer beantragt werden.

nachgewiesene Qualität

Biogasregister-Auszug BioP20150812103008924 98 Biogasregister-Auszug erstellt am: 12.08.2015 4 / 4

Figure 22: Registry excerpt "Confirmation of Cancellation" of German Biogas Registry

6.8.5.7 Certificate on paper

Owners of cancelled Certificates may ask for a written registry statement as a proof that the Certificate has in fact been cancelled.

Upon request of the written statement, the registry will print out the PDF form on "special paper". The document is then signed by a clerk and/or the director of the biomethane registry. The process of manually signing the document should guarantee the quality of the Certificate. The registry should also provide on demand of owner of cancelled Certificates a report of cancelled Certificates to third parties (company auditors, …).

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6.8.6 Operative tasks of the registry

6.8.6.1 Daily processes

Daily activities within a biomethane registry, depending on the administrator and account holder, are listed in Table 2.

Table 2: Daily activities within a biomethane registry

Task in Registry	Administrator	Account Holder
System check	✓	X
Latest Communications	✓	X
Transfer List Inspection	✓	X

SYSTEM CHECK AT START OF WORKDAY

Users should have no problems to access the registry system. Therefore, it is important that, before start of working day, the administrator makes sure that all technical resources (system connection, website accessibility, technical infrastructure, phone, email) are functioning.

LATEST COMMUNICATIONS

Continuous Inspection of communication inboxes (post and email) that could affect the operation of the registry. Additionally, information channels can be actively read by the registry administrator periodically. These sources can be different depending on national sources and must be defined by each registry, for example news agencies, insolvency pages, emails, etc.

TRANSFER LIST INSPECTION

A daily inspection of the transfers takes place.

If a transfer is not accepted by the buyer within a time frame determined in the rules of the registry it is automatically rescinded. Error messages pertaining to transfers must be handled in time by the administrator.

6.8.6.2 Monthly processes

Monthly activities within the registry are, depending on the administrator and account holder, the following:

Table 3: Monthly activities within a biomethane registry

Task in Register	Administrator	Account Holder
Input of additives in Certificate	X	✓
Input of produced quantity	✓	X
Certificate generation	✓	X
Statistics	✓	X
Transfer volumes	X	✓
Publications	✓	X
Billing	✓	X

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INPUT OF PRODUCED QUANTITY

Entering the produced quantity into the biomethane registry can be done by the account holder or the administrator. The generation of Certificates is a very sensitive process and is established by each registry individually. However, in all cases it is the administrator's responsibility to monitor these processes and make sure that deadlines are met.

CERTIFICATE GENERATION

The generation of Certificates is taken care of by the administrator or, depending on national regulations, the account holder or even the authorised auditor. This process must however in any case be monitored by the administrator.

STATISTICS

The amount of information made available for published statistics is left to the discretion of the administrator due to legal requirements, national interests, privacy policies and etc. Statistic or graphical representations should show, the biomethane volume injected.

TRANSFER VOLUMES

The account holder has the possibility to transfer its volumes at any time within the validity of the Certificate.

PUBLICATIONS

All publications should be updated regularly on the registry website. For example, account holders, facilities, contact persons, statistics etc. require regular updating and maintenance. The decision of the registry on the release of information is dependent on the legal requirements of the registry, national interests, privacy policies, etc.

BILLING OF FEES

Fees are charged periodically.

6.8.6.3 Periodical processes

Recurring tasks within the registry are, depending on the administrator and account holder, the following:

Table 4: Periodic activities and processes within a biomethane registry

Registry tasks	Administrator	Account Holder
Inquiry Processing	✓	X
Access Management	✓	✓
Account Management	✓	✓
System Updates	✓	X
Confirm Cancellation	✓	X
Certificate Inspection	✓	✓

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INQUIRY PROCESSING

Any inquiries to the register must be answered/processed and are usually the first step to start non-periodic activities.

ACCESS MANAGEMENT

Data and access changes can be performed by the account holder or an authorised representative.

This includes the following activities:

- Establishment of first application
- Assignment of accounts
- Direct user access
- Processing of user inquiries concerning access
- Error processing
- Change in user data
- User lock out by order of account holder

ACCOUNT MANAGEMENT

Each new account in the registry also can only be carried out by the account holder or an authorised representative.

This includes the following activities:

- Establishment of first application
- Assignment of account to authorised user
- Processing of user inquiries regarding accounts
- Change of account master data
- Change of master accounts data in assigned facilities
- Block or cancellation of account by order of account holder or regulator (authority/ministry)

SYSTEM UPDATES

Software updates are necessary for ongoing operations and the technical infrastructure of the registry operator. These updates should take place without disruption and outside of operating hours. The coordination and inspection of these updates must be organised by the registry administrator.

CONFIRMATION OF CANCELLATION

Confirmation of a cancelled Certificate is a non-periodic activity that is carried out by the registry administrator. Identification numbers can be attained individually.

This includes the following activities:

- Inspection owner of Certificate
- Inspection of Certificate within registry
- Identification of Certificate as “confirmed”
- Note in registry as confirmed

The handling of the original or the copy of such confirmation must be clearly defined. For the last user/owner of the Certificate, but also the registry it is essential that the confirmations are only created

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once. It should not be possible to generate confirmations individually more often. An original statement with a signature or stamp could be a secure solution.

CERTIFICATE INSPECTION

The check of Certificate is normally done by the registry administrator. It is his responsibility to confirm the cancellation of a Certificate. But it can also be important for the owners of the Certificate (account holders) or even not registered entities which were given a Certificate by an account holder (process of selling Certificate to end consumers which are not registered in the biomethane registry).

6.8.7 Publication of information – transparency

Transparency is the foundation of any functioning market and therefore presents a key challenge for the biomethane Certificates market. The public availability of information is very important to ensure the necessary trust in the market. As an independent body, the biomethane registry has to provide information. It is essential that information pertaining to participation in the registry and functions of the registry is made transparent. Transparency can be achieved through the publication of manuals, system descriptions and registration documents. To this end there should be an area on the registry homepage where company names are listed with corresponding contact data. Due to data protection laws, approval must be obtained in order to make this contact information public. Approval can be obtained from users directly or by integrating the proper language into the terms and conditions. Some account holders may not wish to have their information available to other account holders. In the context of transparency, the rights and wishes of the users are very important and must be given attention.

The following information should be made available if the biomethane Certificate market is to be made as transparent as possible:

- News about the biomethane market and the registry
- Statistics (ex. Injection quantities, generated Certificates, number of participants, etc.)
- Reports
- Rules and regulations

The biomethane registry holds private information that should be handled with the highest confidentiality. This can be information about account balances or individual transactions between account holders. Without the consent of the account holder, this information may not be published or used in any way. In addition, each registry has country specific data protection laws which must be obeyed.

6.8.8 Functionalities

Uniform processes are necessary for the successful and efficient operation of a registry. This is possible only when the processes are defined and therefore all market participants are treated the same way. Processes should be supported by an IT-based system. It is necessary to respect different requirements and functionalities of a system to get sufficient support of the market participants. The biomethane registry IT-system has to include general, specific and registry specific requirements. Mentioned below are the technical requirements which are essential to the registry system:

- General
  - ✓ System structure (offline, online, web applications)

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- ✓ Security features
- ✓ Operations
- ✓ User friendliness
- ✓ Rights and roles

- Specific Applications
  - ✓ Login/Logout
  - ✓ Logging
  - ✓ Data import/export
  - ✓ Master data
  - ✓ Certificate management
  - ✓ Reports
  - ✓ Transfer market
  - ✓ Whiteboard
- Registry specific applications
  - ✓ Market participant registration
  - ✓ Master data management
  - ✓ Settings configuration
  - ✓ Communication changes (interface adaptor)
  - ✓ Certificate Generation
  - ✓ Certificate properties
  - ✓ Certificate inspection
  - ✓ Transfers
  - ✓ Whiteboard

6.8.9 Quality assurance

The following mechanisms are in place to ensure quality assurance in the registry:

Quality Assurance must be implemented in accordance with an international standard for example ISO Standard 9001:2008 or equivalent.

All processes and tasks in the registry are documented and carried out only by authorised persons. An essential part of the quality assurance certification (for example ISO) process is that all processes are regularly monitored both internally and externally. Any changes in process or adjustments due to new business procedures must be implemented and updated in the system by authorised persons. All processes and documents are internally controlled through certification protocols. The final control can be either done on specific results, for example if you have an industry product with clear measures and data to be controlled. Or on the other hand the control via a second instance, a so called four-eye-principle which checks the entering of data or the general application process.

The goal of the certification process is to document ongoing activities and maintain a high standard of quality in the registry. As a result, when risks arise, they can be evaluated and avoided in the future through changes in the system.

