Important Notice

16 March 2021

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This report should be read in conjunction with its disclaimer which states that the statements and opinions expressed in this document are based on information available as at the date of the document. New information has become available since the publication date of this report, for example the New Zealand Climate Change Commission published its 2021 Draft Advice For Consultation on carbon emissions. This report has not been updated to take into account such new information.

If you require any clarification or further information, please do not hesitate to call.

Yours faithfully,
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Gas Industry Company

Green Gas Certification Scheme Research

9 September 2020

Strictly Private and Confidential

pwc

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We reserve the right, but will be under no obligation, to review or amend our document, if any additional information, which was in existence on the date of this document was not brought to our attention, or subsequently comes to light.

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9 September 2020

Considerations for the development of a Green Gas Certification Scheme in New Zealand

Dear Grace,

In accordance with our engagement letter dated 9 July 2020, we attach our paper on considerations for the development of a Green Gas Certification scheme in New Zealand.

Our key findings are contained in the Executive Summary of this paper and should be read in conjunction with the remainder of the paper as well as Appendix 1 and 2.

If you require any clarification or further information, please do not hesitate to call.

Yours faithfully,
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1 Executive summary

New Zealand has made climate commitments under the United Nations Framework Convention on Climate Change, the Paris Agreement and the Kyoto Protocol and passed these commitments in law under the Climate Change Response (Zero Carbon) Amendment Act 2019. In order to meet these emissions targets, the make up of New Zealand's energy consumption will need to change significantly from today to greater use of renewable energy. For the gas sector in New Zealand, this will require substantial change, with likely falling use of natural gas and LPG over time and the potential increase in renewable gases, such as green or low carbon hydrogen and biogas. Development of a certification scheme for renewable gases in New Zealand will be a formative step in helping increase the use of these renewable gases.

Production of biogas is slowly gaining traction in New Zealand with 3.66 PJ of biogas produced for energy use in 2018. Currently, biogas is predominantly used for electricity and heat production at its location of extraction and there are no instances of biogas being refined and injected into the natural gas pipeline. New Zealand's hydrogen economy is in its infancy, with a small number of pilot projects, studies and opportunities being undertaken. Both the biogas and hydrogen sectors in New Zealand are expected to grow and both gases have the potential to be injected into the natural gas pipeline in New Zealand, allowing for greater consumer consumption of renewable gases. However, the timing and economics of such an injection is still uncertain.

Certification not only provides a potential channel for additional value to green gas suppliers, it also:

- Allows consumers to make better informed choices around purchasing green or fossil fuel sourced gases
- Provides price signals for suppliers to incentivise investment
- Provides production requirements and/or standards to ensure facilities are established and operating to meet green standards so consumers can trust what they are purchasing and
- Can aid in the international trade of renewable gases and recognition of the additional value they afford on international markets.

Looking overseas, there are a number of renewable gas certification schemes in place or under development. The most established schemes are in Europe, with the EU Renewable Energy Directive providing both the renewable energy targets and sustainability characteristics for gases that can be used by customers to meet their renewable obligations. Certification schemes, such as the Green Gas Certification Scheme (UK Biomethane) and CertifHy (European Green or low carbon hydrogen) have been established or are being established to help provide the mechanisms for consumers and producers to meet their obligations under the EU Renewable Energy Directive, and assist in meeting consumers' own sustainability targets. The European Renewable Gas Registry (ERGaR) has also been established as a scheme for cross-border trading of Guarantees of Origin. ERGaR and CertifHy highlight the importance of both international alignment and measures to avoid potential double counting for certification schemes, especially when import and export of gases is a future possibility.

Closer to home, Australia is consulting on the development of a renewable hydrogen certification scheme to support the National Hydrogen Strategy, a key objective of which is to establish Australia as a major global player for renewable hydrogen. This consultation provides a valuable information source for considering key elements of a new certification scheme in New Zealand, and touches on many of the key issues and principles found in the international schemes. The importance of international alignment is also emphasised in the Australian consultation materials, which aligns with the overarching intention for Australia to export renewable hydrogen to other markets.

Considerations for a New Zealand Renewable Gas Certification Scheme

In establishing a renewable gas scheme in New Zealand, there are a number of key questions and considerations that will need to be addressed, which are outlined in the table below. Lessons from overseas can guide a number of these areas, but considering local objectives, market nuances and stakeholder feedback will be key in establishing a well functioning certification scheme.

Table 1: Key considerations for establishment of a New Zealand renewable gas certification scheme

	Topic	Early insight or questions
1. Why establish the scheme?	• Purpose and Objective of the scheme	• The certification scheme should align with an overall vision for the gas market
2. Who should be involved in the establishment?	• Parties involved in development of the scheme	• It is important to include members from across the value chain in consultation (distributors, regulators, technical gas 'testers', producers, industry consultants, industry bodies)
	• What gases will be included	• Green or low carbon hydrogen and biogas
3. What is the scope and standards of the scheme(s)?	• Single or multi product scheme(s)	• Overseas schemes are typically single product (e.g. biogas/biomethane or hydrogen, but not combined). • Other methods of transportation outside pipeline transportation should also be considered. • The definition of sustainability and other standards for renewable gas production will be important - consider international alignment for these.
	• International alignment and geographic boundaries	• Alignment with other international certification schemes is prefered, especially for hydrogen. • Hydrogen scheme design will need to consider imports/exports in scheme design.
	• Link with other domestic schemes	• Alignment with other domestic schemes is preferable (e.g. NZECS), especially in the case of biogas, as producers may have the choice of generating electricity on site or injecting into the pipeline.
	• Guarantees of Origin (GO)	• These are critical for the scheme. The key is to determine what details are captured in the GO and the mechanisms to avoid potential double counting with other schemes. • Scope of production emissions will also need to be considered in consultation as this will influence assurance and information requirements from producers (e.g. the extent of that assurance is required for inputs into the production value chain) and consumer emissions requirements/reporting.
4. How will the scheme maintain trust and credibility?	• Extent of assurance of producers and inputs into production	• Assurance requirements will need to align with the production standards and scope of production emissions to be captured in the GOs.
	• Assurance requirements	• Annual certification is typical for overseas schemes. • It is important that the assurer(s) do not have an economic interest in the production of the gases.
	• Scheme administration	• The scheme can be operated by a third party, but maintaining trust and integrity in the scheme is important (note: there are some groups calling for greater regulatory involvement in certification to maintain trust and integrity, especially for international trade).
5. How will the scheme operate?	• Chain of custody	• Mass balancing or book and claim (or both)?
	• Trading of credits	• If domestic trading is desired, what sort of platform is required to trade credits? • If international trading is desired, would this be conducted through bi-lateral agreement or through joining an international scheme?
	• Accommodating estimation, losses, imbalances, mismatches, UFG	• Consider a final settlement lag for each trading period to allow for estimation in the system. • Other balancing areas should also be considered (i.e. does adjustment need to be made for losses in the system), but these may be secondary considerations once a scheme is well established.
	• Alignment with other schemes	• Biogas - consider applicability within MfE's guide to voluntary emissions offsetting.

A number of key principles for establishing a new certification scheme have also been developed and are shown in section 4.1 of this paper[1].

[1] See page 24

2 Introduction

2.1 Purpose

GIC is the industry body and co-regulator of the NZ gas market. It undertakes the development of arrangements and regulations to improve consumer outcomes, gas market operation and access to infrastructure.

With growing local and international pressure to reduce fossil fuel consumption, it is expected over the long term that New Zealand will shift to greater sources of renewable energy, which could result in significant change to our local gas sector. One potential characteristic of this new future is the greater use of renewable gases by industrial and commercial consumers, specifically hydrogen and biogas. While current markets for both of these gases are small or in their infancy, it is important to establish the right foundations for their growth. As part of this foundation setting, GIC is interested in exploring options for the introduction of a certification scheme for renewable gases in New Zealand.

GIC engaged PwC to assist in building its understanding of the following in relation to a renewable gas certification scheme that could support one or both of these markets:

- What schemes exist internationally for the certification of renewable gases in gas distribution networks and
- The characteristics of these schemes that may be most appropriate for NZ and the potential process for introducing these to the NZ market.

This report outlines the findings of PwC's analysis of several existing and emerging international renewable gas certification schemes.

2.2 Background

2.2.1 Renewable gas certification schemes

Renewable gas certification schemes facilitate the issuance, registration and tracking of Guarantees of Origin (GOs) for renewable gas throughout the gas supply chain. A Guarantee of Origin is a label or tracker, which guarantees that the underlying unit of gas meets the criteria of 'renewable gas', e.g. it is certified biomethane or green or low carbon hydrogen. GOs can be traded and the ultimate owner/end user is able to 'retire' the GO in order to claim the green attributes of the underlying gas.

'Claiming the green attributes' of a renewable gas can mean one of two things:

1. If the end user is a ***gas consumer or uses gas for industrial purposes***, they can use evidence of the GO being retired out of the scheme as confirmation that they 'used' renewable gas
2. If the end user is ***not a direct gas user***, they can use evidence of the GO being retired out of the scheme as confirmation of their efforts to offset their carbon emissions.

Importantly, each GO has a unique identifier and can only be owned by one party. This means that only one end user can make a claim on the green attributes of the underlying gas. When a GO is 'exported' (traded internationally), it is retired from the scheme it was issued in and enters the scheme of the market it enters.

In general, a renewable gas certification scheme acts as a registry for GOs. The structure of existing schemes varies, however in general, each will include:

- **A governance body** which defines the parameters and rules for how the scheme operates and the standards and criteria for the gas type within the scheme
- **A scheme administrator** which is responsible for the day-to-day operation of the scheme, 'maintenance' of the register and enforcement of the scheme rules set by the governance body
- **An independent verification body** which provides assurance over the renewable attributes of the gas entering the scheme
- **Account holders/members** who register and/or trade GOs within the scheme. These can be gas producers, consumers or outside parties who wish to purchase GOs as part of their carbon reduction efforts.

Renewable gas certification schemes can:

- provide certainty for consumers who buy the gas
- support confidence in the renewable gas sector
- provide balanced incentives, so that renewable gas producers can inject renewable gas into the grid instead of using it to generate electricity and remain compensated for green characteristics
- enable gas providers to attract a premium for their product
- provide GOs which can be purchased as a voluntary emissions offset
- contribute to lowering carbon emissions within an economy.

Depending on the distribution methods of the gas, certification schemes can operate on a ‘mass balancing’ and/or ‘book and claim basis’. Mass balancing and book and claim are two approaches for tracking the ‘chain of custody’ for the renewable gas and GOs.

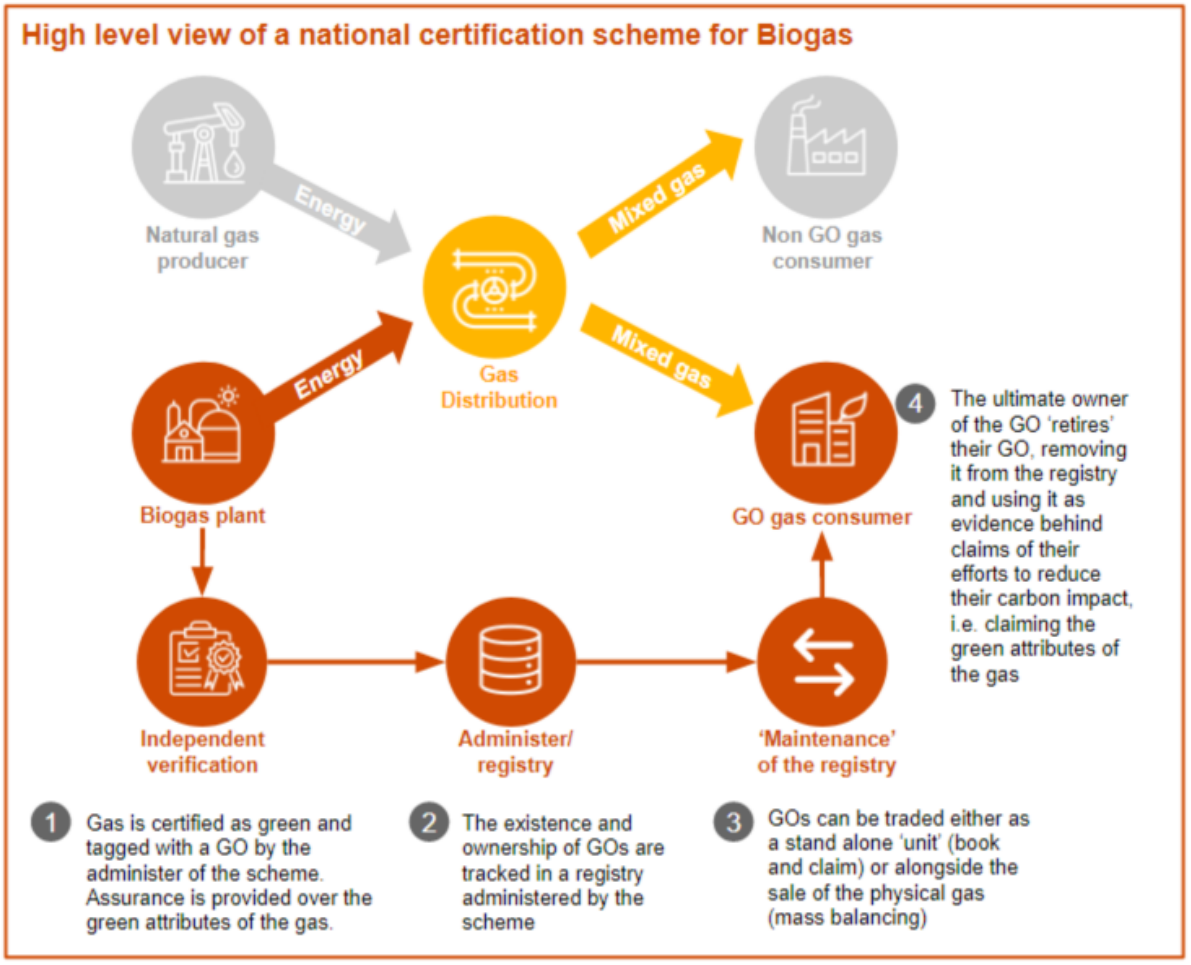
- **Mass balancing** is applied when the renewable gas is injected into the same pipeline as traditional gas. Mass balancing involves tracking the ownership of the physical gas throughout the supply chain and ultimately reconciling the amount of renewable gas injected with the amount of renewable gas sold. Noting that the sale of renewable gas is facilitated by the sale of a GO, alongside the physical gas.
- **Book and claim** is applied when the gas is distributed using multiple methods (e.g. bulk hydrogen supply through local or international transportation vessels) and therefore, it is not possible to reconcile the inputs and outputs of the supply chain. A book and claim system decouples the physical gas from the GO.

