Method for assessment and certification of renewable gas production

Version 1

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Certified Energy

New Zealand Energy Certificate System

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II. Definitions

Term	Definition
Assessment	The process by which information is assembled and communicated to describe characteristics of renewable gas production.
Assessment Methodology	The assessment methodology used to assess production characteristics of a renewable gas Production Device. The subject of discussion and consultation within this paper.
Avoided emissions	Emission reductions that occur as a result of the production and use of that product compared to the current situation. This could include capture and use of methane emissions which are currently released to the atmosphere, use of solid material from anaerobic digestion instead of fertiliser etc.
Biogenic carbon	Carbon derived from biomass (from ISO 14067:2018, section 3.1.7.2)
Biomass	Material of biological origin, excluding material embedded in geological formations, material transformed to fossilised material and peat (from ISO 14067:2018, 3.1.7.1)
Biomethane	Methane gas deemed to be renewable due to use of renewable waste feedstocks.
Certification	The process of transferring attributes via a digital certificate, requiring assessment and verification of Production Device characteristics.
Construction emissions	Emissions caused by the process of constructing the Production Device and manufacturing major equipment.
Displaced fuel	Business as usual or predominant fuel source that would otherwise be used were renewable gas not available.
Fugitive emissions	These can be intentional (flaring or venting) or unintentional (leaks) emissions from a gas system.
Gate	Point of transfer to distributor or consumer. For example, for pipeline injected biomethane this is the point of injection. For hydrogen from electrolysis, this is the point of departure from the production facility.

Term	Definition
GHG	Greenhouse gas (for the purpose of this assessment, these are limited to CO_2, CH_4 and N_2O).
GWP	Global warming potential - this is the combined warming potential of the assessed GHGs, expressed in CO_2-e.
Input electricity	Electricity used in the process of production or operation of the Production Device.
ISO	International Organisation for Standardisation.
ISO/TS	ISO Technical specifications.
Life Cycle Assessment (LCA)	A process to quantitatively assess the type and extent of environmental impacts that may arise from a set of activities.
LCA Report	Record and report on the LCA assessment.
NZ	New Zealand.
NZ-ECs	New Zealand Energy Certificates.
NZECS	New Zealand Energy Certification System.
Production Device	The facility producing renewable gas, including all processes and steps required for the conversion of inputs into output gas.
Production Emissions	Emissions from the production life cycle stage of renewable energy, which is predominantly renewable gas that will be covered. This may involve on-site pre-processing, and converting the feedstock into the final product for sale to customers.
Registrant	A user within the NZECS with authority to act on the behalf of a Production Device.
Renewable gas	A renewable gas is produced from renewable feedstocks. Refer to section 2.2.1 for a comprehensive list of renewable feedstocks.
System Users	Parties registered on the NZECS to issue and/or redeem renewable gas certificates.
Upstream emissions	Emissions from the life cycle stage prior to production, including feedstock exploration, development and extraction/production, transport of feedstock.