QUALITY ASSURANCE RECOMMENDATIONS

Certification for example via ISO is highly recommended for biomethane registries.

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The following points should be present in the operation of a biomethane registry regardless of certification:

- Documentation of all processes and activities
- Four-eye-principle for critical processes
- Activity verifying protocols
- Monitoring of ongoing processes to their completion with implementation of any necessary changes
- Risk identification and minimisation
- Defined roles and tasks for authorised persons

QUALITY ASSURANCE IS GUARANTEED IN SEVERAL WAYS:

- The Certificates are generated by the registry. Generation of Certificates is based on the metering value from the grid.
- Before the Certificate can be generated, the registry administrator must approve the quantity
- The biogas plants and Certificates are also inspected by independent auditors
- The registry has established several quality assurances processes such as ISO certification
- Important actions in the IT-based registry system are secured with 4-eyes principle

SAFETY REGULATIONS AND HELPDESK

Contract partners should be at all times obliged to comply with all provisions of the conditions defined by the registry. The helpdesk of the biomethane registry will assist all parties during pre-determined operating times if they are able to identify themselves accordingly.

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1 Annex: Overview of established registries

1.1 Austria

1.1.1 AGCS Biomethane Registry Austria

AGCS Gas Clearing & Settlement AG is the settlement agent (clearing house, balance group coordinator) for the Austrian gas market. Since its start of operations in 2002, following the full liberalisation of the Austrian gas market in 2002, it has gained profound, in-depth knowledge on the gas market in Austria and Europe. AGCS provides the Austrian gas market with unique know-how, neutrality, independence, data security and confidentiality for all market participants. As settlement agent, AGCS is responsible for the calculation and clearing of balancing energy and its tasks are based on the Austrian Gas Economy Act (GWG – Gaswirtschaftsgesetz) and the Austrian Renewable Electricity Act (ÖSG – Ökostromgesetz). AGCS is responsible for all data concerning gas movements including injection and withdrawal data also concerning biomethane.

Based on the Renewable Electricity Act, AGCS as clearing agent was requested to provide confirmations (Certificates) on a monthly basis with a unique identification for biomethane injected into the Austrian gas grid. Balancing this task required by law and the need of developing a biomethane market in Austria, AGCS opted for a registry system. AGCS has thus established the Biomethane Registry Austria which has been in operation since 2012.

The AGCS Biomethane Registry Austria provides the stakeholders of the Austrian biomethane market free choice to use the services of the Registry to prove the quantity and quality of their injected biomethane via biomethane Certificates. Biomethane producers have the freedom to decide on the end use of their biomethane Certificate. The generation of electricity from biomethane fed into the gas grid is subsidised via a feed-in tariff, which is handled by the Austrian Settlement Agent for Renewable Energy (OeMAG). Many Austrian stakeholders use such certificates as proof that their renewable energy product fulfils all necessary requirements to receive the Austrian feed-in tariff for renewable electricity from biogas. In this case, the Certificates are usually sold by the biomethane producer to the operator of an electrification plant who will apply for the feed-in tariff. Several biomethane producers use the Certificates on the free market, however, to provide renewable gas to different end consumers.

The AGCS Biomethane Registry Austria is basically a centralised data base with a direct link to the Austrian gas clearing system. The levels of physical transfer and the Certificate transfer are decoupled. The system is conceptually based on the system of the Austrian CO_2 registry for which until 2012 ECRA Emission Certificate Registry Austria GmbH was responsible.

The gathered know-how is used by AGCS experts to work on the establishment of cooperation agreements and European projects, all focused on the development of the Austrian and European renewable gas market. In 2016, AGCS Biomethane Registry Austria has established the first bilateral cooperation in Europe with dena (German Energy Agency, operating the German Biogas Registry) to exchange certificates for renewable gases. With this cooperation agreement and the establishment of the necessary interface and required processes, the Biomethane Registry Austria enables the Austrian stakeholders to sell their product on the German market or to purchase German renewable gas respectively. At the time of establishment, this cooperation was unique in Europe but was soon followed by a second bilateral agreement between Germany and Denmark based on documentation of AGCS-dena cooperation.

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AGCS had been consortium partner in the European H2020 project BIOSURF (2015-2017), contributor to the CertifHy Project and is also founding member of ERGaR aisbl, European Renewable Gas Registry. The most recent established cooperation agreement was performed on national level with the Environmental Agency Austria (UBA, Umweltbundesamt) who operates the Austrian Registry for Biofuels. The targets of this agreement are to prevent double-counting and double-sale by establishing a system for exchange of information related to biomethane volumes, injected into the grid and used for the purpose of biofuels in the Austrian transportation sector.

The possibility to exchange Certificates with other European registries should benefit the Austrian biomethane producers and consumers. Implementing the transfer process with foreign registries is thus a key element for the success of biomethane. The partaking in such mentioned projects and of course, the REGARTRACE project, has positioned the Biomethane Registry Austria as a central key-player of the biomethane market. The issued biomethane Certificates represent an integral part of the Austrian biomethane value chain.

1.1.2 IT system of the Biomethane Registry Austria

The IT-system of the Biomethane Registry Austria was specified by AGCS and implemented by SMART Technologies GmbH. The mentioned cooperation agreements show that the Registry is ready to integrate several institutions and companies which deal with biomethane. There are 40 account holders:

- 14 Biomethane production plants
- 10 Electrification plants (renewable electricity from biomethane)
- 8 auditors
- 6 traders
- 1 Austrian Settlement Agent for Renewable Energy (OeMAG)
- 1 foreign registry (dena, Deutsches Biogas Register)

1.1.3 Data and Facts

There are 15 biomethane producing plants in Austria, 14 of which inject into the gas grid and all of these 14 are account holders at the Biomethane Registry Austria, making use of the intrinsic value of biomethane Certificates. Most plant operators receive national feed-in tariff, while several others sell the additional value to end suppliers charging a premium from end consumers. Nearly 800 GWh of biomethane were injected into the Austrian grid since start of operation of the Biomethane Registry, in 2018, 171 GWh were injected (see Figure 23.)

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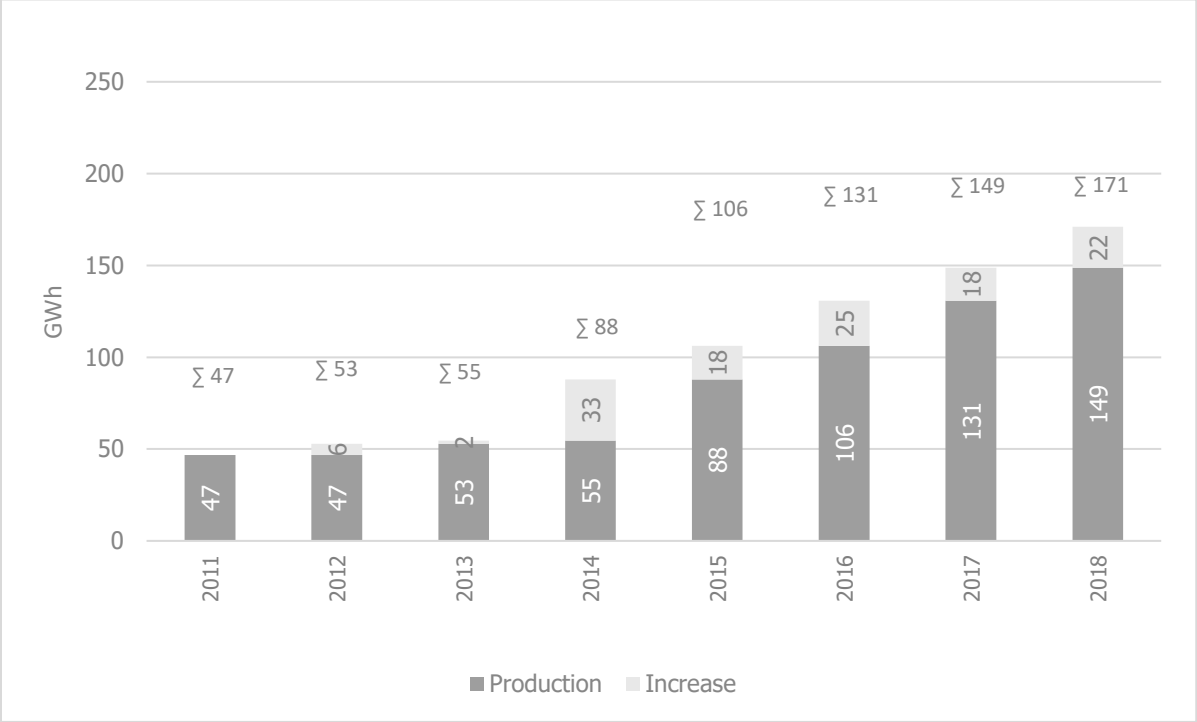

Figure 23: Biomethane injection in the Austrian gas grid (GWh)

1.1.4 Austrian Biomethane Certificates

The biomethane GoO system should satisfy two needs:

- provide GoOs as a basis to subsidize green electricity (electricity from biomethane)
- provide a traceable and secure transfer of ownership of biomethane for the Austrian gas industry.