If a renewable gas is distributed in a pipeline, the relevant certification scheme can operate on both a mass balancing and a book and claim basis depending on whether the end user of the GO is also the end user of the physical gas.

2.2.2 A renewable gas certification scheme for pipeline gas

The diagram below gives a high level view of how a renewable energy certification scheme operates on both a mass balancing and a book and claim approach. In this example, biogas is distributed through the natural gas network.

Figure 1: High level view of a renewable gas certification scheme using mass balancing and book and claim



2.2.3 Natural gas and renewable gas in New Zealand

Today, gas consumption in New Zealand is predominantly made up of natural gas (2018 = 173.6PJ[2]) and LPG (2018 = 8.7PJ). Industry, electricity producers, businesses and consumers obtain this either via the North Island natural gas network or via LPG distribution throughout New Zealand, as bottled product or in reticulated networks in some South Island cities. Both products are primarily sourced from the oil and gas fields located in the Taranaki basin, with small amounts of LPG imported to balance supply/demand when needed.

Production of biogas is slowly gaining traction in New Zealand with 3.66 PJ of biogas produced for energy use in 2018. Currently, this is predominantly used for electricity and heat production at its location of extraction and there are no instances of biogas being refined and injected into the natural gas pipeline. New Zealand's hydrogen economy is in its infancy, with a small number of pilot projects, studies and opportunities being undertaken.

Both the biogas and hydrogen sectors in New Zealand are expected to grow and both gases have the potential to be injected into the natural gas pipeline in New Zealand, allowing for greater consumption of renewable gases. However, timing and economics of such an injection is still uncertain, with a recent Castila study indicating pipeline injection of hydrogen would not be economically competitive until 2046[3].

Biogas

Biogas is commonly produced in municipal wastewater and sewage treatment plants, industrial operations that have liquid wastes containing organic material and on farms where animals are kept or held in a small area, such as pig or poultry farms. The anaerobic digestion can occur in purpose-built sealed containers or in covered ponds[4]. Coming from a variety of non-fossil sources, biogas is primarily a mixture of methane and carbon dioxide, which is combusted on site to produce heat and/or electricity.

In 2018, 3.66PJ of biogas was produced for energy use in New Zealand with 90% of this being used in electricity generation or cogeneration (combined heat and electricity generation). The remaining 10% was used directly in industrial or commercial energy processes[5]. Currently, biogas is not refined and injected into the natural gas pipeline.

The Bioenergy Association of New Zealand estimates an additional 1.1PJ p.a. of biogas capacity exists in New Zealand and has assessed a further 6PJ p.a. of additional potential capacity, using existing waste material. The potential capacity could come from:

- municipal solid waste 2.5 PJ
- dairy shed waste 1.5 PJ
- sewage biosolids 0.9 PJ
- meat processing biosolids 0.6 PJ
- dairy processing biosolids 0.4 PJ

While these additions would provide a significant portion of renewable gas, approximately 7% of current natural gas consumed, it is unclear how much of this would be potentially injected into the natural gas network, as opposed to being used in closed electricity and heat processes on site.

Hydrogen

New Zealand's hydrogen economy is in its infancy, with a small number of pilot projects, studies and opportunities being undertaken. However, while small, it is increasingly being discussed as a key part of New Zealand's clean energy future. In September 2019, the Government released "A vision for hydrogen in New Zealand: Green Paper"[6]. This paper provided a broad vision that covered the scope of hydrogen's potential to

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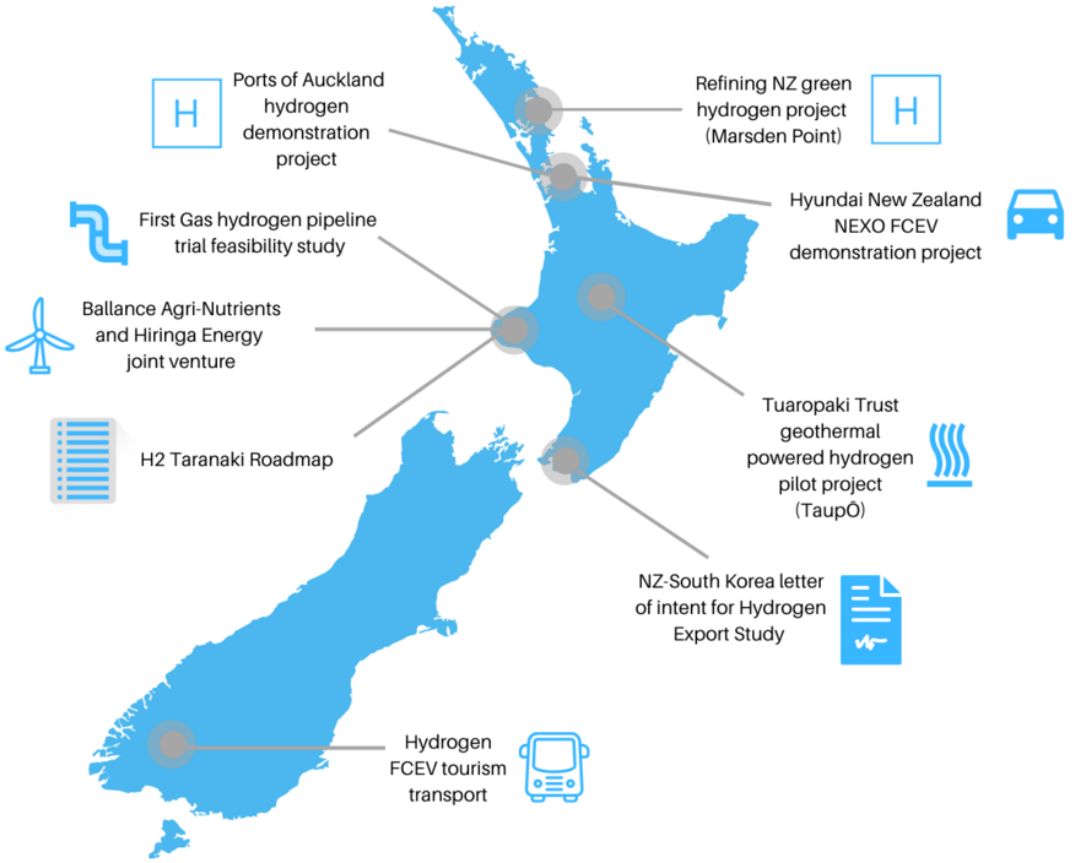
[2] Ministry of Business Innovation & Employment (2019), *Energy in New Zealand 19*, retrieved from https://www.mbie.govt.nz/dmsdocument/7040-energy-in-new-zealand-2019, pp. 12-13
[3] Castalia (2020), *Modelling Hydrogen Pathways for MBIE: Model Results*, retrieved from https://www.mbie.govt.nz/dmsdocument/11513-modelling-hydrogen-pathways-for-mbie-model-results, pp. 22
[4] Bioenergy Association (2020), *Biogas*, retrieved from https://www.bioenergy.org.nz/biogas
[5] MBIE (2019), *Energy in New Zealand 19*, retrieved from https://www.mbie.govt.nz/dmsdocument/7040-energy-in-new-zealand-2019, pp. 13
[6] New Zealand Government (2019), *A vision for hydrogen in New Zealand Green Paper*, retrieved from https://www.mbie.govt.nz/dmsdocument/6798-a-vision-for-hydrogen-in-new-zealand-green-paper

frame discussions for a national strategy and examined potential for hydrogen production, export and utilisation in the NZ economy. Applications for hydrogen explored in this paper included:

- Hydrogen for mobility
- Hydrogen for industrial processes
- Decarbonising gas supplies (conversion of the natural gas network into a hydrogen network, or blending hydrogen into the existing natural gas network) and
- Hydrogen for export.

Figure 2: Current New Zealand hydrogen projects



[7]

With regard to certification, it was noted in the green paper that "Green hydrogen exports, with internationally recognised green hydrogen certification, should be the aspirational goal"[8]. In the summary of submissions on the green paper, it was also noted that "From supporters of green hydrogen, there was strong support for certification internationally for a green hydrogen standard to ensure hydrogen promotes a legitimate carbon reduction"[9].

Outside of the green paper, the New Zealand Government has also provided direct funding to stimulate hydrogen development in New Zealand, the latest being a $19.9m investment by the Provincial Growth Fund into the Ballance Agri-Nutrients Limited and Hiringa Energy Limited Joint Venture in Taranaki[10].

[7] Hydrogen New Zealand (2020), *Current Hydrogen Projects in New Zealand*, retrieved from: https://www.nzhydrogen.org/nz-hydrogen-projects

[8] New Zealand Government (2019), *A vision for hydrogen in New Zealand Green Paper*, retrieved from https://www.mbie.govt.nz/dmsdocument/6798-a-vision-for-hydrogen-in-new-zealand-green-paper, pp. 74

[9] MBIE (2020), Analysis of Hydrogen Vision Submissions, retrieved from https://www.mbie.govt.nz/dmsdocument/11343-analysis-of-hydrogen-vision-submissions, p. 7

[10] Beehive (2020), *PGF investment in green hydrogen*, retrieved from: https://www.beehive.govt.nz/release/pgf-investment-green-hydrogen

2.3 Why consider renewable gas certification in New Zealand now?

Establishing a well functioning and trusted certification scheme is seen as a key formative step in developing a reputable market for renewable gases. Certification not only provides a potential channel for additional value to green gas suppliers, it also:

- Allows consumers to make better informed choices around purchasing green or fossil fuel sourced gases
- Provides price signals for suppliers to incentivise investment
- Provides production requirements and/or standards to ensure facilities are established and operating to meet renewable standards, so consumers can trust what they are purchasing and
- Can aid in the international trade of renewable gases and recognition of the additional value they afford on international markets.

Establishing a certification scheme when the market is in its infancy also helps remove uncertainty for early participants, taking away uncertainty around future requirements or operation of the scheme. However, the benefits of early scheme establishment need to be traded off against the economic cost of the scheme and ensuring that it is not too onerous or burdensome for early participants.

3 Analysis of international certification schemes

To assist in building GIC's understanding of renewable gas certification, PwC carried out desktop research on several key certification schemes in place or being established around the world. Through consultation with our global PwC network and GIC, it was determined that the European market was the most developed and globally accepted market. The Australian market was also deemed to be of interest, as it is currently in the process of developing a Hydrogen Certification Scheme.

PwC's analysis covered an overview of selected renewable gas certification schemes, the environments they operate in and how they were established:

Section	Topic	Areas of analysis
3.1	The wider regulatory and governance context of the European market	• **EU Renewable Energy Directive:** a directive of the European Parliament and Council intended to promote the use of energy from renewable sources • **The role of OFGEM:** (Office of Gas and Electricity Markets) a non-ministerial government department and independent National Regulatory Authority, recognised by EU Directives • **European Renewable Gas Registry (ERGaR):** an independent body, currently in development, designed to provide a documentation scheme between national registries for biomethane and other renewable gases as they are distributed along the European Gas Network.
3.2	The characteristics of existing international renewable gas certification schemes	• **Green Gas Certification Scheme (GGCS):** an existing scheme for the certification of biomethane in the UK • **CertifHy:** an emerging scheme that is currently in pilot, looking to establish an EU-wide scheme for the certification of green hydrogen and low carbon hydrogen • **Other European schemes:** The Belgian, Italian, German, French and Dutch certification schemes were briefly looked at during desktop research. The shape of European schemes tends to be heavily influenced by the legislation under which they operate (EU Renewable Energy Directive).
3.3	The establishment approach for new or recently established schemes	• **CertifHy:** as above • **Australia's National Hydrogen Strategy/Certification Scheme:** a programme of work currently underway to develop an international certification scheme for renewable hydrogen in line with Australia's national hydrogen strategy.
3.4	Certification of renewable energy in New Zealand	• Currently operating renewable energy certification schemes (or wider certification schemes) in New Zealand.

The following section outlines our key findings on each of the above, as well as some key themes to consider as GIC explores options for a certification scheme in New Zealand. Further detailed assessment of each of the above schemes or wider market aspects can be found in Appendix 1.

3.1 The wider regulatory and governance context of the European market

The Renewable Energy Directive

In the European market, the Renewable Energy Directive encourages and facilitates the growth of the renewable energy and gas industry and ensures consistency and best practice is applied in certification schemes within the industry.

The Renewable Energy Directive is a directive of the European Parliament and Council intended to promote the use of energy from renewable sources. The initial directive, introduced in 2009, which established national targets for EU member countries, was seen as a "novelty act"; however the directive was revised in December 2018 (RED II) to include a new binding renewable energy target in the European Union for 2030 of at least 32%.