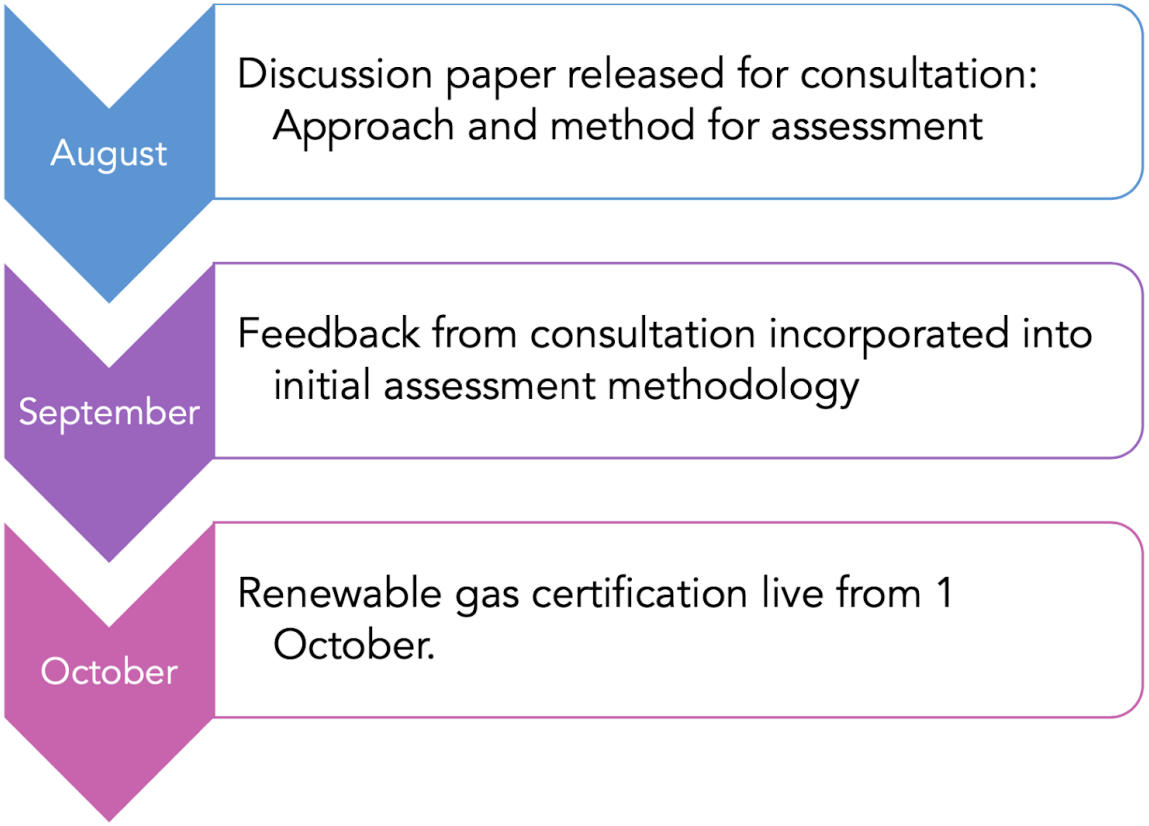
Term	Definition
	This would generally align with a partial Scope 3 GHG Protocol inventory, but excluding business travel, employee commuting and leased assets.
Verification	Confirmation of the accuracy of information provided for the purposes of assessment of characteristics of the Production Device.
Waste	A substance which the owner intends or is required to dispose of (ISO 14044:2006 section 3.35 and ISO 14067:2018, section 3.1.4.9)

III. Purpose of this Document

This framework document introduces the general approach that Certified Energy will take to verify and communicate characteristics of renewable gas production in New Zealand, via the New Zealand Energy Certificate System. This document is not intended to be a detailed technical manual on how to assess a specific production device, but provides general guidance on the framework approach for provision of certification. It will be supplemented by more specific technical guidance relating to various production systems and their associated technical specifications. These technical guidance documents are expected to be released subsequent to version one of this framework document.

The process preceding the creation of this framework document is shown in Figure 1 below.

Figure 1: Process for finalizing the Draft Assessment Methodology



Background

i. Certified Energy operates the New Zealand Energy Certificate System (NZECS). Established in 2018, the NZECS is the national registry for energy attribute tracking and has been used to successfully track renewable energy attributes in the New Zealand electricity market since that time.

ii. From 1 October 2022, the NZECS will expand to offer certification for renewable gas, comprising Production Device verification and attribute transfer via certificate.

iii. The initial rules governing renewable gas certification were published on the Certified Energy website in September/October 2021, after public consultation. The document can be found here.