The AGCS clearing system registers the metered values of biomethane injected into the gas grid and books these values in the respective biomethane balance group of the biomethane operator. These volume data are provided to the Biomethane Registry on a monthly basis as base information for the creation of biomethane Certificates.

It is the responsibility of the plant operator to record the additives directly and manually in the registry each month. These values for additives are subtracted from the metering values to be sure that Certificates representing only biomethane volumes are issued.

After a monitoring process that ensures the correct Certificate generation, the Certificate is subsequently entered into the account of the biomethane plant operator at the Biomethane Registry.

The monthly generation of the Certificates is performed following a fixed clearing calendar which is made available on the Biomethane Registry website, also including the preparation date, date of generation and date of availability.

An Austrian Biomethane Certificate contains the following information:

- Production period (from/to on monthly basis)
- Original amount in kWh
- Any remaining amounts (some parts possibly already transferred)
- Name of plant without details
- Evaluation conducted (Yes/No)

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- If yes, evaluation available with files (possible to download yes/no)
- Status of GoO
- Owner of GoO
- Date generated
- Date of report marks
- Date of cancellation.

After monthly creation of the Certificate, and entry of the Certificate at the owner's (biomethane producer) account, the Certificate is tradable. In case the owner decides to sell a different (smaller) volume of biomethane than documented on the Certificate, the owner also has the possibility to split the certificate in any desired volume with the smallest unit steps being 1 kWh, before transferring the Certificate. Each registered user in the system (except the experts) can be chosen as a recipient of the Certificate.

The authorised auditors fulfil an important role in the Biomethane Registry. They are responsible for inspecting all of the Certificates of their assigned biomethane production plant. It is also their responsibility to mark the Certificate as inspected by attaching the corresponding auditing report to the Certificate. The inspection of more than one Certificate without attaching a report is also possible. The authorised auditor's main task is to evaluate the original Certificate. It is up to the buyers if they accept a Certificate that has not been inspected. OeMAG in its special role for subsidising renewable energy accepts only inspected Certificates. Market participants may also use Certificates for their own purposes. The Certificates are used for many different applications but the Biomethane Registry Austria generally neither tracks these uses nor has any information related to the price of these Certificates.

The last step of a Certificate 'lifespan' is the cancellation process. It is always the owner (usually the end user) of the biomethane Certificate who cancels the Certificate, thus devaluing. This step is essential to prove that no double-counting nor double-use is possible.

Following the wishes of the Austrian industry, the validity of Certificates in the registry is at the moment set unlimited. It is the choice of the recipient as to whether or not they will accept a Certificate with a known lifespan. OeMAG in its special role for subsidising renewable energy only accepts Certificates from the present year.

1.2 Denmark

1.2.1 Danish Biomethane Registry (Energinet)

Energinet is the Danish transmission system operator and owns the Danish electricity and gas transmission systems. Energinet's main task is to maintain the overall short-term and long-term security of electricity and gas supply. Energinet is an independent public enterprise owned by the Danish state as represented by the Ministry of Climate, Energy and Utilities.

The Danish register for biomethane GoOs was established in 2011. A number of players on the Danish natural gas market requested a GoO scheme for biomethane sold via the Danish natural gas system for heating purposes. Unlike what applies to electricity produced on the basis of renewable energy, Energinet is not required to provide a GoO scheme or issue GoO for the production of biomethane.

To meet the market players' request for GoO of biomethane, Energinet has agreed to manage the GoO register and to issue biomethane GoO on behalf of the market players. The GoO scheme is based on

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electronic and paperless registration. No GoO in paper form are issued. So far, the use of the GoO scheme is free of charge.

The main purpose of issuing biomethane GoO is for the sellers of biomethane to be able to document to the end-consumers that a given amount of biomethane has been produced from a renewable energy source. More information about the certificate scheme is to be found on Energinet's website:

https://en.energinet.dk/Gas/Biomethane/Biomethane-Certificates

The biomethane GoOs are not linked to any subsidies, taxes or duties. The GoO can therefore not be used as documentation in relation to subsidises, tax advantages or duty cuts.

1.2.2 The Danish GoO registry

To be registered in the GoO register, and thereby become a GoO account holder, the applicant must provide the following information:

- Company identification number (VAT, GLN or similar)
- Company name, address, postal code, city, country and CVR number
- Contact information (name, telephone number and e-mail address of contact person)
- Name of person authorised to sign for the GoO account holder.

If the applicant is also a RE-gas producer, his production facility will automatically be linked to the GoO account and, in that case, additional information regarding the production facility must also be provided:

Identification of the production facility

- The production facility's address, postal code, city, country and CVR number
- Production technology applied (biogas, thermal gasification, landfill gas, synthetic gas etc.)
- Capacity of the production facility in kWh/year
- Commissioning date of the production facility
- Metering point, GSRN
- Meter operator of the production facility (contact person, company name, address, telephone number and e-mail address)
- Description of how metered data have been obtained, including whether propane has been added to the gas
- Production subsidies.

1.2.3 Biomethane GoO

The actual issue of biomethane GoOs is carried out by Energinet at the request of the GoO account holders on the Danish natural gas market and is as such a voluntary scheme.

Only GoO account holders can receive biomethane GoOs.

The biomethane GoOs are issued on a monthly basis and each for a standard amount of 1 MWh. The biomethane GoOs are issued automatically on the basis of the metered data received from the Danish distribution companies. The number of MWh gross determines the number of biomethane GoOs issued, and biomethane GoOs are only issued for whole amounts. Energinet has issued biomethane GoOs for all amounts of upgraded biogas injected into the Danish gas system so far:

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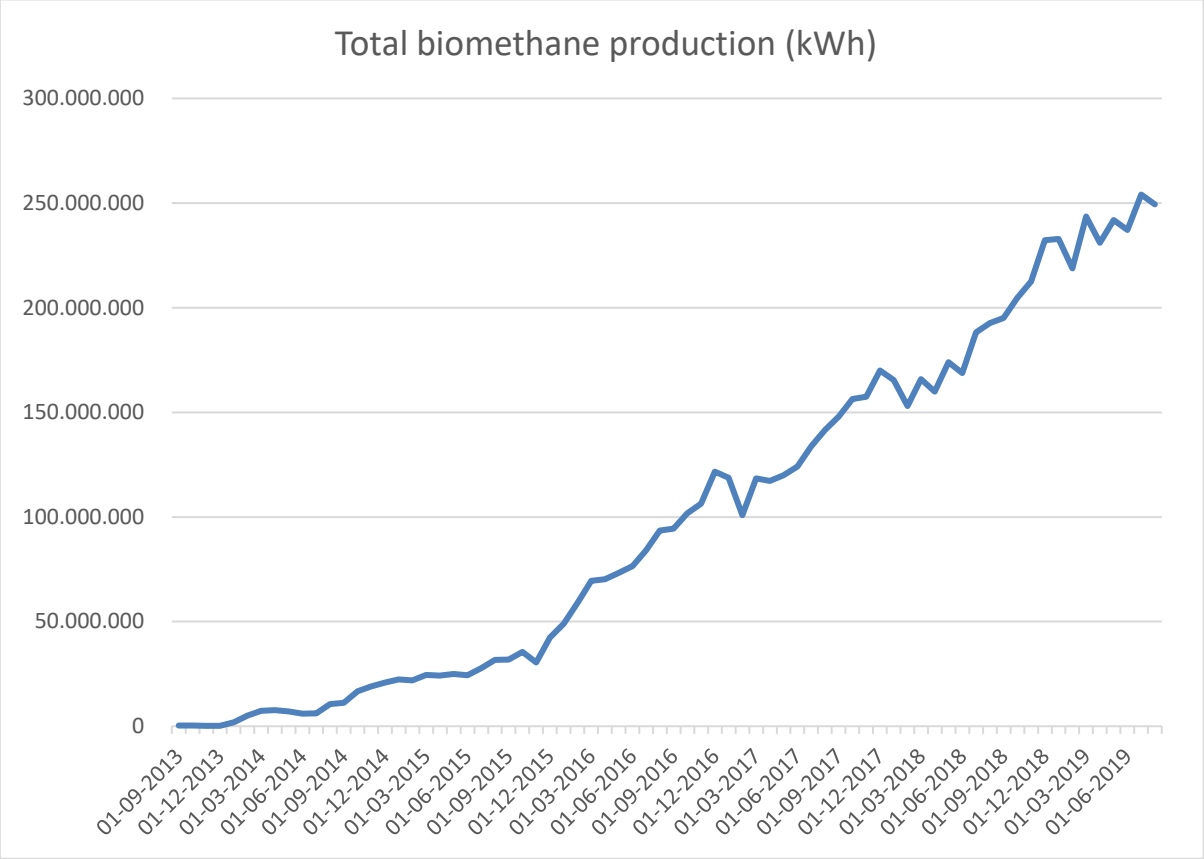

Figure 24: biomethane (kWh) in the Danish gas system

The certificate account holders may transfer biomethane GoOs among themselves. Transfers as well as cancellations are handled by the account holder in Energinet's it-system for this purpose.