Although the directive is broad in scope (comprising 39 articles), it contains specific provisions for the verification of compliance with sustainability and emissions savings for biofuels, bioliquids and biomass fuels.

With respect to gas, the directive sets out the mathematical measure for the carbon impact of biomethane derived from different fuel sources. This mathematical measure accounts for the sustainability of the production of biomethane in both how and where it is produced - if biofuel production involves the displacement of areas such as primary forests, despite otherwise being sustainable, it would not meet the land-use criteria to be considered sustainable under the Renewable Energy Directive. It also emphasises the importance of Guarantees of Origin, to facilitate a functioning cross-border trade market in gas, and a Mass Balance approach to measurement to ensure there is no double counting of renewable energy[11].

RED II has been designed to allow voluntary schemes to be established to ensure the certification and verification of emissions. It does however allow the European Commission to specify standards with respect to reliability, transparency, independent auditing and requires all voluntary schemes to apply these standards.

OFGEM (Office of Gas and Electricity Markets - UK)

OFGEM is a non-ministerial government department and an independent National Regulatory Authority in the United Kingdom, recognised by EU Directives and governed by the Gas and Electricity Markets Authority. OFGEM's key objectives include:

- working with Government, industry and consumer groups to deliver a net zero economy at the lowest cost to consumers
- monitoring industry practices and ensuring fair treatment for consumers
- enabling competition and innovation, which drives down prices and results in new products and services for consumers.

While OFGEM does not specifically regulate renewable gas certification schemes, as a key industry regulator, it has an influence on the quality measures and operations underlying gas production, distribution and trading, therefore providing a lot of the structures and requirements for meeting the EU Renewable Energy Directive. In particular:

- The production and injection of biomethane is tightly regulated by OFGEM, National Grid, and the local gas distribution network operator (GDNO), where the plant is based, to ensure that gas produced meets stringent sustainability and quality criteria.
- The sustainability criteria for UK biomethane (set by OFGEM) sets out some of the most detailed requirements in the world and biomethane produced in Biomethane to Grid (BtG) schemes can only qualify for Renewable Heat Incentive (RHI) support if it has achieved a minimum 60% greenhouse gas (GHG) saving over the European heat average[12].
- OFGEM also administers the UK Guarantees of Origin Scheme for Renewable Energy (Electricity).[13]

[11] OFGEM (2020), *Gas*, retrieved from https://www.ofgem.gov.uk/gas

[12] Green Gas Certification Scheme (GGCS) (2018), *Response to Draft London Plan (Greater London Authority (GLA) consultation, December 2017)*

[13] OFGEM (2020), *Guarantees of Origin*, retrieved from https://www.ofgem.gov.uk/environmental-programmes/rego/energy-suppliers/guarantees-origin-goos

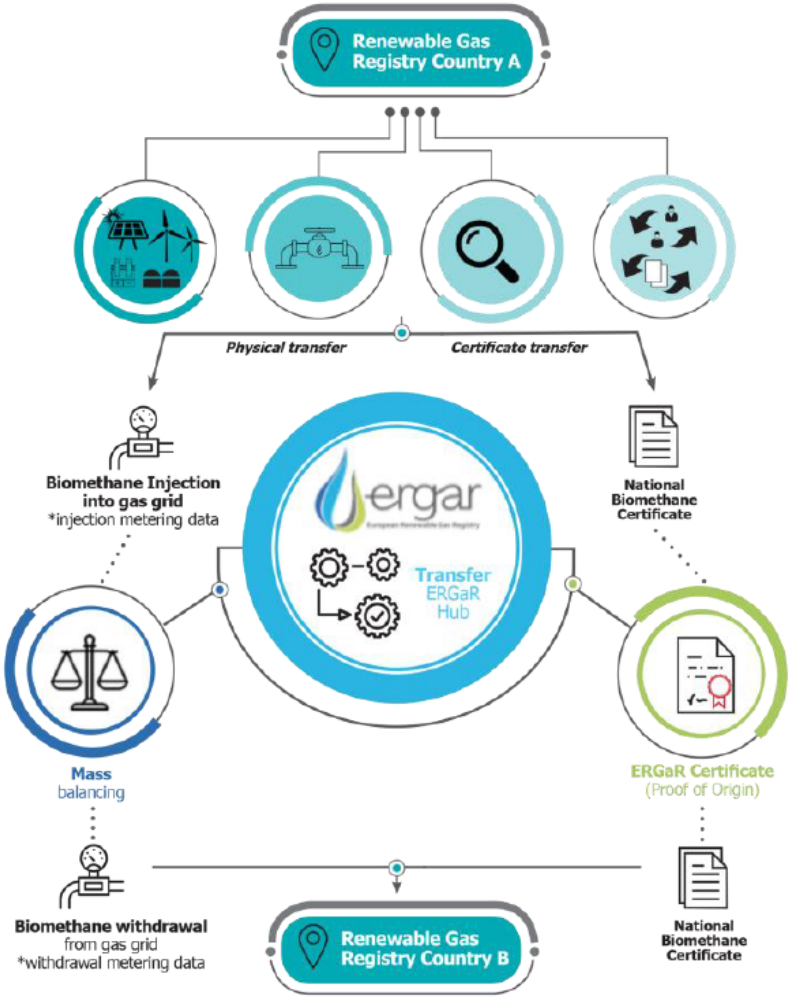
European Renewable Gas Registry (ERGaR)

ERGaR is an independent body currently in development, designed to provide a documentation scheme between national registries for biomethane and other renewable gases as they are distributed along the European Gas Network. It is designed to allow for co-operation between Europe's National Gas Registries and producers in European countries with registries, such that a transnational trading market for certificates can occur in Europe.

Cross-border transfer introduces additional complexity into certification schemes, as double counting and double sale of certificates can occur by bad actors in countries where national registries are poorly designed, which may in turn undermine the legitimacy of other national registries, even if they are soundly developed internally. ERGaR has been designed as an indepent, transparent and trustworthy documentation scheme, in an attempt to prevent this issue occurring and reduce the need for bi-lateral agreements between national registries.

ERGaR plans to operate its documentation scheme through a digital transfer hub, which ensures that national certificates are appropriately cancelled when transferred across countries and that the certificates reconcile against the physical gas, such that mass balancing can be confirmed transnationally.

Figure 3: ERGaR Proposed Process Diagram[14]



[14] ERGaR (2020), *ERGaR Presentation*, retrieved from http://www.ergar.org/wp-content/uploads/2018/10/ERGaR-presentation_March2020.pdf

Considerations for a New Zealand scheme

- The development of gas certification schemes in Europe has been underpinned by EU wide and national targets associated with reductions in greenhouse gases and/or increased production of renewable gases. These have come with incentives or penalties for consumers of gas, making the value of certification easier to ascribe. As part of developing a renewable gas certification scheme in New Zealand, it will be important to understand the drivers for production of renewable gas in New Zealand and how certification could be designed to assist the desired change in our market.
- OFGEM, as the gas market regulator, plays an important role in setting regulation and criteria for renewable gases in the UK, which assists in both meeting EU directive requirements and providing consumers with trust in the wider schemes. With a different market context and drivers in New Zealand, GIC could take a different role in any certification in New Zealand, or no role at all, but it will be important to consider how this reflects on national and international trust in any scheme. OFGEM also sets a precedent for an industry regulator successfully administering a guarantees of origin scheme (albeit for renewable electricity, not gas).
- While the gas market in the EU is substantially different to New Zealand, the development of ERGaR highlights some of the considerations for international trading which need to be considered if renewable gases could be exported from or imported into New Zealand in the future. If facilitating an export market is deemed to be of relevance, then alignment with, or participation in, international schemes will be important to consider. This could either be implemented in the New Zealand scheme from the outset or consideration could be given to the design of the scheme, such that it could join international bodies at a later date.

3.2 Characteristics of existing international renewable gas certification schemes

While many certification schemes exist worldwide, we have primarily focused our attention on two leading renewable gas schemes: the Green Gas Certification Scheme (UK) and CertifHy (Europe).

The table below provides a summary of the design and operation of these two schemes. The two schemes share a lot of similar operating principles and practices. Further detail on each of the schemes can be found in Appendix 1.

Table 2: Key findings of analysis of Green Gas Certification Scheme UK and CertifHy

Topic	Green Gas Certification Scheme UK[15]	CertifHy[16]
Product(s) within the scheme	Biomethane RGGOs (Renewable Gas Guarantee of Origin) only	Green hydrogen and low carbon hydrogen GOs only
Method of gas distribution	Pipeline only	Pipeline and transportation
Chain of custody	Mass balance and Book and Claim	Book and Claim

[15] Renewable Energy Assurance Limited (2020), *Green Gas Certification Scheme*, retrieved from https://www.greengas.org.uk/
[16] CertifHy (2020), *Home page*, retrieved from https://www.certifhy.eu/

Topic	Green Gas Certification Scheme UK[17]	CertifHy[18]
Details that are captured within the schemes Guarantees of Origin (GO)	○ Technology and feedstock used, e.g. landfill gas ○ Month and year in which it was produced (MM/YY) ○ Region in which the gas was produced ○ Registered producer ○ The kWh number, part of a sequence or range relating to that producer's green gas injected into the grid that month	○ Account number ○ Identity of the production device ○ Date and time of the hydrogen production ○ Fuel (or heat source) and Technology ○ Financial support to hydrogen production or input fuel ○ Share of renewable energy for each input energy carrier for producing the hydrogen ○ GHG balance (greenhouse gas intensity, the amount of carbon and equivalents emitted in the production of one MJ of Hydrogen) ○ GO identity info *unique identifier, date, cancellation/expiry date) ○ CertifHy label - Green hydrogen or low carbon hydrogen - determined by the above information and audited
Structure and Governance	Issuance and registry are managed by an independent body - Renewable Energy Assurance Ltd (REAL). REAL also appoints the auditor(s). Governed by an oversight panel of various industry stakeholder including: • A Bio Energy plant operator • A biomethane to grid project management company • An energy supplier • A local council • The owner and operator of the the gas national transmission system • A water and waste water management company	Certification, issuance and maintenance of the registry are planned to be operated as separate bodies. Governed by an independent 'competent authority'/stakeholder platform comprising various industry participants.
Alignment with international schemes	RGGOs can be exported to other registries and GOs from other registries can be imported into the GGCS.	CertifHy is intended to operate across the European Union.
Regulatory environment	The GGCS itself is not specifically monitored by a regulatory body. The design of the GGCS ensures that members of the scheme are compliant with certain regulations and ensures that the scheme's requirements facilitate compliance with regulations as well as alignment to other Government initiatives such as the Renewable Heat Incentive.	CertifHy itself is not specifically monitored by a regulatory body. The design of the scheme, particularly the definition of green hydrogen is aligned to various legislation such as the Renewable Energy Directive and the Fuel Quality Directive. Design of the scheme also considers legislation relating to green energy disclosure and guarantees of origin.

[17] Renewable Energy Assurance Limited (2020), *Green Gas Certification Scheme*, retrieved from https://www.greengas.org.uk/
[18] CertifHy (2020), *Home page*, retrieved from https://www.certifhy.eu/

Topic	Green Gas Certification Scheme UK[19]	CertifHy[20]
Other points of interest	RGGOs are recognised Energy Attribute Certificates (EACs) - a market instrument created to represent the renewable and/or sustainable value of a unit of energy generation	N/A

Other European schemes we identified during desktop research operate in a similar manner (see Appendix 1), likely due to their need to comply with the European Renewable Energy Directive. Certain countries (namely France and Italy) have distinct regulation and subsidies for renewable gas used in the transport sector, as compared to renewable gas that has no specific intended use. This is in large part due to the targets for renewable energy use in the transport sector specified in the European Renewable Energy Directive.

Key Takeaways	Considerations for a New Zealand scheme
Each scheme focuses on one gas type or product. Focusing on a single gas type within a scheme is likely driven by the need to reduce complexity that would arise from variation in: • the stakeholders involved in the market for each gas and their priorities • the audit procedures required to certify each renewable gas type • the end use of the gases driving differences in the requirements of end users/consumers • the regulations which apply to each gas • the expertise required to design and operate schemes associated with each gas.	• **Overseas practice would indicate any future certification scheme(s) should focus on one gas type each**, rather than one scheme for all renewable gases.
The chain of custody of a scheme is influenced by the distribution methods of the gas. • **In the case of pipeline gas:** the entire pipeline/supply chain can be measured for the level of renewable gas vs other gas. Therefore, GOs can be claimed on a mass balance basis whereby the end user of the gas provides evidence of both their purchase of the physical gas and their purchase of the GO in order to claim the green attributes of the gas. Alternatively, the gas and the GO can be decoupled on a book and claim basis, meaning the end purchaser of the GO can claim the green attributes of the gas and the end user of the physical gas cannot. • **In the case of transportation or mixed distribution:** only a book and claim approach can be applied as the entire supply chain (i.e. the transportation network and the pipeline) is not monitored for total levels of renewable gas.	• In designing certification scheme(s), it will be important to consider the chain of custody and if a mass balancing or book and claim (or both) would work best.