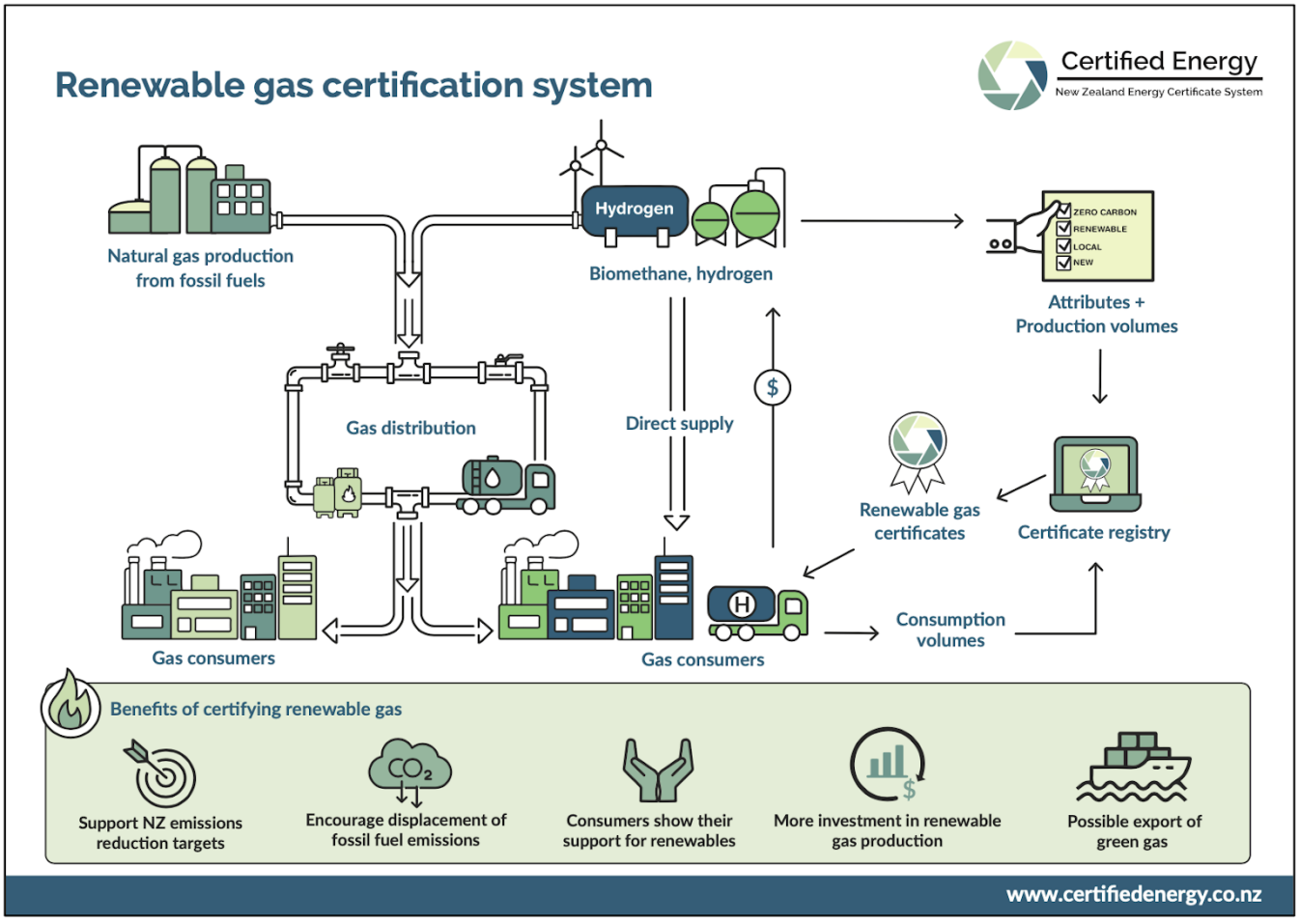
1. Requirements and guiding principles

i. As a key step in the registration of a Production Device on the NZECS, Certified Energy will assess the Device to verify characteristics of production.

ii. Once a Production Device has been assessed and registered, production attributes can be issued and transferred to a separate party by way of a digital certificate (Certification).

iii. A diagram of how the NZECS will provide certification for renewable gas is shown in Figure 2 below.

Figure 2: Diagrammatic explanation of energy attribute tracking via energy certificate.



iv. The intended assessment approach is built on international standards relating to LCA and GHG (greenhouse gas) assessment, primarily the ISO 14040/14044 standards as the overarching standards for LCA, while the ISO/TS 14067 provides specific requirements and guidance for the carbon footprint of products.

vii. The aim of this approach is to provide a tailored and workable approach to renewable gas certification in New Zealand. Therefore, strict adherence to the ISO standards is not essential, but any departure from these standards is to be justified.

viii. To avoid double counting global GHG emission reductions, Production Devices that are accredited by or planning to be accredited by other certification or offset schemes e.g. Verra, Gold Standard, New Zealand Emissions Trading Scheme, are not eligible to certify under this program and cannot be issued a certificate. A declaration to this effect will form part of the registration process by the Registrant.

ix. If carbon credits are discovered to be issued in addition to renewable gas certificates for the same MWh, appropriate penalties may be applied to the Registrant responsible for the relevant Production Device by Certified Energy.