Account holders cancel GoO, because the biomethane GoO in question has been disposed of by sale of an amount of energy. A cancelled biomethane GoO is no longer in circulation and can therefore not be transferred to any other GoO account holder or sold to any other consumer.

Transfer or cancellation, including for export purposes, of a biomethane GoO must take place not later than 12 months after the calendar month in which the relevant amount of biomethane was produced. After 12 months Energinet automatically changes the status of issued biomethane GoOs to “expired”.

1.3 Estonia

1.3.1 Renewable Gas Registry (Elering AS)

Elering is an independent electricity and gas transmission system operator in Estonia whose main duty is to guarantee high-quality energy supply to Estonian consumers at all times.

The Natural Gas Act obliges the Transmission System Operator to establish and manage the Estonian Renewable Gas Registry (also Biomethane Production Portal), where the main functions include issuing Guarantees of Origin (GO), transferring GOs from one account to another and cancelling GOs against end-consumer to prove that the consumed gas had green origin. According to the Natural Gas Act Elering is the settlement agent responsible for issuing GoOs with a unique identification for injected biomethane volumes on a monthly basis.

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The Estonian Renewable Gas Registry was completed by Elering AS in April 2018 and operates now continuously. All data in Renewable Gas Registry on gas injections is retrieved from the Gas Data Hub (Figure 25) on a monthly basis. The Gas Data Hub, which is managed by Elering AS is a system that holds all agreements related to gas transfer, production and consumption and all measurement data.

1.3.2 Market Roles

The Estonian biomethane registry distinguishes between the following registered users:

- Producers (biomethane plant operators)
- Traders (gas sellers)
- Consumers
- Liquid fuel sellers (future development to enable liquid fuel sellers to trade with biomethane statistics)

1.3.3 Biomethane GO

The issue of biomethane GOs is carried out by Elering AS on a monthly basis and each GO is issued for a standard amount of 1 MWh. Only GO account holders can receive biomethane GOs. Producers of biomethane receive biomethane GO at the point of injection. Producers who are not connected to the gas grid receive the GO at the production site after the gas has been produced and transferred to the CNG tubes for transportation. Issued GOs are based on higher calorific value of produced biomethane. Since gas is measured in cubic meters and GOs are issued in megawatt hours, the production and consumption data are retrieved form Gas Data Hub in both units of measurement, m3 and MWh.

After the GOs have been issued, producers can transfer GOs from their account to the trader's account. Traders who have been registered consumption metering points on their account can then cancel GOs against metering points consumption. Before cancelling against consumption, trader can see the exact consumed amount for a chosen period under the metering point and it is not possible to cancel more GOs than was the actual consumption. Each registered metering point in Renewable Gas Registry has an indication on the type of usage (home, business or transport) making it easy to identify how much biomethane is used in transport or other sectors. Consumers who have bought biomethane can check the origin of their consumed gas in the Renewable Energy consumer portal (Figure 25).

When the GOs are cancelled, producers can apply for subsidy which is also integrated into the Registry. The subsidy applications are generated each month automatically on the producer's account after the cancellation procedure, so the producers will only need to confirm the application. The data on paid subsidies is transferred automatically to the State AID Registry (Figure 25).

Cancellation of biomethane GO must take place within 12 months after the issuance of GO, because GO's validity period is one year. After 12 months, the GO that has not been cancelled becomes automatically expired and it is not usable any longer.

In addition, biomethane is exempt from excise duty and the tax exemption accounting is also based on biomethane GOs. Distribution system operators who are responsible for collecting natural gas excise tax will receive monthly reports from the Registry on consumed amounts of biomethane (verified with GOs) in their grid network.

The Renewable Gas Registry (Biomethane Production Portal) is a sub system of Renewable Energy platform (Figure 25) managed by Elering AS. In the future, the Electricity and Biomethane Production Portals are planned to be integrated more closely under the Renewable energy trading environment to enable liquid fuel sellers to fulfil their biofuel blending obligation through biofuel statistics trading.

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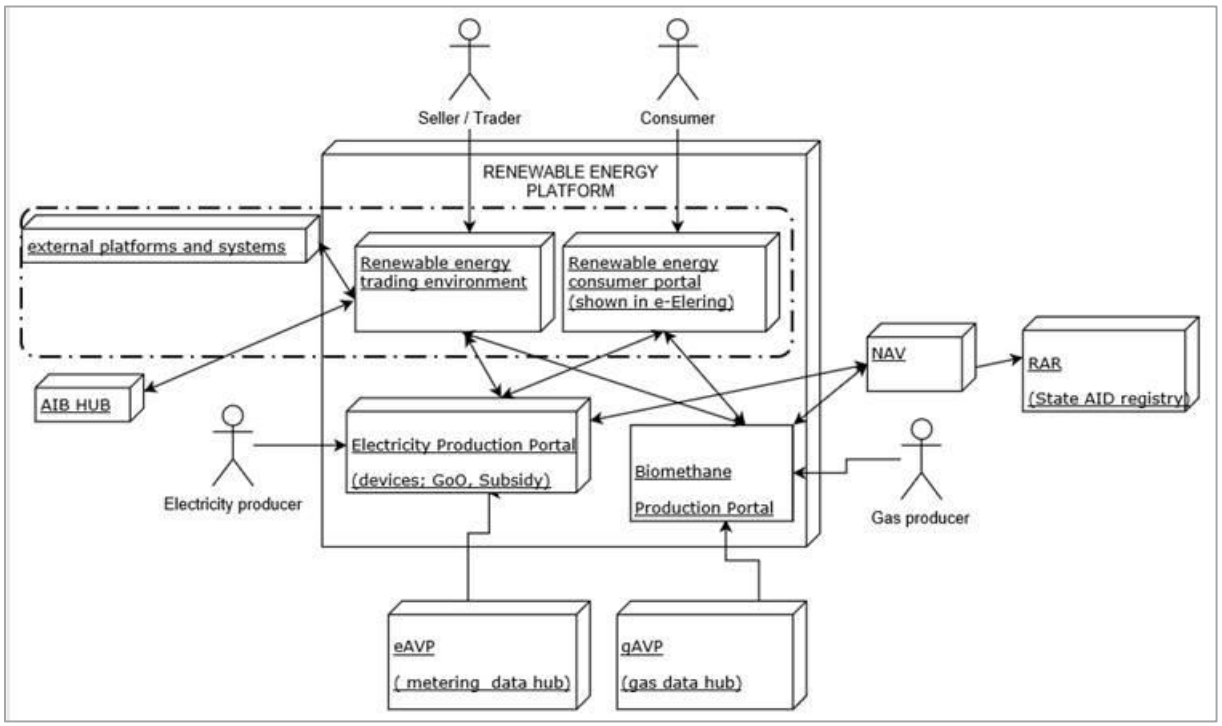

Figure 25: Renewable Energy Platform Estonia

1.3.4 Production data

Currently there are two biomethane plant operators in Estonia and both plants' production complies with the Sustainability Criteria, which is audited once a year. Biomethane is produced from wastewater sediments and from animal manure and silage:

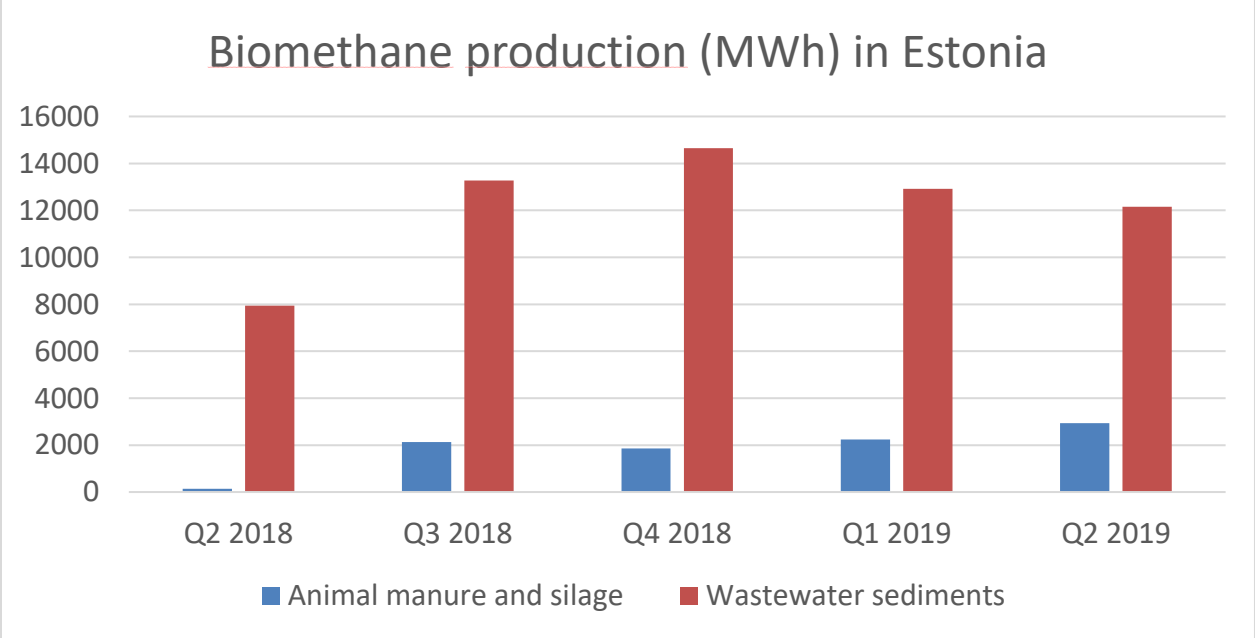

Figure 26: Biomethane Production in Estonia (MWh)

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1.4 France

1.4.1 Mandate of the French registry for biomethane Guarantees of origin

The French registry for biomethane Guarantees of origin (GoOs) is the property of the French Ministry of ecological and solidarity transition (ministry also in charge of energy topics in France). Its operation is delegated by tender every 5 years to a third-party actor. The French gas distributor, Gaz Réseau Distribution France (GRDF), won the first two public service delegations. It thus operates the registry since 2013 and until March 31, 2023.

The tasks performed by the registry manager (GRDF) are set by law: the energy code (articles D. 446-17 et seq.), Decree no. 2011-1596 of November 21, 2011 and specifications of the Concession. Please refer to section III for more details on these tasks.

A satisfaction survey is also conducted annually with registry users in order to evaluate the quality of the service provided by the manager and any changes in the tool to be provided.

1.4.2 Role of the French registry for biomethane guarantees of origin

The French registry for biomethane (GoOs) only deals with **national production of biomethane injected into the French gas grid.** For the moment, no French biomethane GoOs can be sold abroad and no GOs purchased abroad by a French supplier passes through the registry. Non-injected biomethane productions do not give rise to GoOs creation via the registry.

Depending on the actor concerned, the interest in obtaining a GoO and therefore having such a registry varies:

- **Biomethane producers:** in order to secure the acquisition of the GoOs, the supplier sometimes pays a supplement to the feed-in-tariff to the producer at the time of purchase of the biomethane production;
- Biomethane suppliers
  - ✓ The suppliers can sell a renewable gas offer to an end consumer only if he has a GoO to sell in complement to the gas supplying contract;
  - ✓ The suppliers can benefit from a tax exemption (TICGN tax) when the GoO is used for heating purpose. This amount is in theory deducted from the selling price of the GoO to the end consumer;
  - ✓ The GoOs are the only proofs, for fuel suppliers, of compliance with their regulatory obligations for the incorporation of renewable energy into the energy mix they propose.
- Biomethane consumers:
  - ✓ The GoOs are the only proofs of the origin and characteristics of the renewable gas they consume;
  - ✓ The GoOs are the only proofs of the consumption of renewable gases, especially for purposes of tax exemptions (case of industrialists and district heating) or achievement of energy policy targets (case of municipalities).

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1.4.3 Operation of the French registry for biomethane guarantees of origin

1.4.3.1 Registration in the French registry for biomethane guarantees of origin

The French registry for biomethane GOs only deals with **French gas suppliers (which own a specific license to supply gas in France).** Only these actors can create an account in the registry, register a French biomethane plants and also create/sell/buy a biomethane French GOs.

Registration of French supplier in the registry

When entering into a purchase agreement with a biomethane producer, the company supplying the consumers (shorty supplier) frequently provides it with a purchase price (feed-in-tariff between €46 and €139 / MWh depending on the type of plants and feedstocks used to production) a premium. This premium can take different forms: purchase price higher than the floor rate defined in the regulatory texts, investment aid, financing of certain stages of project development (studies for example), etc. This additional income paid to the biomethane producer enables the supplier to secure access to the GOs; only able to attest to the renewable character of the gas marketed.

The supplier thus has a right of ownership on the GOs associated with the physical production of biomethane corresponding to the purchase contract. In order to make this right effective, the supplier must turn to the French biomethane GO registry.

The supplier must first create a user account within the registry. This must be done by communicating the following information to the manager of the registry:

- Identity (company name, SIRET number, head office address);
- Legal Responsible;
- Persons authorized to intervene on the account and perimeter of action. Until 5 persons can be authorized to use the account on behalf of the supplier.

For the moment, only suppliers within the meaning of the French law (Article L. 443-1 of Energy code) may have a user account on the registry. Any trading or direct purchase of GOs by a third party (end consumers for example such as municipalities, industrials) is not possible.

1.4.3.2 Registration of biomethane plants in the registry

Once his user account is created, the supplier can register the biomethane injection plants which he buys production and for which he wishes to create GOs.

For this purpose, the following information must be mentioned in the registry. They remain attached to all GOs created for the concerned plant:

- Identity of the biomethane producer (company name, SIRET number, administrative contact, head office address, ADEME identifier);
- Number and period of injection contract (s);
- Date of commissioning of the plant;
- Maximum annual production capacity (in MWh);
- Daily flow (in Nm3 / h);
- Name of the grid operator;
- Nature of feedstocks used for production;
- Production technology;
- Identifier of the metering injection point.

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The supplier is also required to provide the manager of the registry with copies of the biomethane injection and purchase contracts but also the public authorisation for the plant (ADEME or prefectural certificate).

If the information communicated to the registry manager is valid, he proceeds to the creation of the account: a login identifier and a password are then sent to the supplier.

1.4.3.3 Issuing of French biomethane GOs

Following the declaration of the biomethane injection plant, the supplier has a period of 90 days from the date of the end of the injection of the corresponding physical production to request the creation of GOs. The start date of the injection period for which a GO is requested cannot be earlier than January 1 of the calendar year preceding the application.

The registry manager then has 60 days from the date of receipt of the supplier's request to issue the certificate of GOs in case of first request. This period is reduced to 30 days when a GO has already been issued for the concerned biomethane plant.

The registry manager creates the GOs according to the following principle: each MWh of biomethane injected into the French natural gas network gives the right to one GO.

1.4.3.4 French biomethane GOs operations

GOs' lifetime is 24 months from the date of its creation in the registry.

Two types of transactions are possible with French biomethane GOs:

- **The transfer of GOs between suppliers holding accounts on the registry:** can acquire GOs through this marketplace, gas suppliers that have not concluded a purchase agreement with a biomethane producer or who need more GOs than they have in stock;
- **The use of GOs by an end consumer under its "renewable gas" supply agreement:** each GO can only be used once. Once this transaction is completed, the GO is unavailable for any other operation.

The declaration of use provided by the supplier to the end consumer contains the following information:

- Information mentioned in part III, A, 2) concerning the biomethane production plant linked to the GOs (address of the plant, annual production capacity, plant commissioning date);
- Biomethane quantity injected during the consumption period;
- Consumption period;
- Identifier of the delivery point;
- Name / business name and address of the end consumer;
- Use of the GO. The categories currently available are: fuel, heating tertiary/industry or domestic uses. If the GO is used for fuel purpose, the supplier can keep all the selling price of the GO to the end consumer. If the GO is used for heating purpose, the supplier must give 75% of the selling price of the GO to the end consumer to the Government. This amount partly finances the biomethane feed-in-tariff;
- Production technology and feedstocks.