[19] Renewable Energy Assurance Limited (2020), *Green Gas Certification Scheme*, retrieved from https://www.greengas.org.uk/
[20] CertifHy (2020), *Home page*, retrieved from https://www.certifhy.eu/

Key Takeaways	Considerations for a New Zealand scheme
Renewable gas certification schemes are typically governed by an independent panel/consortium of industry participants.	• Trust and integrity of the schemes are key, but GIC does not necessarily need to administer and govern the scheme if this could be achieved through third parties or industry participant representation.
Verification of the information on GOs is carried out by an independent assurance provider. This is crucial, as verification must be provided by a party with no economic interest in the scheme.	• Verification of renewable gas in New Zealand needs to be carried out by an economically independent party. This may be a new market created by the introduction of a certification scheme.
Renewable gas certification schemes are typically voluntary and rely on 'self regulation' by the industry. However, renewable gas certification schemes add value to their members and ensure credibility of the scheme by ensuring alignment with relevant domestic and international legislation, regulation and standards. See below.	• Who are the key players in the New Zealand gas industry that would have an interest in the governance of the scheme?
Each scheme has been designed to align with relevant international regulations. By aligning to international regulations surrounding gas production, GO issuance/certification and sustainability and GHG measures, a scheme enables: • export of the gas and/or GOs • integrity and credibility of the market • alignment to established best practice.	• Alignment with domestic and international energy schemes will be key to consider when establishing any new renewable gas certification scheme. • Also consider legislation or regulations currently existing in the New Zealand gas market and carbon emissions market.
Renewable gas certification schemes are typically operated on a not-for-profit basis. Fees charged by the scheme are a factor of both the number of members within the scheme and the volume of gas/GOs issued.	• Who would fund the establishment of a New Zealand renewable gas certification scheme? • What scale does the scheme need to achieve in order for participation to be commercially viable for its members?

3.3 Approach for establishment of new or recently established schemes

CertifHy and the Australian National Hydrogen Certification Scheme are programmes currently being developed to establish renewable hydrogen certification schemes in the EU and Australia respectively. CertifHy has progressed to the point of running a pilot at four sites which use different gas production methods. The Australian scheme is at an earlier stage, working through detailed consultation with industry and the public on potential scheme design.

Topic	CertifHy[21]	Australian National Hydrogen Certification Scheme
Key objectives of the scheme	Implementation of an EU-wide green and low carbon hydrogen GO market. Initiated at the request of the European Commission as part of the Renewable Energy Directive.	Implementation of a renewable hydrogen certification scheme to support the National Hydrogen Strategy, a key objective of which is to establish Australia as a major global player for renewable hydrogen.

[21] CertifHy (2020), *Home page*, retrieved from https://www.certifhy.eu/

Topic	CertifHy[22]	Australian National Hydrogen Certification Scheme
Parties involved in establishment	The CertifHy project is being undertaken by a Consortium led by Hinicio (a strategy consulting firm specialised in sustainable energy and transport) and financed by the FCH 2 JU (Fuel Cells and Hydrogen Joint Undertaking), a consortium which supports research, technological development and demonstration activities in fuel cell and hydrogen.[23] Members of the consortium include: ● GREXEL - energy certificate registry provider ● Ludwig Bolkow Systemtchnik (LBST) - independent strategy and technology consultant in energy, mobility and sustainability ● TNO - Netherlands Organisation for applied scientific research ● TUV SUD - technical service provider of testing, inspection, certification and training solutions.	In May 2020, Australia's Department of Industry, Science, Energy and Resources (DISER) commenced consultation with state and territory stakeholders and industry representatives. A request for quotation was recently issued to consulting firms in relation to the development of a certification scheme for renewable hydrogen.
Key activities	**Completed to date:** ● Creation of a stakeholder platform for continuous consultation and governance throughout the programme ● Review of market outlook and regulatory contexts across the EU ● Review of existing GO schemes ● Development of a common Europe-wide definition of green hydrogen and low carbon hydrogen ● Design of a preliminary scheme and roadmap for a pilot ● Operation of pilot and feedback **To be completed:** ● Final design of scheme incorporating feedback ● Implementation of the final scheme	**Completed to date:** ● Industry consultation surrounding: ○ Whether a scheme should have a domestic or international focus. ○ When a scheme should begin operating. ○ How a scheme should align with existing regulations and frameworks. ○ How the scheme should be measured and how it should interact with environmental regulations. ● Request for quotation from consulting firms for the development of a scheme **To be completed:** ● Programme roadmap to inform key activities for design and implementation
Key findings	● Lack of regulatory guidance on the operation of GO schemes can create issues when looking to enable export of GOs to other schemes. Leakage of attributes and/or arbitrage can occur when GO tracking systems are not coordinated, the industry believes regulation would enable better consistency and coordination. ● There are several trade-offs involved in using a central platform vs bilateral trading: ○ bilateral trading can lead to cumbersome price discovery and	● The majority of consultation respondents felt that the scheme should be in place promptly - by 2021/2022. However, some suggested that implementation should be delayed in order to allow the market to develop prior to regulation. ● The Australian National Greenhouse and Energy Reporting System was suggested by most respondents with regards to carbon accounting. Other options considered included: ○ The Intergovernmental Panel on Climate Change (IPCC) carbon accounting

[22] CertifHy (2020), *Home page*, retrieved from https://www.certifhy.eu/
[23] CertifHy (2020), *Project Team*, retrieved from https://www.certifhy.eu/contributors/consortium-members.html

	unwanted market segmentation (e.g. based on source or location) ○ central trading can remove these barriers but reduce gas producers' ability to market a distinctive product. ● There is a level of skepticism in the market surrounding the validity of renewable gas schemes given historic issues with double counting in the renewable energy industry. Subsequent scheme designs have had a heavy focus on preventing double counting by using unique identifiers for GOs and more robust systems for verification of GO certificates and their ownership status.[24]	○ Bottom-up measuring at sites ○ World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) greenhouse gas protocols. ● Respondents suggested alignment to the existing Renewable Energy Target schemes/Certificates (administered by the Clean Energy Regulator), the Australian Energy Market Commission, the Australian National Greenhouse and Energy Reporting System and the National Energy Market rule. ● The carbon emissions scopes considered appear to be inconsistent between schemes.[25]

Key Takeaways	Considerations for a New Zealand scheme
Both programmes have commenced with significant industry consultation. Consultation has covered a wide range of industry participants across the full value chain including producers, distributors, technical experts and researchers, regulatory bodies, gas consumers and consultants. In the case of biomethane, producers of feedstock e.g. wastewater management and landfill companies have also been involved in consultation.	● Who are the key players in the New Zealand gas industry that would have an interest in a certification of renewable gas? ● What is the process for industry consultation? How will it be managed and governed?
Initial consultation and work packages focused on: ● The current market, its potential and its priorities ● The current regulatory environment ● The potential for international alignment/interaction to facilitate exports of gas and GOs ● The design of and lessons learned from existing schemes.	● What is GIC's role in the development of any renewable gas certification scheme?
The design of renewable gas certification schemes is becoming more standardised as best practice becomes apparent and regulation of renewable gas production, carbon emissions accounting provide guidance for the design of GO schemes.	● What best practise characteristics of international schemes can we easily apply in New Zealand?
The carbon emissions scopes considered appear to be inconsistent between schemes.	● Are there any commonly accepted practices in reporting GHG emissions associated with the production and use of renewable gases in New Zealand? Are these globally accepted?

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[24] CertifHy (2015), *A review of past and existing GoO systems*

[25] Australian Government and COAG Energy Council (2019), *National Hydrogen Strategy Issue paper series, Guarantees of Origin Issue paper*

3.4 Certification of Renewable Energy in New Zealand

Certification of green energy is still in its early stages in New Zealand. To date, the New Zealand Government has utilised carbon pricing as its main tool to incentivise lower carbon emissions and, with New Zealand's high proportion of renewable electricity generation, 82.4% for 2019[26], there has been little commercial incentive for certification. However, as a result of growing climate change awareness across society, this is changing and a New Zealand Energy Certificate System (NZECS)[27] has been established by the New Zealand Body for Certificate Issuance (NZBCI)[28].

NZECS provides certification for electricity generation and has been designed to be compatible with international greenhouse gas reporting standards. The scheme certificates can only be issued to electricity generation facilities operating in New Zealand and the scheme does not yet incorporate other forms of energy, such as renewable gases. The promotion of the benefits of NZECS's certification can be seen through Meridian Energy's Certified Renewable Energy product shown on the following website: https://www.meridianenergy.co.nz/business/sustainability/certified-renewable-energy

A plethora of other sustainability certifications are now available for organisations to show independent verification of their commitment to sustainability. Although not energy specific, these schemes provide accreditation for businesses' sustainability efforts. Examples of schemes include CoGo, Toitū (carbonreduce and carbonzero) and Environmental Choice.

Considerations for a New Zealand scheme

- How would any renewable gas scheme align to other renewable certificate schemes in place in New Zealand?
- The production of renewable gas is a generally accepted 'carbon removal', therefore, the design of a New Zealand scheme should consider MfE's guidance for voluntary offsets to ensure validity of GOs within the New Zealand voluntary offsetting market.

[26] MBIE (2020), *Electricity*, retrieved from https://www.mbie.govt.nz/assets/Data-Files/Energy/nz-energy-quarterly-and-energy-in-nz/Electricity.xlsx. Table 2

[27] See https://www.certifiedenergy.co.nz/

[28] The NZBCI is a commercial, for-purpose entity, registered as a company in New Zealand.

4 Principles and considerations for renewable gas certification in New Zealand

PwC's analysis has highlighted several general principles that should be applied to the design of any certification scheme, as well as a number of considerations which will need to be explored in the context of New Zealand's gas industry. These findings are outlined below.

4.1 Design principles for an effective certification scheme

There are several key principles that should be applied when designing any renewable gas certification scheme. We expect that, at a fundamental level, a New Zealand scheme should exhibit the following characteristics:

- **Measurable** - Emissions measurement is essential for producers, consumers, investors and governments to quantify the climate change mitigation effects of a specific source of renewable gases.
- **Simple** - The scheme should be well-understood by consumers and producers, avoid onerous complexity that may result in difficulties to effectively regulate and audit, and avoid creating an additional administrative burden.
- **Transparent** - Participation should be based on objective and publicly disclosed criteria, so as to achieve fair and open access to the scheme. Access to details of GOs should be made available to all members/ account holders.
- **Immutable** - To preserve the integrity of the GOs, data should not change once a GO has been issued. Re-bundling and re-labelling of GOs to produce derivatives is not recommended.
- **Reliable** - Appropriate systems, controls and procedures should be in place to ensure data security and data backup.
- **Cost efficient** - Producers are already tackling the commercial challenges of establishing renewable gases in an emerging market against established, competing fuels. The Guarantee of Origin requirements should avoid adding material capital costs, monitoring or reporting costs, which may discourage uptake and disincentivise investment.
- **Consistently applied** - A single scheme to cover hydrogen produced from multiple regions and production methods should be in place to reduce confusion and allow comparability of products. The same principle should apply to biomethane scheme design.
- **Transferable and traceable** - As hydrogen could be a potential export commodity that will be handled by multiple parties through the supply chain, the Guarantee of Origin certificate needs to be traced to the product in a secure and unique way to ensure consumer and regulator confidence and prevent double counting.
- **Maintained -** GOs should be able to be withdrawn from the scheme in the case of an error or non-compliance, retired when 'claimed' by the end user, and expired when not retired or withdrawn within a given time period.

4.2 Considerations for renewable gas certification in New Zealand

The earlier sections of this report have touched on a number of key establishment decisions, learnings and considerations for a renewable gas certification scheme in New Zealand. This section provides further consideration of these choices in the New Zealand environment, highlighting either preferred direction to follow

or key questions that will need to be considered and discussed with key stakeholders as part of the establishment of any scheme.

The certification scheme may draw upon specific characteristics of existing schemes and, through stakeholder consultation, adapt in response to New Zealand-specific considerations such as:

- The potential for future export (and import) of renewable gases, particularly hydrogen
- Current estimation within New Zealand's gas market, particularly the use of estimation of gas use between meter reads for many business and residential customers
- Balancing and losses within the gas network (and whether these are considered in the scheme)
- Alignment to MfE's guidance for voluntary carbon offsets
- New Zealand's current gas specification and future specification requirements for pipeline injection and
- Practical considerations, such as metering or other physical pipeline requirements that would need to be in place, particularly for hydrogen injection into the gas pipeline.

	Topic	Context	Early insight or questions
1. Why establish the scheme?	Purpose and Objective of the scheme	Certification schemes are usually driven by a market need or objective which influences the design of the scheme and who is involved in implementing it.	• The certification scheme should align with an overall vision for the gas market.
2. Who should be involved in establishment?	Parties involved in development of the scheme	Certification schemes are generally established by a selection of industry participants in a consortium approach.	• It is important to include members from across the value chain in consultation (distributors, regulators, technical gas 'testers', producers, industry consultants, industry bodies).
	What gases will be included	Hydrogen and biogas would appear most relevant at this stage.	• Green or low carbon hydrogen and biogas.
3. What is the scope and standards of the scheme(s)?	Single or multi product scheme(s)	All schemes analysed by PwC are single product schemes, however this does not limit a single party operating multiple schemes.	• Overseas schemes are typically single product (e.g. biogas/biomethane or hydrogen, but not combined). • Other methods of transportation outside pipeline transportation should also be considered. • The definition of sustainability and other standards for renewable gas production will be important, consider international alignment for these.
	International alignment and geographic boundaries	Most schemes consider alignment to and interaction with international schemes in their design. This facilitates the export of gas and GOs.	• Alignment with other international certification schemes is prefered, especially for Hydrogen. • Hydrogen scheme design will need to consider imports/exports in scheme design.