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1.4.3.5 Verification of the operations carried out in the French registry for biomethane guarantees of origin

Each GO has a unique identifier that it keeps on the register from its creation regardless of the operations performed. Some checks are however also carried out by the registry manager in order to avoid any risk of double counting / double valuation or use of an obsolete GO:

- When the GOs are created, the registry manager checks that the quantity of GOs requested is consistent with the quantity of biomethane injected during the period according to the biomethane purchase invoice issued by the supplier. The registry manager also systematically checks the coherence between the GOs creation requests and the quantities of biomethane injected based on network operators' data.
- An annual audit check of coherence between the created GOs and the quantities of biomethane injected - based on network operators' data - is also carried out on GOs issued less than 3 years ago.
- If the check reveals that the issue of the GOs is based on incorrect information, the GOs are cancelled on the account of the supplier. New GOs may only be issued for a period after a new inspection establishing compliance with the elements of the GOs application. This new control will be carried out at the request and expense of the supplier;
- A GO that is not consumed within this lifetime is automatically cancelled by the registry and reported in the Annual Report as "Expired GO";
- Before any transfer of GO between suppliers, it is verified that GOs to be transferred are valid (exact information, validity period in progress) and that the seller has in his stock a number of GOs consistent with the amount of the sale to another supplier.

1.4.3.6 Operations' prices of the French registry for biomethane guarantees of origin

Operations' prices of the French registry for biomethane GOs are constant between April 1 of year N and March 31 of year N + 1 ("annual contract period"). They are revisable on April 1 of each year to consider inflation process:

Table 5: Prices in France

Operations	Price
Registrations of French gas suppliers	2 025.06 € excl. taxes / account
Modifications of existing suppliers accounts	162.01 € excl. taxes / account / modification
Registrations of French biomethane plants	1 620.05 € excl. taxes / plant
Modifications of existing plants accounts	162.01 € excl. taxes / account / modification
Issuing of GOs	0.10 € excl. taxes / GO

Transfers and uses of GOs are free in the registry. The invoices for GOs creation are emitted by the registry quarterly and at each registration/modification step for the other operations.

1.4.3.7 Potential future developments of the French registry for biomethane guarantees of origin

Due to the deadline of June 30, 2021 for the transposition into national law of the Renewable Energies Directive (RED II), negotiations are currently underway to modify the French registry for biomethane GOs:

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- The lifetime of GOs could be reduced from 24 months from the date of creation to 12 months from the date of injection of the corresponding physical biomethane production;
- The GOs attached to the new biomethane purchase contracts would be the property of the Government. It would value them from suppliers (or even end consumers) via an auction mechanism. Only municipalities could benefit from free access to the GOs of biomethane production plants located in their territory without going through the auction platform;
- GOs from other EU Member States will be assimilated to French GOs.

Last, but not least, the registry manager is currently working on the development of a "non-supplier buyer" account, in addition to the "supplier" account. This account would allow a legal entity (for example some end consumers such as municipalities, industrials…), that does not have an authorization to supply natural gas, to purchase GOs for the purpose of using them directly. These GOs cannot be resold to a third party.

1.4.3.8 Key data on the French registry for biomethane guarantees of origin

The French registry for biomethane GOs is accessible at the following link: https://gobiomethane.grdf.fr (website only in French). This platform also contains all legal information, annual reports and user guides related to the management of the registry.

For any questions, please send your requests to the following address: gestionnaire-go-biomethane@grdf.fr (French and English speaking).

Table 6: Overview of the operations carried out on the French registry for biomethane GOs over the period 2013 - 2018

	2013	2014	2015	2016	2017	2018
Number of French gas supplier account created	2	1	4	11	3	7
Number of French biomethane plants created	2	4	7	11	18	18
Number of GOs issued	9 855	12 133	54 169	141 815	346 086	373 514
Number of GOs used	4 130	10 131	33 046	72 103	134 594	347 379
Number of GOs expired	0	0	0	0	813	0
Number of GOs waiting for use	5 725	7 727	28 850	98 562	309 241	335 376
Number of GOs transferred	0	0	5 939	62 400	152 263	217 066
Quantity of injected biomethane (MWh/year)	20 069	31 989	82 166	215 876	406 389	714 000

1.5 Germany

1.5.1 Mandate/Mission

DENA is the competent organism for energy efficiency, renewable energies and intelligent energy systems in Germany. It supports the implementation of an energy transformation in politics, business and society. It looks at the energy system as a whole and is committed to make the generation and use of energy as efficient, safe, affordable and climate friendly as possible on both a national and international scale. The concept for the biogas registry in Germany was developed by DENA in 2009 with the support of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety;

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and with a dialogue between market participants and political and economic experts. The registry has been supported since the onset by 14 leading companies from the biogas and energy sector. The German biogas registry provides a platform for the generation and transfer of biogas GoOs. Use of the biogas registry in Germany is voluntary. This registry is able to document the transfers of biomethane GoOs and provide a mass balance sheet of biomethane delivery. By means of the biogas registry criteria catalogue, the GoOs can be created and documented for many different ways of subsidies. The documentation is done completely independent of the physical natural gas balance group management. However, cooperation exists between the biogas registry and the balance group management indirectly because certain laws (EEG, EEWärmeG) require a mass balancing. Registered auditors, acting as neutral experts, evaluate plants and the gas produced at these plants based on criteria of the biogas registry's fixed structure. These auditors are required to present their qualifications and satisfy certain criteria. These criteria are available to the public and can be found under "Terms and Conditions for Auditors".

1.5.2 Audit Documents

The producers of biomethane document the necessary information about the origin and qualities in the so-called audit documents in the biogas registry. For this purpose, a registered auditor inspects the production plant and prepares a report in accordance with the catalogue criteria. Within the registry, the producer will enter information which is then to be confirmed by the auditor so that the report is also provided electronically. After the validation of the data through a report by DENA, the GoO is completely recognized. Upon completion of procession the audit documents are accessible in the archive. There are two types of audits:

- Audit of the facility and
- Audit of the business operation.

In each case, the company audit is administered only for one facility at a time in which technical conditions are evaluated. The second type of audit is concerned with one or more assigned production quantities. Generally, this audit is conducted on the quantity of biomethane produced in an entire calendar year. The biomethane producing plant is accepted in the system upon completion of the audit. After this step and once the plant is entered into the system, the employees of this plant may record biogas quantities and create operational audit documents. Registered employees can request a "Grünstellung" (green marked) for their own companies with the produced quantity with an operations audit. Following the successful plausibility by the administrator, the quantity is "grüngestellt" (marked as green).

1.5.3 Accounts System

Each company has biogas and GoO certificates. These accounts display the quantity of GoOs in the form of "charges". These can be shared, transferred to other companies or cancelled. A transfer documents the handing over of the quantity within the natural gas network. A decommissioning document the withdrawal of the quantity from the natural gas network.

1.5.4 Generation of Registry Statements

The responsibility of generating registry statements lies with the system user. Further inspection by the administrator does not take place. The registry statement is set up on a certain quantity. Information (qualities and origins) about the quantity comes from the provided audit documents. The recipient data, intended purpose of, period of use and location of transfer are entered personally by the "Ausbucher" (person who cancels) through a mask. Thus, the quantity will be postmarked for a certain purpose and certain timetable.

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1.5.5 Statements issued by the German Biogas Registry

In the German biogas registry, two types of biogas registry statements (origin and purpose) are distinguished. They can be distinguished by the title, which is displayed on each page of the statement:

- Biogas registry statement on the biogas delivery (mass balancing)
- Biogas registry statement on the biogas GoO (without mass balancing).

In the first case, the biogas quantity will be delivered from the plant to the user and with that any transfer of rights within the natural gas network documented. Thus, the German design of a mass balancing is satisfied. In the second case, the gas property is separated from the other biogenic properties during the transport. The properties are connected again upon arrival to the consumer. In this case, the mass balancing terms are no longer satisfied.

1.5.6 Content of DENA Registry Statements

The registry statement summarizes all relevant data about the consumed biogas quantity, especially the following information:

Part 1: Information about the production and injection In the first part the documented facility and injection data is reproduced, which includes the following points:

- The facility in which the biogas was produced (incl. commissioning)
- The quantity
- Injection point and timetable.

These data are provided by the facilities – and operations audits. The biogas quantity refers to quantity consumed, not produced.

Part 2: The documented criteria from the criteria catalogue (Biomethane quality). It follows a listing of the criteria from the German biogas registry. These criteria show the quality of the biomethane. The criteria catalogue refers without exception to the demands which are presented by the German legislative framework. In theory personal responsibility can also be worked into the criteria catalogue.

Part 3: The company's usage of the biomethane is documented in this part especially who is the receiver of the biomethane and the respective GoO.