	Topic	Context	Early insight or questions
	Link with other domestic schemes	Most schemes consider alignment to and interaction with domestic schemes to create consistency for consumers and alignment where producers have a choice in how to transport or use the gas.	• Alignment with other domestic schemes if preferable (e.g. NZECS), especially in the case of biogas as producers may have a choice to generate electricity on site or inject into the pipeline.
	Guarantees of Origin (GO)	The GOs within a scheme are each tagged with information about the underlying gas. Scope of production emissions are not consistent between overseas schemes.	• These are critical for the scheme. Key is to determine what details are captured in the GO and the mechanisms to avoid potential double counting with other schemes. • Scope of production emissions will also need to be considered in consultation as this will influence assurance and information requirements from producers (e.g. the extent of that assurance is required for inputs into the production value chain) and consumer emissions requirements/reporting.
4. How will the scheme maintain trust and credibility?	Extent of assurance of producers and inputs into production	For the scheme to have credibility, the information within the GOs, particularly the technology and feedstock or fuel, need to be verified by a third party.	• Assurance requirements will need to align to the production standards and scope of production emissions to be captured in the GOs. • Annual certification is typical for overseas schemes. • It is important that the assurer(s) do not have an economic interest in the production of the gases.
	Scheme administration	Administration of a certification scheme needs to be carried out by an independent party.	• The scheme can be operated by a third party, but maintaining trust and integrity in the scheme is important (note: there are some groups calling for greater regulatory involvement in certification to maintain trust and integrity, especially for international trade).
5. How will the scheme operate?	Chain of custody	The two main chains of custody applied in the context of gas are mass balancing and book and claim. See section 2.2.1 for further detail.	• Mass balancing or book and claim (or both)?
	Trading of credits	Trading can be carried out bilaterally or through a trading platform. Both are facilitated by the administer of the scheme.	• If domestic trading is desired, what sort of platform is required to trade credits? • If international trading is desired, would this be conducted through bi-lateral agreement or through joining an international scheme?

	Topic	Context	Early insight or questions
	Accommodating estimation, losses, imbalances, mismatches, UFG	The New Zealand gas market still requires processes to accommodate estimation and balancing and this is not expected to change in the short to medium term.	• Consider a final settlement lag for each trading period to allow for estimation in the system. • Other balancing areas should also be considered (i.e. does adjustment need to be made for losses in the system), but these may be secondary considerations once a scheme is well established.
	Alignment with other schemes	To create a viable market for GOs they need to have value to the end buyer. Value of a GO is derived from the ability to 'claim the green attributes of the underlying gas.	• Biogas - consider applicability within MfE's guide to voluntary emissions offsetting.

5 Appendices

Appendix 1 International Schemes

A. EU Renewable Energy Directive

Directive Status: Directive implemented

Directive overview

The Renewable Energy Directive is a directive of the European Parliament and Council intended to promote the use of energy from renewable sources. The initial directive, introduced in 2009, which established national targets for EU member countries was seen as a "novelty act"; however the directive was revised in December 2018 (RED II) to include a new binding renewable energy target in the European Union for 2030 of at least 32% of energy sourced from renewable sources[29].

Although the directive is broad in scope (comprising 39 articles), it contains specific provisions for the verification of compliance with sustainability and emissions savings for biofuels, bioliquids and biomass fuels. GIC may find this context useful when considering the implementation of a New Zealand certification scheme.

RED II entered into force in 2018, and binds European Union member countries to the targets it sets out.

How does the directive work (with respect to biomethane and hydrogen)?

The directive sets out the mathematical measure for the carbon impact of biomethane and hydrogen derived from different fuel sources. It also emphasises the importance of Guarantees of Origin, to facilitate a functioning cross-border trade market in gas, and a Mass Balance approach to measurement, to ensure there is no double counting of renewable energy. We republish the relevant principles of the treaty below[30].

Guarantees of Origin

"(59) Guarantees of origin which are currently in place for renewable electricity should be extended to cover renewable gas. Extending the guarantees of the origin system to energy from non-renewable sources should be an option for Member States. 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 in such gas. It would also enable the creation of guarantees of origin for other renewable gas such as hydrogen."

Mass Balance measurement

"(123) European gas grids are becoming more integrated. The promotion of the production and use of biomethane, its injection into a natural gas grid and cross-border trade create a need to ensure proper accounting of renewable energy as well as avoiding double incentives resulting from support schemes in different Member States. The mass balance system related to verification of bioenergy sustainability and the new Union database are intended to help address those issues."

Sustainability Criteria

It also may be of note for consideration in the development of a New Zealand scheme that the revised directive reinforces the sustainability criteria of bioenergy through a number of different provisions. The most salient of these provisions is attempting to prevent the negative impact the production of biofuels may have due to Indirect Land Use Change (ILUC).

ILUC may occur when pastoral or agricultural land previously used in the production of food or feed is diverted to the production of biofuels. In this case, as food and feed demand still needs to be satisfied, it may lead to the extension of agricultural land into areas with high carbon stock such as forests. As a result the land use change may cause the release of greenhouse gas emissions that negates any emissions savings from the use of biofuels instead of fossil fuels.

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[29] European Commission (2020), *In focus: Renewable energy in Europe*, retrieved from: https://ec.europa.eu/info/news/focus-renewable-energy-europe-2020-mar-18_en

[30] Official Journal of the European Union (2018), *Directive on the promotion of the use of energy from renewable sources*, retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN

Regulation

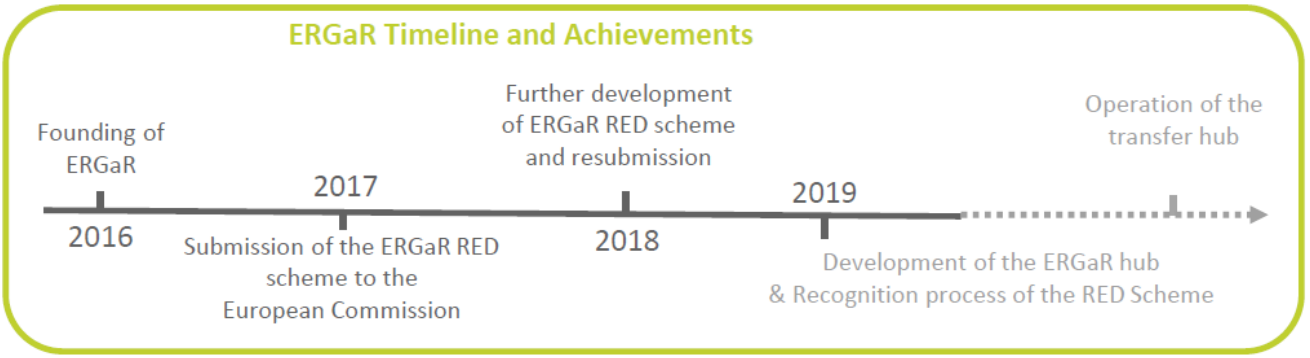
With respect to gas, RED II has been designed to allow voluntary schemes to be established to ensure the certification and verification of emissions. It does however allow the European Commission to specify standards with respect to reliability, transparency, independent auditing and require all voluntary schemes to apply these standards.

For more information see:
https://ec.europa.eu/energy/topics/renewable-energy/renewable-energy-directive/overview_en

B. European Renewable Gas Registry (ERGaR)

Registry Status: In development - currently seeking compliance with the Renewable Energy Directive

Figure 5: Overview of ERGaR's development timeline[31]



What is it?

ERGaR is an independent body designed to provide a documentation scheme between national registries for biomethane and other renewable gases as they are distributed along the European Gas Network. The cross-border transfer of certificates between national registers is designed to prevent double sale and double counting, which is made possible via ERGaR providing a technical hub for the cross-border transfer of certificates of origin.

ERGaR currently operates two schemes – the ERGaR Renewable Energy Directive (RED) & the ERGaR Guarantee of Origin (GoO). We summarise the key aspects of the schemes below.

Table 3: Overview of ERGaR's two schemes

Name of the Scheme	ERGaR RED	ERGaR GoO
Character	Voluntary scheme to be recognised by the EC under the RED.	Voluntary scheme operated without recognition by the EC.
Biomethane use	Biofuel for transportation.	Any.
Methodology	Mass-balancing.	Book and claim.
Tradability	ERGaR Proof of Origin is transferable from the product.	ERGaR GoO is transferable from the product.
Sustainability Verification	Mandatory according to the EU rules regarding biofuels.	Optional.

ERGaR's schemes are currently in the process of being established. ErGar RED is currently in the process of being approved by the European Commission for recognition under the Renewable Energy Directive. ERGaR is establishing a hub connecting national registries – this is currently in testing phase, however several bilateral agreements are already in operation between registries exchanging biomethane Guarantee of Origins.

Measurement

ERGaR RED is a mass balancing scheme designed to conform to the principals of the Renewable Energy Directive.

ERGaR GoO is a book and claim scheme, designed to enable a functioning market in the trade of certification.

[31] ERGaR (2020), *ERGaR Presentation*, retrieved from: http://www.ergar.org/wp-content/uploads/2018/10/ERGaR-presentation_March2020.pdf

Reconciliation

By operating an online hub between National Registries, ErGar is able to provide reconciliation between the national registries of Europe.

Certification (process & players)

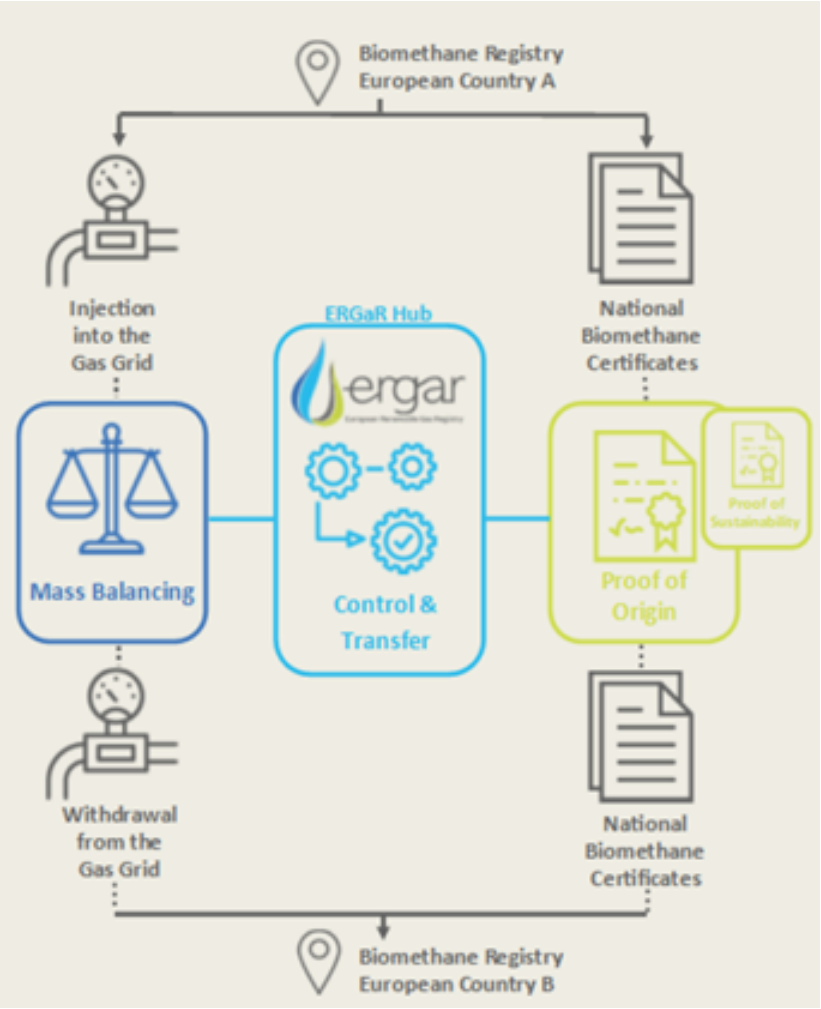
Under ErGar, National Registries are still responsible for issuing certification of biomethane. ErGar acts as a hub to facilitate the transfer of certification across the transnational European gas grid. The process is shown below.

Regulation

ERGaR is a voluntary scheme that is not regulated. However, it is worth noting that to generate substantive uptake from national registries ErGar RED will likely require approval by the European Commission as a valid scheme.

For more information see: http://www.ergar.org/

Figure 6: Overview of the ERGaR registry process between national registries



C. Green Gas Certification Scheme, UK

Scheme Status: Established 2011

Scheme overview

The Green Gas Certification Scheme (GGCS) tracks biomethane, through the supply chain to provide certainty for those that buy it.

- tracks the commercial transactions/ contractual flows rather than physical flows to ensure there is no double-counting from production to end use - Since each unit of green gas injected into the network displaces the need for a unit of conventional, or natural gas, the contracts are the only practical means of tracking the green gas from production to end use without double counting or double selling.
- tracks each unit of green gas from its injection into the distribution grid, to any trades, to its sale to a consumer, or group of consumers.

The GGCS now has over 50 members who are injecting green gas into the grid, trading Renewable Gas Guarantees of Origin and selling Green Gas[32]

Establishment of the scheme

The GGCS is run by the Renewable Energy Association's subsidiary, Renewable Energy Assurance Ltd. The Renewable Energy Association is a trade association for the United Kingdom renewables industry. GGCS participants oversee the way it is run, on a not-for-profit basis. Establishment of the scheme was carried out by a variety of organisations with an interest in the green gas sector including:

- Bio Group - Bio Energy plant operator
- Centrica - Biomethane to Grid project managers (design and build)
- CNG Services -
- E.ON - Energy supplier
- Milton Keynes Council - Local council in England
- National Grid - owns and operates the gas national transmission system in Great Britain
- Thames Water - water and waste water management company in the UK[33]

How the scheme works

- **Renewable Gas Guarantees of Origin (RGGOs):** Each registered kWh of green gas is electronically labeled by the GGCS IS system with a unique identifier known as a Renewable Gas Guarantee of Origin (RGGO). This identifier contains, for each kWh of green gas, information in code form about:
    - the technology and feedstock from which it was produced (for example, biogas from Anaerobic Digestion (AD), landfill gas or syngas from gasification)
    - the month and year in which it was produced (MM/YY)
    - the part of the UK in which it was produced (England, Wales, Scotland, N. Ireland)
    - the registered producer
    - the kWh number, part of a sequence or range relating to that producer's green gas injected into the grid that month.[34]
- **Certificates:** Once a licensed supplier registers a sale of gas to an end-use consumer , the GGCS IS system issues an electronic **Green Gas Certificate** in the consumer's name.
    - The Certificate is the guarantee of the authenticity and origin of the equivalent amount of green gas injected into the network as it cites the relevant range of RGGOs attached to it.
    - The consumer, in making any claims concerning the green gas , whether for regulatory, commercial or other purposes, must back up the claim with the relevant RGGOs listed on the certificate. The

[32] Renewable Energy Assurance Limited (2020), *Green Gas Certification Scheme*, retrieved from: https://www.greengas.org.uk/
[33] Renewable Energy Assurance Limited (2020), *Oversight Panel*, https://www.greengas.org.uk/governance/oversight-panel
[34] Renewable Energy Assurance Limited (2020), *Renewable Gas Guarantees of Origin*, retrieved from: https://www.greengas.org.uk/scheme/rggos

certificate is also in pdf format and can be downloaded and printed.

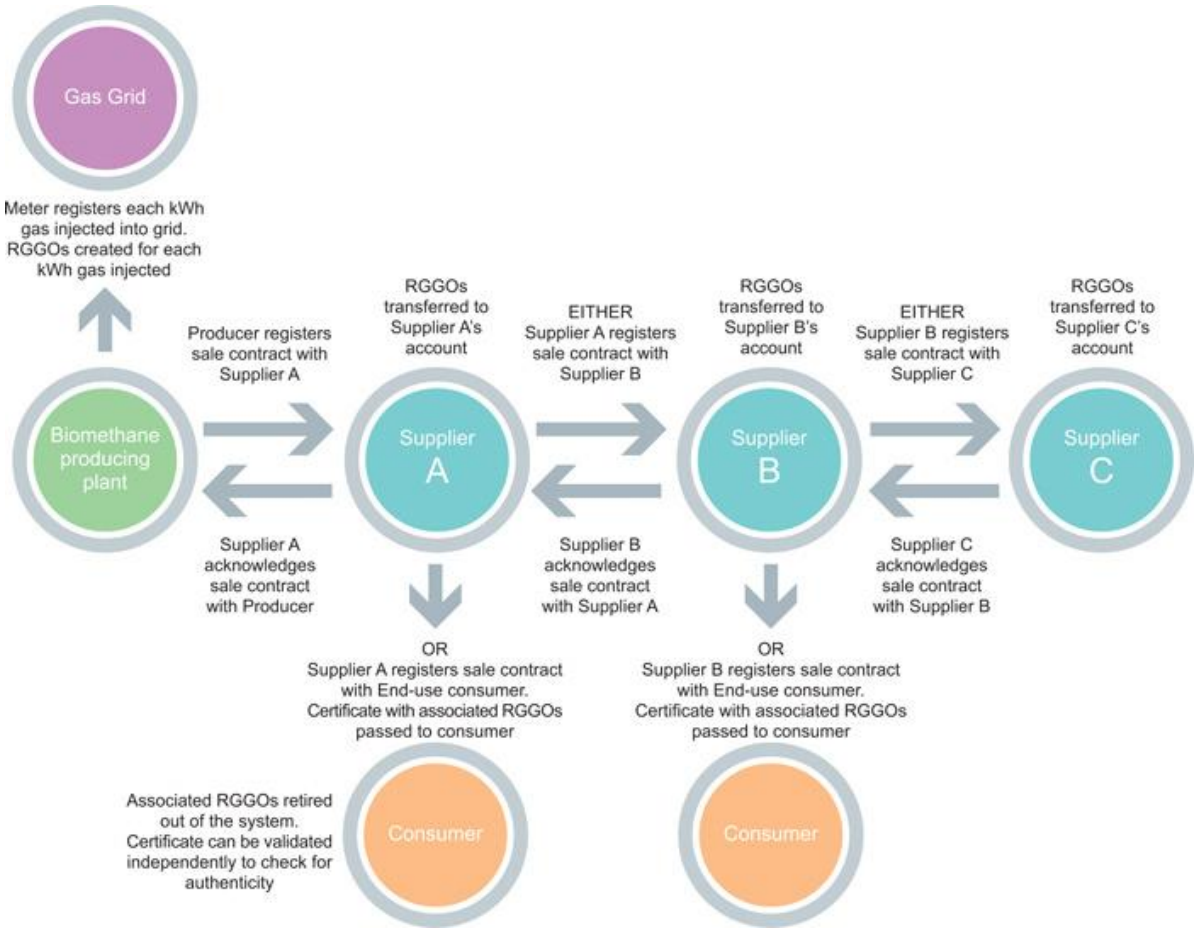
  - A consumer may validate the authenticity of the certificate by registering the RGGO details and the pin number on the GGCS website
  - Certificates within the scheme are recognised Energy Attributable Certificates (EAC). EACs are a market instrument created to represent the renewable and/or sustainable value of a unit of energy generation. Parties purchasing and retiring EACs may make a claim that they have used the renewable energy that an EAC represents. EACs are recognised by various bodies which govern greenhouse gas reporting and sustainability disclosures.[35]

- **Registration database:** the information technology system used to run the Scheme, known as the Registration database, keeps a record of the issue of RGGOs, their transfer between Gas Producers and Account Holders and their retirement or expiry. Gas Producers and Account Holders are provided with secure access to areas of the database that are relevant to their participation in the Scheme.
- **Allocation of RGGOs:** Allocation of RGGOs to an End-Use Consumer may represent a claim of Green Gas use based on the principles of Book and Claim or on the principles of Mass Balance.
- **Expiring RGGOs:** If, three years after green gas has been registered on the system, there are any units that have not been sold to an end consumer, the scheme operator will notify the supplier or trader, and give them a further period of three months to register the gas as sold. If, at the end of this period, no registration has been received, the relevant RGGOs will be retired out of the system, and marked as unsold.
- **Auditing:** Green gas producers, suppliers and other traders are required to be audited to ensure that the information registered on the GGCS IS system is accurate. The Scheme operator appoints and instructs the auditor(s), reports back to the Oversight Committee and publishes details in the annual report.

[35] Renewable Energy Assurance Limited (2020), *Certificates*, retrieved from https://www.greengas.org.uk/scheme/certificates

Participants of the Scheme

Figure 7: flow diagram the GGCS[36]



Direct Participants:

Green gas producers:

- Each participating green gas producer registers the amount of biomethane it has injected to the grid, on a quarterly basis, based on the actual volume and CV (coefficient of flow) of green gas that flowed.
  - Registration is based on an independent meter reading.
  - Meters are generally the property of the relevant gas distribution company (GDN) .
- Each producer then registers the details of the supplier or other trader it has contracted with to sell the unit(s) of injected gas. (This would normally be by means of a Gas Purchase Agreement.)
- In future, producers will have the option to request that GGCS notify them of any unmet demand for green gas from suppliers or consumers.

Gas suppliers or other traders:

- Each participating gas supplier or other trader must acknowledge a transaction with the producer registered to their account.
- The amount is based on the actual volume of green gas that flowed.
- The supplier or other trader must register each kWh, or sequence of kWhs, of green gas it has contracted to sell. This can be to another supplier or trader, or, in the case of a licensed gas supplier to an end-use consumer or group of consumers.

[36] Renewable Energy Assurance Limited (2020), *Flow Diagram - Scheme*, retrieved from https://www.greengas.org.uk/scheme/flow-diagram

- If the sale is to another supplier or trader, they will be required to acknowledge a transaction registered to their account. They must then register each kWh or sequence of kWhs of green gas they sell, either to another supplier or trader, or in the case of a licensed gas supplier to an end-use consumer, or group of consumers.
- The licensed gas supplier registers the sale of green gas to a consumer / group of consumers it has contracted with. The supplier or other trader thus guarantees to the consumer(s) that, for each unit of gas they buy, an equivalent amount of authentic green gas has been injected into the network, and that it has not been sold to anyone else.
- In future, suppliers and other traders will have the option to request that GGCS notify them of any unsold green gas being injected into the grid by producers.

Consumers:

- An end-use consumer is any-one with a gas meter through which they can consume gas. This may be commercial or not-for-profit entities, such as housing associations or communities, or they may be domestic households or a group of households who have signed up to a particular 'green tariff'.
- Once the supplier has registered a sale to a consumer / number of consumers, the GGCS IS system will automatically generate a certificate in each consumer's name with the relevant RGGOs listed.
- The GGCS system will then retire the relevant RGGOs from the system and log them as having been sold to that consumer, or group of consumers.
- In future, suppliers may decide to offer domestic consumers a tariff that is made up of a proportion of green gas only. In such a case only the green gas element supplied will be registered on the system. In practice, it is likely that the green gas will not be registered to that tariff until after the end of the year when the precise amount of gas consumed can be settled.

Indirect participants ('scheme associate members')

Gas Distribution Network Operators:

- Participating Gas Distribution Network Operators (GDNs) are not required to register on the system. So long as producers can show the auditor acknowledgement from the GDN that the registered biomethane has been injected into the distribution network, no further confirmation on the system is required in real time.

Gas shippers:

- Gas shippers underpin the GGCS but do not participate directly in it since they facilitate the physical rather than the contractual flow of the gas. Biomethane cannot be injected into the distribution network unless the producer has also arranged for it to be 'shipped' (or introduced into the network).
- Licensed gas suppliers and traders are also gas shippers. In practice, they will arrange to ship any gas they buy (introduce it into, move it through or take it out of the system).
- There may be two different shippers, though this is rare. Under this scenario, the gas producer would introduce under one shipper, and then pass the title of the gas to the second shipper at the supply point.
- 'Non-shipper' bodies that participate in the GGCS can contract directly with a green gas producer to buy the gas, but they must also arrange for a shipper to 'ship' the gas as outlined above. This need not be the same shipper that ships the conventional gas they purchase. A large organisation, for example, that is not a licensed gas supplier, may participate in the GGCS directly as a 'trader'. In this way, it will contract directly with a green gas producer to buy the gas, and arrange for it to be shipped. (This need not be by the same shipper that ships the natural gas the consumer buys.)[37]

Governance

- The GGCS is run by the Renewable Energy Assurance Ltd (REAL) which is a not-for-profit company which administers a number of other certification schemes (relating to bio fertiliser, Compost, and compostable materials) and consumer codes (relating to renewable energy and home charging points).
- **The Renewable Energy Association (REA):** REAL is a wholly owned subsidiary of the Renewable Energy Association which was established in 2001 to represent British renewable energy producers and promote the use of sustainable energy in the UK. The REA's membership is active across the

[37] Renewable Energy Assurance Limited (2020), *Participants - Scheme*, retrieved from https://www.greengas.org.uk/scheme/participants

whole spectrum of renewables: electric power, heat and biofuels. The REA represents a wide variety of organisations, including generators, project developers, fuel and power suppliers, equipment producers and service providers.

- **Oversight Panel:** Founder participants of the scheme as well as independent members and consumer/user and environmental group representatives form an Oversight Panel which advises on the day-to-day running of the GGCS. The Panel has an independent Chair and meets three times a year. to consider the results of the audits, agree on rule changes and resolve any disputes among the parties. It also discusses the budget for the GGCS and agrees the fee level on an annual basis in line with the budget. The Oversight panel is guided by an agreed Terms of Reference.
- **Scheme rules:** Participants of the scheme are subject to a set of scheme rules which are reviewed and updated on a regular basis by the Oversight Panel. Rules cover:
    - the schemes objectives
    - the definition of Green Gas as it relates to the scheme
    - the role and obligations of scheme members, participants and account holders
    - details of the schemes alignment to international schemes and Government objectives
    - processes involved in the assurance, issuance, withdrawal, retirement and expiry of RGGOs
    - governance of the scheme
    - security, back-up and confidentiality considerations of the scheme
    - public and scheme reporting commitments
    - scheme fees

Regulation

While the GGCS itself doesn't appear to be specifically monitored by a regulatory body, the gas industry is subject to a number of regulations. The design of the GGCS ensures that members of the scheme are compliant with certain regulations and ensures that the scheme's requirements facilitate compliance with regulations as well as alignment to other Government initiatives such as the Renewable Heat Incentive (RHI).

- The production and injection of biomethane is tightly regulated by OFGEM, National Grid, and the local gas distribution network operator (GDNO), where the plant is based, to ensure that gas produced meets stringent sustainability and quality criteria.
- The sustainability criteria for UK biomethane (set by OFGEM) sets out some of the most detailed requirements in the world, and biomethane produced in Biomethane to Grid (BtG) schemes can only qualify for Renewable Heat Incentive (RHI) support if it has achieved a minimum 60% greenhouse gas (GHG) saving over the European heat average[38].