1.5.7 Content of GoO Germany

DENA divides the GoO into 3 parts (Production and Extraction Information, Detailed Criteria and Withdrawal i.e. Consumption Information), see under (in German language only):

https://www.biogasregister.de/en/biogas-records/register-extract.html

1.6 The Netherlands

1.6.1 Mission of Vertogas

Stimulate the development of the (international) green gas market and the production of green gas through issuance of GoOs and hence contribute to the transition to a sustainable energy future

- Key facts
  - ✓ Founded 1 July 2009 and mandated by the Dutch Ministry of Economic Affairs and Climate ("EZK") since January 2015

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- ✓ Execution has been laid down in a ministerial rule for GoOs for energy from renewable energy sources ("MR GvO")
- ✓ Gas in MR GvO is gas from renewable energy sources, i.e. Bio-Methane and Hydrogen

- VERTOGAS contributes through:
  - ✓ Reliable GoOs
    - Market acceptance of green gas
    - Legitimate payment of subsidies
  - ✓ Easy to use / low hurdles (Vertogas platform)
    - ICT platform for issue, transfer and cancellation (NL) and Export (EU) for producers, traders and end users
  - ✓ Participation in European Renewable Gas Registry (ERGaR)
    - Developing uniform and EU compliant GoO cross border transfer

Figure 27: gas volumes via Vertogas

1.6.2 Certification System

1.6.2.1 Issuance of Guarantee of Origin (certification):

GoO shows verified information about the specific origin of the green gas, including

- The volume injected energy per biomass type used
- Data regarding the producer, location, installation, production month and biomass mix
- Data regarding the sustainability of the biomass used and the CO2 emission reduction

1.6.2.2 Transfer and cancellation of GoO's (transfer):

- Facilitating the transfer of GoOs between GoO account holders in the Vertogas system
- Facilitating the cancellation of GoOs by GoO account holders in the Vertogas system to provide proof of the delivery of green gas.

1.7 Switzerland - Swiss Biomethane Registry (Swiss Association of Gas Industry)

1.7.1 Mandate/Mission

Federal law (Art. 12b Mineralölsteuergesetz) provides for the exemption of biomethane from the mineral fuel tax, so long as certain criteria (sustainability) are met. All amounts of biomethane meeting these criteria, whether injected into the gas grid or directly sold at fuelling stations, are to be registered with the clearing agency, which is operated by the Swiss Association of Gasindustry (Verband der

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Schweizerischen Gasindustrie, VSG). Not subject to registration with the clearing agency are biomass plants for direct local electricity production.

1.7.2 Regulation and Supervision by the Federal Customs Authority

Operation of the clearing agency is governed by regulations of the Federal Customs Authority (Oberzolldirektion OZD) and is under its supervision. The following market participants are required to register and file the relevant amounts within certain deadlines:

- Producers of biomethane (amounts to be registered monthly)
- Traders and distributors of biomethane (amounts to be registered quarterly).

In order to participate, producers, traders and distributors need to register and are then issued an individual login for www.biogasclearing.ch. Since the production of biomethane needs to comply with federal legislation, producers have to additionally apply for an authorization with the OZD, prior to the registration with the clearing agency.

1.7.3 Data recorded in the clearing agency

The following data is recorded in the clearing agency, individually for all producers, traders and distributors as well as in the aggregate:

- Amount of Biomethane injected into the gas grid or directly sold at fuelling stations. As provided by applicable law, the amounts are given in kilograms.
- Confirmation that all applicable criteria under the Mineralölsteuergesetz are met.
- Tracking of biomethane trade. Trades have to be registered both by the seller as well as the buyer, which allows for matching of the respective amounts.
- For each amount, end use (transportation fuel, heating, electricity production) has to be specified.
- Contact data (master data) for producers, traders and distributors is updated on an ongoing basis.

All data is recorded electronically only. No separately tradeable Guarantees of Origin (GoO) are issued on paper yet.

Table 7: Monthly biomethane production (in kilograms)

	2011	2012	2013	2014	2015	2016	2017	2018
Jan	368'830	458'778	535'574	989'823	1'240'916	1'591'011	1'785'010	2'278'805
Feb	345'555	377'824	502'732	1'056'444	1'339'397	1'523'019	1'836'881	1'783'920
Mar	414'590	633'858	749'166	1'188'424	1'629'658	1'954'608	2'266'837	2'007'088
Apr	431'285	558'062	605'877	1'138'411	1'299'640	1'762'614	1'861'564	1'919'286
May	428'239	737'033	634'919	1'183'189	1'412'558	1'856'701	2'033'699	2'074'874
Jun	723'151	685'100	809'662	1'154'486	1'438'308	1'844'363	1'887'461	2'163'768
Jul	544'252	654'456	775'095	1'218'957	1'420'939	1'731'231	1'903'450	1'813'523
Aug	645'236	519'243	861'597	1'179'249	1'505'724	1'698'953	1'869'793	2'036'039
Sep	616'619	621'479	1'065'830	1'263'131	1'484'186	1'729'797	1'959'075	2'015'707
Oct	642'513	547'826	1'071'639	1'369'733	2'033'546	1'930'884	2'225'301	2'252'447
Nov	610'203	614'508	863'605	1'306'538	1'679'307	2'125'570	2'169'687	2'402'415
Dec	579'649	506'713	1'505'400	2'014'383	2'085'938	2'045'966	2'329'284	2'328'396
Total	6'350'122	6'914'880	9'981'096	15'062'768	18'570'117	21'794'717	24'128'042	25'076'268

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1.7.4 International trade

While the regulations in principle provide for the possibility of cross-border transactions, the authorities currently do not recognize international trade of biomethane through the gas grid. Such transactions therefore cannot be registered with the clearing agency at present. However, such transactions may be filed with the VSG and are kept in a separate record. This also enables the statistical reporting of the development of cross-border trade.

1.8 United Kingdom - Green Gas Certification Scheme

1.8.1 Background information and the company

The Renewable Energy Association (REA) is a not-for-profit trade association representing British renewable energy producers and promoting the use of renewable energy in the UK.

Renewable Energy Assurance Limited (REAL) is a subsidiary of the Renewable Energy Association, with the role of developing and running assurance schemes in the renewables and organics sectors.

Ofgem (Office for Gas and Electricity Markets) provide GoO for renewable electricity in the UK but are not required to do so for green gases. Therefore, REAL has worked with the industry to develop the Green Gas Certification Scheme (GGCS) to provide GoO for renewable gas – Renewable Gas Guarantees of Origin (RGGO). RGGOs are provided for biomethane injected into the grid, as well as bio-propane distributed by tankers and bottles.

Producers of biomethane receive government support for injecting biomethane in the form of a feed-in-tariff called the Renewable Heat Incentive (RHI). The RHI is managed by Ofgem and paid for from general taxation.

The GGCS integrates its processes into the compliance processes of the RHI to create efficiencies for the Scheme and its members.

The GGCS issues a RGGO for each kWh of biomethane injected and registered by a producer. Each kWh is assigned a unique identifier that includes information on the technology and feedstock type, production site and period of injection.

In order for the Scheme to issue RGGOs producers must provide evidence that the biomethane injected met the schemes definition of a green gas which is to:

a) be a gas produced from a renewable source, that has lower GHG emissions from its production and consumption than an equivalent fossil fuel product; and
b) to have met the quality requirements of the Distribution Network into which the gas has been being injected. For injection into GDN and NTS these requirements are set out in the Gas Safety (Management) Regulations 1996.

There are currently (as of July 2019) 60 producers registered on the scheme with an injection capacity of 4.3TWh per annum. A full list of producers is displayed on the GGCS website[8].

The Scheme issued over 2TWh of RGGOs for biomethane injected during 2018. That number of is anticipated to rise to 3TWh in 2019 with a larger number of plants registering gas and existing plants

[8] https://www.greengas.org.uk/certificates/producer-information.

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operating at higher capacity factors. An additional 20 plants are estimated to be commissioned March 2021 adding an additional 0.8TWh of annual capacity.

Not all biomethane production in the UK is issued with RGGOs by the GGCS. There is a second biomethane registry run by Green Gas Trading Ltd, who issue RGGOs for approximately 10 plants. Some biomethane production may not be issued RGGOs by either Scheme.

Producers can transfer the RGGOs they are issued into trading accounts within the GGCS registry. From there RGGOs can be transferred between trading accounts or retired out of the system and allocated to gas consumers.

There are 60 trading accounts open within the GGCS registry, operated by a mix of licenced gas shippers and suppliers, biomethane plant operators, sustainability consultants and commodity traders. A full list is provided on the GGCS website[9].

At the point of retiring the RGGO, a certificate is produced in pdf format which includes the name of the end customer and the range of RGGOs that have been retired. Customers can check the validity of their certificate by visiting the GGCS website[10].

RGGOs issued by the GGCS have been shown to meet Greenhouse Gas Protocol's Quality Criteria for contractual instruments, which allows them to be used a reliable data source when using the market-based method for emission reporting. This means that a range of companies are purchasing RGGOs and reporting zero scope 1 emissions.

There are approximately 1 million UK households on tariffs where between 6 and 100% of the households' gas consumption is being matched to retired RGGOs.

In future support mechanisms for biomethane in the UK it is likely that the value of the RGGO to the producer will be taken into account, reducing the support level needed from government or enabling more biomethane to be produced for the same level of support.

The Scheme is working towards complying with the CEN 16325 standard on Guarantees or Origin for renewable energy.

RGGOs remain in the system for 39 months (three years and three months) from the month of injection, before they expire.

1.8.2 Cooperation with other registries

REAL is on the board of the European Renewable Gas Registry (ERGaR) aibsl and are working with the other registries involved to create a hub for the mass balancing of biomethane and the transfer of GoO.

REAL has a cooperation agreement with DENA who operate the Biogasregister in Germany, which facilitates the transfer of GoO between the two registries.

1.8.3 Registration of producers on the scheme

Biomethane producers must be registered on the RHI with Ofgem to complete their registration on the GGCS. Producers must provide the following information:

- Company name

[9] https://www.greengas.org.uk/certificates/for-sale
[10] https://www.greengas.org.uk/certificates/validate).

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- Company registration number
- Company address
- Company number
- Plant name
- Plant address
- Primary contact details
- Secondary contact details
- The classification of the feedstock they are using e.g. product, residue or waste
- Maximum plant capacity (m3/hr)
- Maximum plant output per month (GWh/month)
- Renewable Heat Incentive Register Number
- Commissioning Date
- Information on any related memberships or Certifications that could increase the risk of double counting.

This information is used to create a producer account that can generate RGGO.

Each RGGO contains information on

- The identity of the plant via the plant code – which links to information on the plant name and address
- The technology by which the gas was produced e.g. anaerobic digestion
- The classification of the feedstock used to be product, residue or waste.
- The quarter during which the gas was injected.
- If government support was received by the producer
- The GHG properties of the biomethane injected

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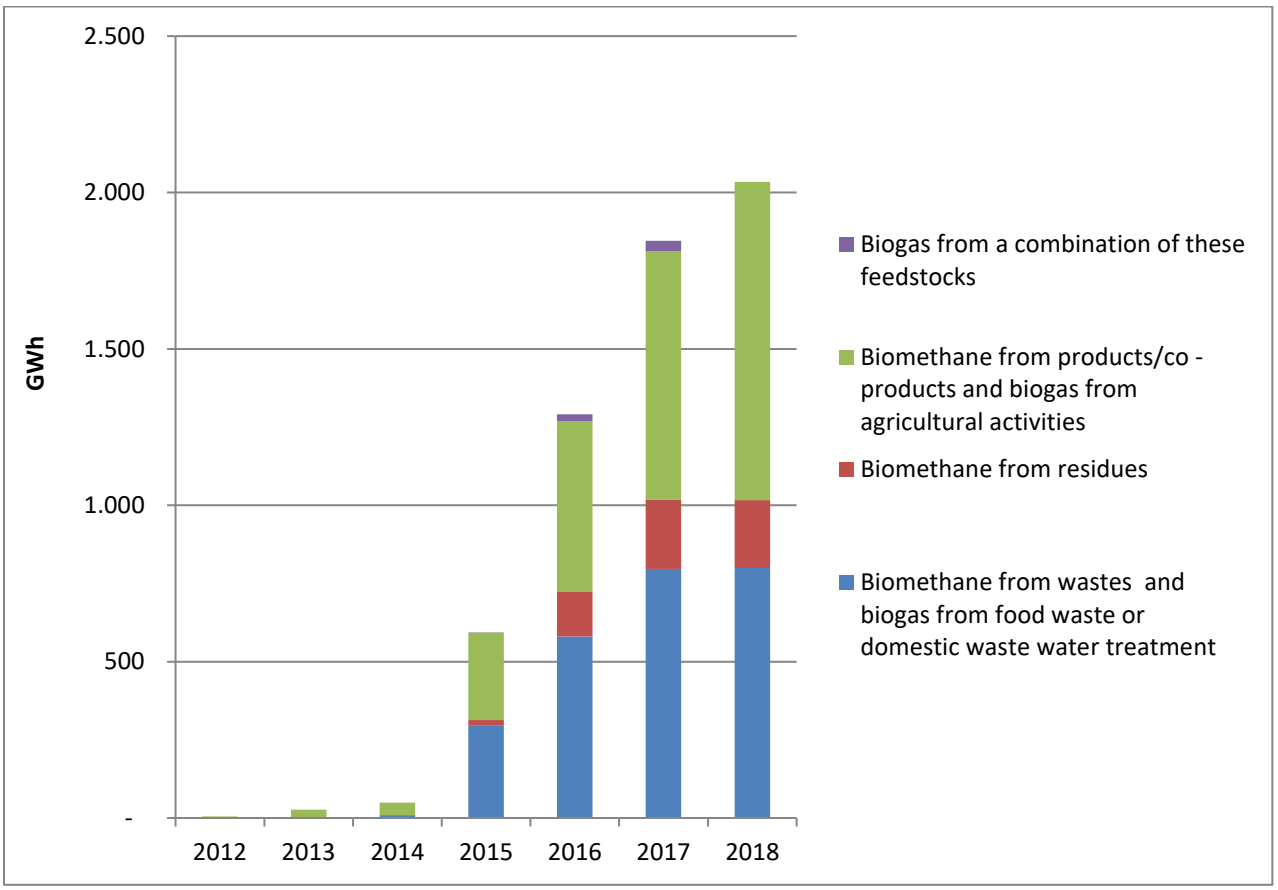

Figure 28: RGGOs issued by GGCS

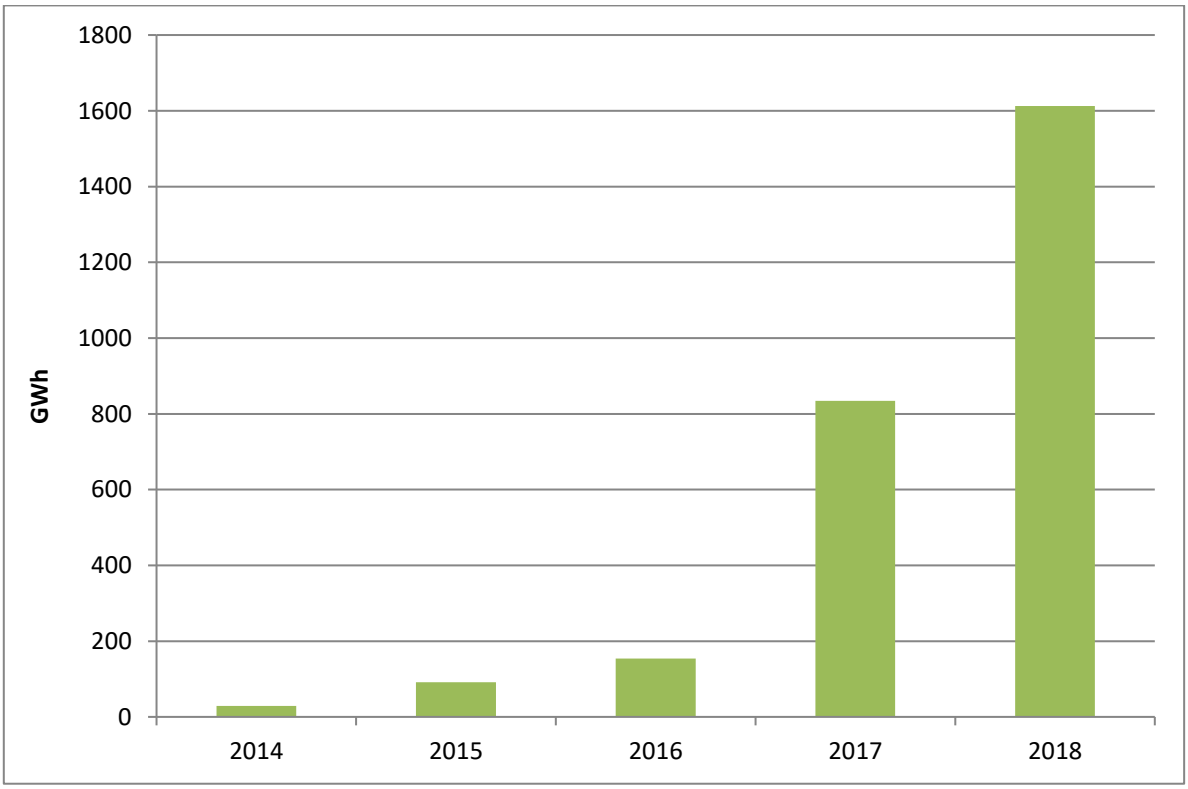

Figure 29: RGGOs sold to gas consumers and retired from the registry

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2 List of figures

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3 List of tables

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