For more information see: https://www.greengas.org.uk/

[38] Green Gas Certification Scheme (GGCS) (2018), *Response to Draft London Plan (Greater London Authority (GLA) consultation, December 2017)*

D. CertifHy

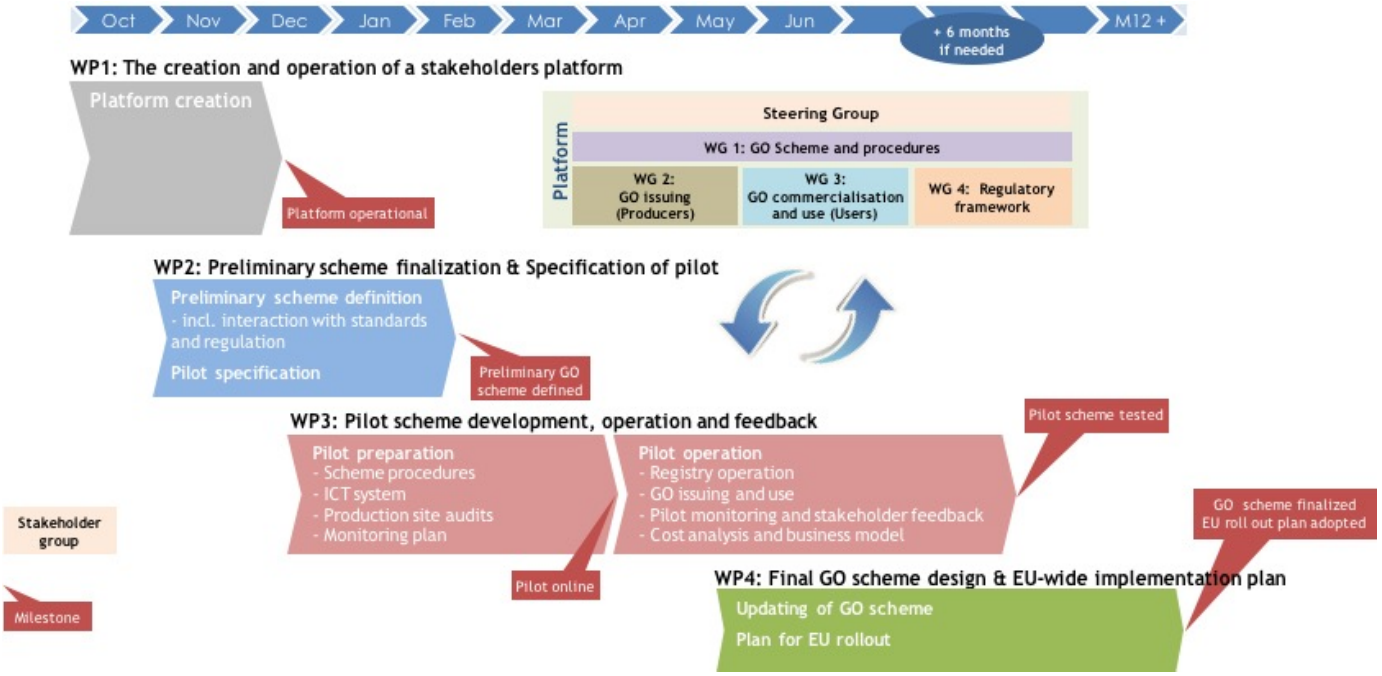
Scheme status: In pilot

Scheme/project overview:

The CertifHy project is focused on the implementation of an EU-wide green and low carbon hydrogen guarantees of origin market.

The project's aim is to create the path forward for a concrete and actionable Guarantee of Origin (GO) scheme with a pilot demonstration of the hydrogen GO scheme and the creation of a Stakeholder Platform to give the scheme its legitimacy. The project will define the scheme's governance, as well as its processes and procedures over the entire GO life cycle: from auditing hydrogen production plants, certification of Green or Low Carbon hydrogen production batches, through issuing, trading to "usage" of GOs.[39]

Figure 8: High level timeline for the CertifHy programme[40]



Progress to date includes:

- Development of a common Europe-wide definition of green hydrogen
- Development of a GO scheme and roadmap for its implementation across Europe
- A pilot of the designed scheme is currently underway with four hydrogen production plants demonstrating different hydrogen production pathways located throughout Europe.

Key deliverables of the project include:

- Bibliographic review of market outlooks for hydrogen in Europe
- Overview of the market segmentation
- Generic estimation scenarios of market penetration and demand forecast for 'premium' green hydrogen in short, mid and long term
- Briefing Paper on the regulatory context
- Identification of possible options and structured list of requirements for Green Hydrogen
- Technical report on the definition of 'CertifHy Green' Hydrogen

[39] CertifHy (2020), *Project Description*, retrieved from https://www.certifhy.eu/project-description/project-description.html
[40] CertifHy (2020), *Project Description*, retrieved from https://www.certifhy.eu/project-description/project-description.html

- Review of past and existing systems for guarantees of origins
- Review of interaction between existing certification schemes and the envisaged hydrogen GO system
- Stakeholder Interviews and recommendations on the establishment of a well-functioning EU hydrogen GO system
- Definition of scope, main principles of the GO scheme as well as roles and tasks of the relevant actors
- Specification of rules and obligations of the GO scheme (requirements, methodologies, certification process and registration of GO)
- Roadmap for the establishment of a well-functioning EU hydrogen GO system
- Endorsement letters received[41]

Establishment of the scheme

The CertifHy project is being undertaken by a Consortium led by Hinicio (a strategy consulting firm specialised in sustainable energy and transport) and financed by the FCH 2 JU (Fuel Cells and Hydrogen Joint Undertaking) - a consortium which supports research, technological development and demonstration activities in fuel cell and hydrogen. Members of the consortium include:

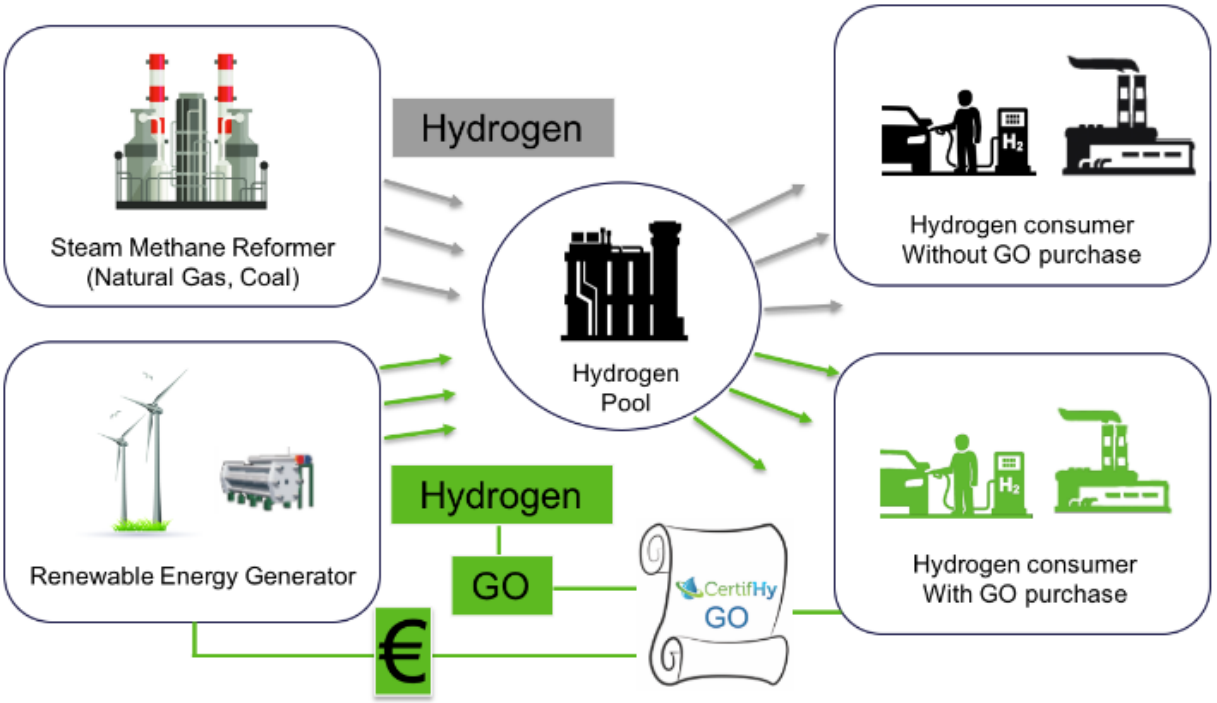
- GREXEL - energy certificate registry provider
- Ludwig Bolkow Systemtchnik (LBST) - independent strategy and technology consultant in energy, mobility and sustainability
- TNO - Netherlands Organisation for applied scientific research
- TUV SUD - technical service provider of testing, inspection, certification and training solutions[42]

How the scheme works

- **Guarantee of Origin (GO) schemes:** a GO scheme labels the origin of a product and provides information to customers on the source of their products. It operates as a tracking system ensuring the quality of a product such as hydrogen or electricity.
- **The proposed Premium Hydrogen GO system**: decouples the green attribute from the physical flow of the product and makes Premium Hydrogen available EU-wide, independently from its production sites (see diagram below).
- **The GO scheme for Premium Hydrogen** includes the GO governance; eligibility and registration of production plants; the GO and information content; issuance, transferability and cancellation; the registry system and trading platform.
- In multi-fuel plants using both renewable and non renewable sources for hydrogen production, only the part produced from renewable sources is viable for certification.

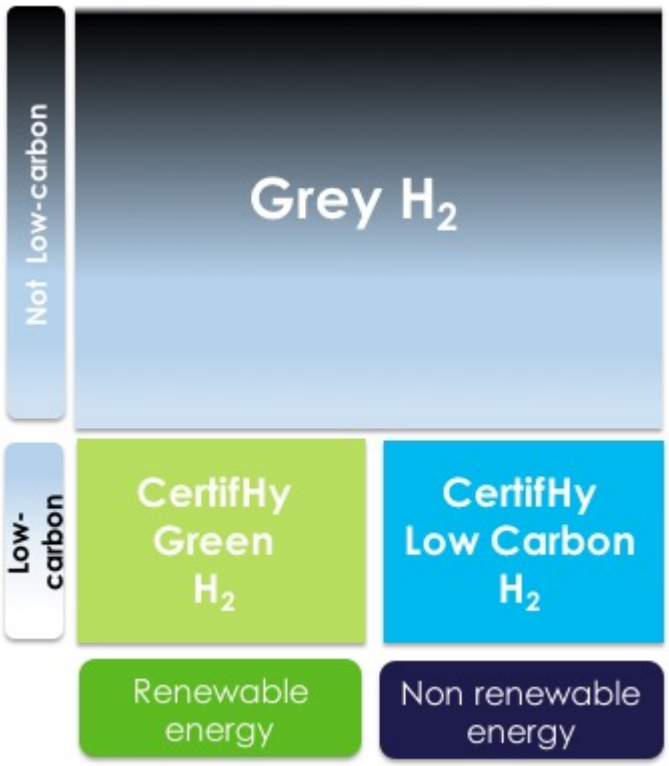
[41] CertifHy (2020), *Publications & Deliverables*, retrieved from https://www.certifhy.eu/publications-and-deliverables.html
[42] CertifHy (2020), *Project Team*, retrieved from https://www.certifhy.eu/contributors/consortium-members.html

Figure 9: operation of the CertifHy scheme[43]



- There are two different GO labels:
  (1) Green Hydrogen (from renewable sources and having ghg balance below a defined threshold)
  (2) Low Carbon Hydrogen (having ghg balance below a defined threshold)

Figure 10: high level view of green and low carbon hydrogen within CertifHy[44]

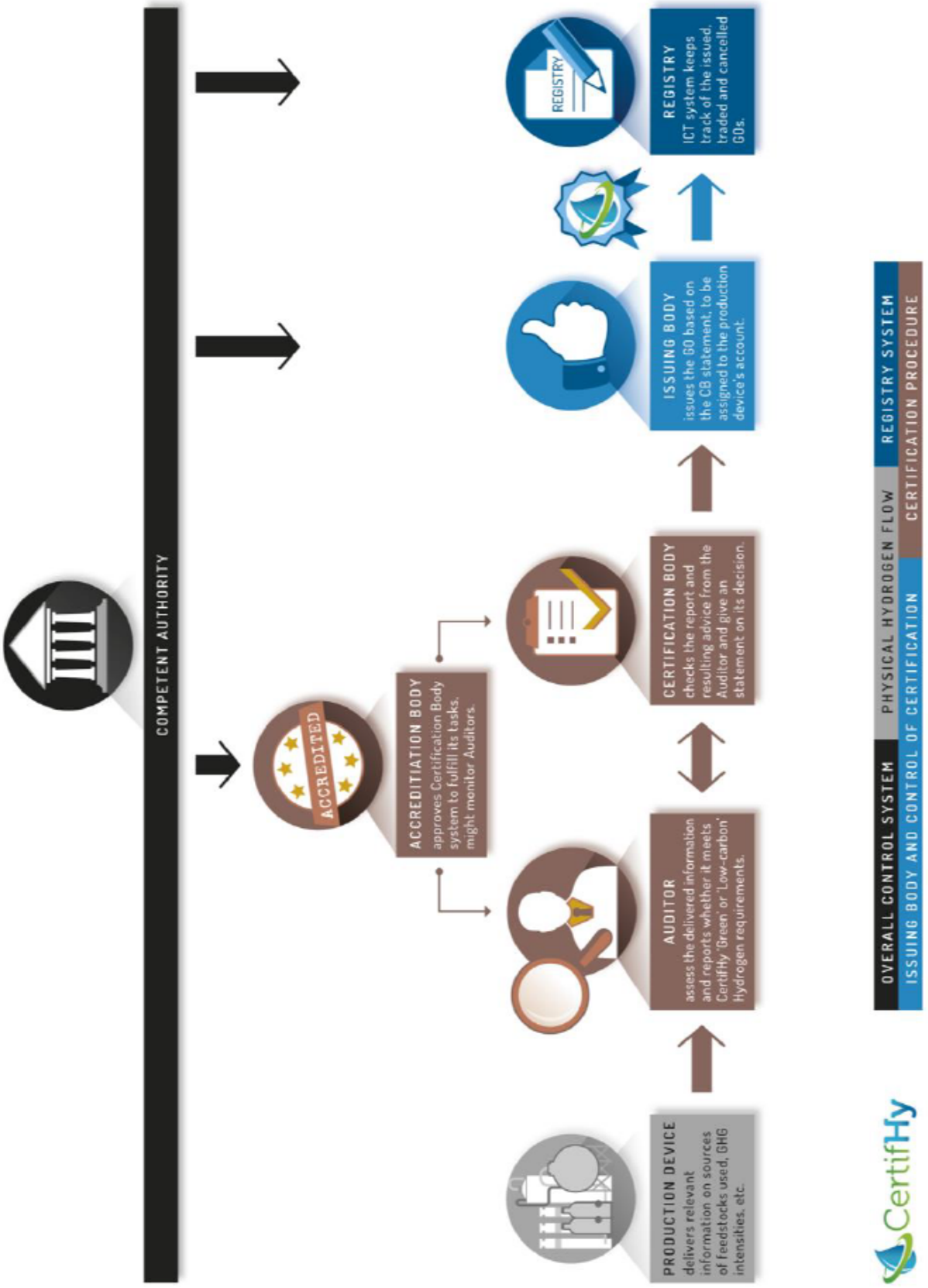


[43] CertifHy (2020), *CertifHy 1*, retrieved from https://www.certifhy.eu/project-description/certifhy-1.html
[44] CertifHy (2020), *CertifHy 1*, retrieved from https://www.certifhy.eu/project-description/certifhy-1.html

- **Guarantees of origin: Each GO covers:**
  - Account number
  - Identity of the Production Device
  - Date and time of the hydrogen production
  - Fuel (or heat source) and Technology
  - Financial support to hydrogen production or input fuel
  - Share of renewable energy for each input energy carrier for producing the hydrogen
  - GHG balance
  - GO identity info *unique identifier, date, cancellation/expiry date)
  - CertifHy label - Green hydrogen or low carbon hydrogen -- determined by the above information and audited[45]

[45] CertifHy (2016), *Specification of rules and obligations of the GO scheme (requirements, methodologies, certification process and registration of GO*

Figure 11: Key roles in the CertifHy scheme



- **Competent authority:** endorses the scheme document and all subsidiary documents, decides on approval of certification bodies and appoints issuing bodies
- **Certification body:** verifies eligibility of Production Devices through a Production Device Audit in contract with the registrant, verify attributes of Production Batches through audit
- **Issuing body**: supervises the issuance, transfer and cancellation of GOs. Ensures all aspects of the scheme are enforced. Decides on registration of Account Holders, Production Devices, issuing GOs, verify and satisfied that GO transfer requests are valid and all information on the online form for GO transfers are accurate, decide on cancellation
- **Registrant/account holder:** - to cancel GOs only against physical hydrogen consumption that can be ascertained as belonging to the specified GO system scope. They can register accounts with the Issuing Body in the Registry, register Production Devices with the Issuing BOdy, select and contract a Certification Body for the verification of the attributes of Production Batches, request GO issuing from Issuing Body, request GO transfers, request cancellation.

For more information see: https://www.certifhy.eu/

E. Australia's National Hydrogen Strategy/Certification Scheme

Scheme Status: In development

Figure 12: Timeline for Australia's Hydrogen Certification Scheme and National Strategy

Development overview

In November 2019 the Council of Australian Governments (COAG) Energy Council released its National Hydrogen Strategy which laid out a plan to establish Australia's hydrogen industry as a major global player by 2030. As part of the document, the council identified the need for a certification scheme to[46]:

- Provide consumers transparency around the environmental impacts of the hydrogen they use.
- Ideally be single and global in nature such that international trade could be facilitated by the scheme.
- As far as practicable, any domestic scheme should build on or harmonise with any international certification schemes.

As part of its broader set of nationally co-ordinated government actions, it agreed to the following as certification related actions under the National Hydrogen Strategy[47]:

Table 4: Certification actions agreed to under the National Hydrogen Strategy

Task #	Action
4.16	Agree that Australia will seek to play a lead role in the design and development of an international guarantee of origin scheme.
4.17	Agree that, as far as practicable, any Australian domestic scheme should build on or harmonise with international certification schemes.
4.18	Agree to initially develop an international certification scheme that verifies and tracks: ● Production technology ● Carbon emissions associated with production (scope 1 and scope 2) ● Production location.
4.19	Agree that in addition to the above, any subsequent expansion of an international certification scheme could include water consumption and other factors.

What steps have been taken since the Strategy was published?

On the 26th of May 2020 , Australia's Department of Industry, Science, Energy and Resources (DISER) began to undertake consultation with state and territory stakeholders and industry representatives on the design of a Hydrogen Certification Scheme. They sought to understand:

- Whether a scheme should have a domestic or international focus.
- When a scheme should begin operating.
- How a scheme should align with existing regulations and frameworks.
- How the scheme should be measured and how it should interact with environmental regulations.

[46] Commonwealth of Australia (2019), *Australia's National Hydrogen Strategy*, retrieved from https://www.industry.gov.au/data-and-publications/australias-national-hydrogen-strategy, pp. 55

[47] ibid, pp. 81

Consultation closed on the 22nd of June 2020 and responses, where consent was given to publish the response, are available on DISER's website[48]. We provide a summary of the key themes found in the responses on the following page.These responses may be useful for GIC or other parties in considering the initial design of a New Zealand certification scheme.

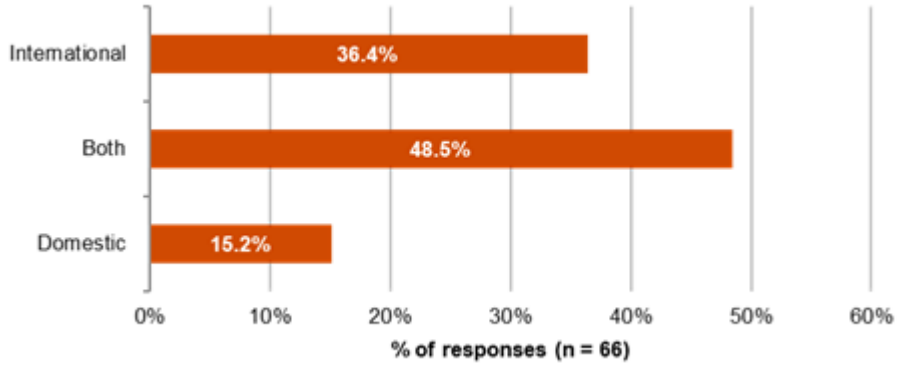
Table 5: Certification actions agreed to under the National Hydrogen Strategy

Question	Respondents Summary
When should the scheme be put in place?	Majority of respondents were of the view that the scheme should be in place promptly - by 2021/2022. Some contrarian viewpoints suggested that implementation should be delayed in order to allow the market to develop prior to regulation.
Carbon accounting methods	The Australian National Greenhouse and Energy Reporting System was suggested by most respondents. The Intergovernmental Panel on Climate Change (IPCC) carbon accounting, bottom-up measuring at sites and the World Resources Institute (WRI) / World Business Council for Sustainable Development (WBCSD) greenhouse gas protocols were other methods proposed.
Possible interaction with existing Regulatory Frameworks	Framework suggestions included Renewable Energy Target schemes/Certificates (administered by the Clean Energy Regulator), the Australian Energy Market Commission, the Australian National Greenhouse and Energy Reporting System and the National Energy Market rule.

Figure 13: Survey respondents by type

[48] Australian Government – Department of Industry, Science, Energy and Resources (2020), *Hydrogen Certification Survey – Published Responses*, retrieved from https://consult.industry.gov.au/national-hydrogen-strategy-taskforce/hydrogen-certification-survey/consultation/published_select_respondent

Figure 14: Survey question 1 - What do you consider more important for state or industry? An international certification scheme or a domestic certification scheme?



Next steps following industry consultation

Following industry consultation in May and June, DISER issued a request for quotation to consultants in relation to developing a certification scheme for hydrogen. The request made clear that further consultation was needed to agree the core principles of any certification scheme as well as address complexities unique to Australia and the clean hydrogen sector. This request was closed in July, and so any report (if made publicly available) should be released over the coming months.

Considerations for New Zealand's scheme

As the Australian scheme continues to develop, we note the following questions will be important to keep up to date with, due to their similar relevance and applicability in a New Zealand context. We do however note that the nature and intent of Australia's Scheme will be important to contextualise any further information that comes out of Australia. Australian's certification scheme is being developed within the context of its National Hydrogen Strategy, which seeks an ultimate goal of Australia acting as an exporter of green hydrogen. As such, it may outweigh the importance of a certification's interaction with international schemes as this is amenable to exporting.

Topics to consider for the development of both Australia & New Zealand's scheme

Strength of consumer preferences

What incremental cost are consumers willing to pay for accredited, clean hydrogen versus alternatives?

Regulatory authority

Who is best placed to oversee and administer a certification scheme (ie government body / industry body / other?)

Project eligibility and scope

Which projects, in terms of scale, process and system boundary, and which emissions scope, will be considered by the scheme?

Use of existing legislative frameworks

To what extent will the scheme interact with existing legislative, emissions monitoring and reduction frameworks, both domestically and internationally?

Cost impact

Who will bear the costs of administering and monitoring the scheme? What incremental costs will applicants be prepared to pay for compliance?

For more information see:
https://www.industry.gov.au/data-and-publications/australias-national-hydrogen-strategy

F. Other European Schemes

We have prepared a brief synopsis of other schemes and national registries identified in Europe below.

Table 6: Other European Schemes

Belgium	
Name of scheme:	Green Gas Certificate
Operated by:	Green Gas Register, an independent organisation
Notes:	The Belgian scheme is not connected to the European emissions trading scheme so certificates cannot be converted into other renewable energy units unlike some of the other European schemes e.g. United Kingdom. Green-gas producers receive a 'Guarantee of Origin' which can be sold to traders. Traders may trade these and sell to end-users who want to consumer renewable gas. 'Guarantee of origins' are cancelled once sold.
Link:	https://www.greengasregister.be/

Germany	
Name of scheme:	German Biogas Register
Operated by:	Deutsche Energie Agentur (DENA), an industry body
Notes:	DENA operates the platform for standardised verification (the Biogas Register). DENA certificates can be traded across the border with Netherlands and Denmark. The certification project began in 2010 and is partnered with 14 leading companies from the biogas and energy industries.
Link:	https://www.dena.de/en/topics-projects/projects/renewable-energies/german-biogas-register/

Italy	
Name of scheme:	Italian scheme on bio-methane
Operated by:	Gestore dei Servizi Energetici (Energy Services Manager), an industry body
Notes:	Italy operates two distinct schemes - one for gas injected into the natural gas grid without any specific intended use, and one for gas to be used in the transport sector. The latter receives significant subsidies. The Italian Government published a decree in 2018 in support of the production of biomethane.
Link:	https://www.gse.it/en/what-we-do/renewable-energy

France	
Name of scheme:	Renewable gas certificates France
Operated by:	Gaz reseau distribution France (Gas distribution network France), an industry body

Notes:	Certificate trading is not possible. Only producers and suppliers to end-users may exchange the certificates. Due to a high share of certificates being used in the transport sector, they have a separate regulation where they keep all revenues from certificate sales but in other sectors 75% of the revenue is transferred to the Government into a fund for energy transition.
Link:	https://www.grdf.fr/

The Netherlands

Name of scheme:	Vertogas certification system
Operated by:	Vertogas, on behalf of the Minister of Economic Affairs and Climate
Notes:	Market size of the scheme is small (0.12 bcm p.a) compared to the entire Dutch natural gas consumption of 40 bcm p.a. The overall scheme has 3 stages - firstly, it defines the standards for sustainable biomass on a voluntary basis. Secondly, it assesses firms that produce, process or trade biomass and issues certificates from one of two certifiers (DEKRA or QS). Finally, Vertogas certifies users under Dutch law, providing “Vertogas Certificates”.
Link:	https://www.vertogas.nl/hoofdmenu/wat-doet-vertogas/wat-is-groen-gas-certificering

Appendix 2 NZ Carbon Market

The following appendix has been prepared to provide a brief overview of the NZ Emissions Trading Scheme and Voluntary offsetting. It may be necessary to consider these when developing a renewable gas certification scheme.

NZ Emissions Trading Scheme

The New Zealand Emission Trading Scheme (ETS) puts a price on greenhouse gas emissions by creating a market in which New Zealand Units (NZUs) can be allocated, earned, surrendered and traded. An NZU represents one metric tonne of carbon dioxide or carbon dioxide equivalent and is, therefore, a means by which to assign a price to a tonne of carbon. Currently, the only way to earn an NZU is to undertake an activity which is recognised as removing greenhouse gases from the atmosphere. According to the Climate Change Response Act 2002, such removal is achieved either through carbon sequestration of 'new' trees (i.e. those planted on land otherwise not in forestry since 1990) or through "other removal activities", such as destroying synthetic greenhouse gases or exporting them or some other products, which contain greenhouse gases.

The reduction in emissions resulting from the production of renewable gas, is, therefore, not eligible for the issuance of an NZU, since it is not considered a removal activity.

Gas producers and some companies involved in biogas feedstock (e.g. landfill operators) are mandatory participants in the ETS and have an obligation to surrender NZUs to the government in relation to the emissions they release. The benefit of renewable gas within the NZ ETS context is obtained where renewable gas participants have a lower emissions profile associated with their product and have lower surrender obligations (equating to a lower financial cost associated with acquiring NZUs).

Voluntary offsetting

Voluntary offsetting enables an organisation to reduce emissions to the atmosphere outside the boundary of their organisation when further internal emissions reductions cannot be achieved. Voluntary emissions offsets can be achieved using both international and domestic emissions reductions and removals.

The Ministry for the Environment sets out guidelines for voluntary offsets to ensure best practice.

These guidelines state that for a voluntary emissions offset to be considered credible, it must be:

- transparent
- real, measurable and verified
- additional
- not double counted
- address leakage
- permanent.