1.1 Registration, assessment and verification process

1.1.1 Initiating registration

i. In order to register a Production Device, a party must provide a range of information, a major component being the LCA Report discussed in this document.

ii. The LCA Report will form a large part of the process of registration, in addition to commercial or legal requirements such as proof of ownership.

1.1.2 Preparation of the LCA Report

i. LCA Reports may be prepared internally, or with the support of independent consultants.

ii. Certified Energy will ensure that there are suitably experienced independent consultants in the market and in due course, will seek to appoint endorsed assessment providers.

iii. Endorsed providers will have completed a process of engagement and will be versed in the provision of LCA Reports that meet these guidelines.

1.1.3 Verification of assessment report

i. Certified Energy will review the data provided in the LCA Report to verify completeness and accuracy.

1.1.4 Site verification

i. At Certified Energy's discretion, a site visit may be requested prior to registration, either to verify aspects of the registration request or assessment report, or to enable better understanding of the Production Device for the purposes of operating the NZECS.

2. Assessment report requirements

This section outlines the requirements for assessment for a Production Device producing a renewable gas. It is largely based on the ISO standards 14040/14044/14067, with some simplifications.

2.1 Goal of the Assessment

i. The main goals of the assessment are to provide an overview of the potential environmental impact of the gas produced by a production device and to meet the requirements for NZECS certification.

ii. Producers may have additional goals depending on the production device, product they are producing or market they are selling into, if so these should be clearly stated.

2.2 Scope of the Assessment

2.2.1 Product system - feedstocks and production systems

i. At the outset, eligible product systems include

- producing renewable gas (biomethane) from anaerobic digestion, pyrolysis, fermentation, thermo-chemical conversion of biomass or other product systems with prior agreement with Certified Energy.
- renewable gas (hydrogen) from electrolysis for water, or from SMR (Steam Methane Reformation) from biomethane.

Approaches to assessment of additional production methods will be developed as requested by system users.

ii. For production to qualify as biomethane within the NZECS, it must use organic waste feedstocks[1] from biogenic origin, namely:

[1] Note - if these wastes currently have a beneficial reuse eg soil conditioner, then the loss of this use must be included in the avoided emissions calculation i.e. include the emissions for what this waste will need to be replaced by, as per ISO requirements.

- Municipal, industrial and commercial wastewaters or sludges;
- The organic component of municipal solid waste (separated at source or prior to landfill);
- Waste from food production eg crop residues, horticultural waste
- Food and beverage processing waste;
- Food waste from retailers, distributors, consumers (including hospitality, government, institutions, companies etc);
- Vegetative matter (including garden waste), and timber waste[2]; and
- Animal waste, specifically (but not limited to) agricultural waste.
- Landfill gas

Energy crops are not currently eligible, but novel systems, such as algae biomass based on recycled wastewater, are.

iii. Hydrogen produced using a range of production technologies classed as electrolysers will qualify within the NZECS. In order to be classed as renewable, all inputs into the production process, such as electricity or steam, must be classifiable as renewable.

iv. Hydrogen produced using a range of production technologies classed as steam reforming of methane will qualify within the NZECS, if the methane is able to be classified as renewable. Hydrogen produced from fossil fuels, such as natural gas, are not eligible.

2.2.2 Functional unit - emissions per MWh

i. The functional unit for all NZ-ECs is MWh. Emissions and other characteristics for gas certification will therefore be as per MWh of energy content using the higher heating value[3].

ii. As all characteristics are averaged values, the value of characteristics within a certificate could be converted to an alternative energy unit, using traditional conversion factors.

iii. It is expected that, in most cases, a volume of certificates will be procured to cover a volume of energy consumed, and that for this reason use of a standardised unit of denomination across energy markets will not be an issue.

2.2.3 System boundary: cradle-to-gate

i. The process of certification will assess total incremental Production Emissions from the processes within the 'cradle–to–gate' system boundary[4]. This boundary includes upstream (extraction of

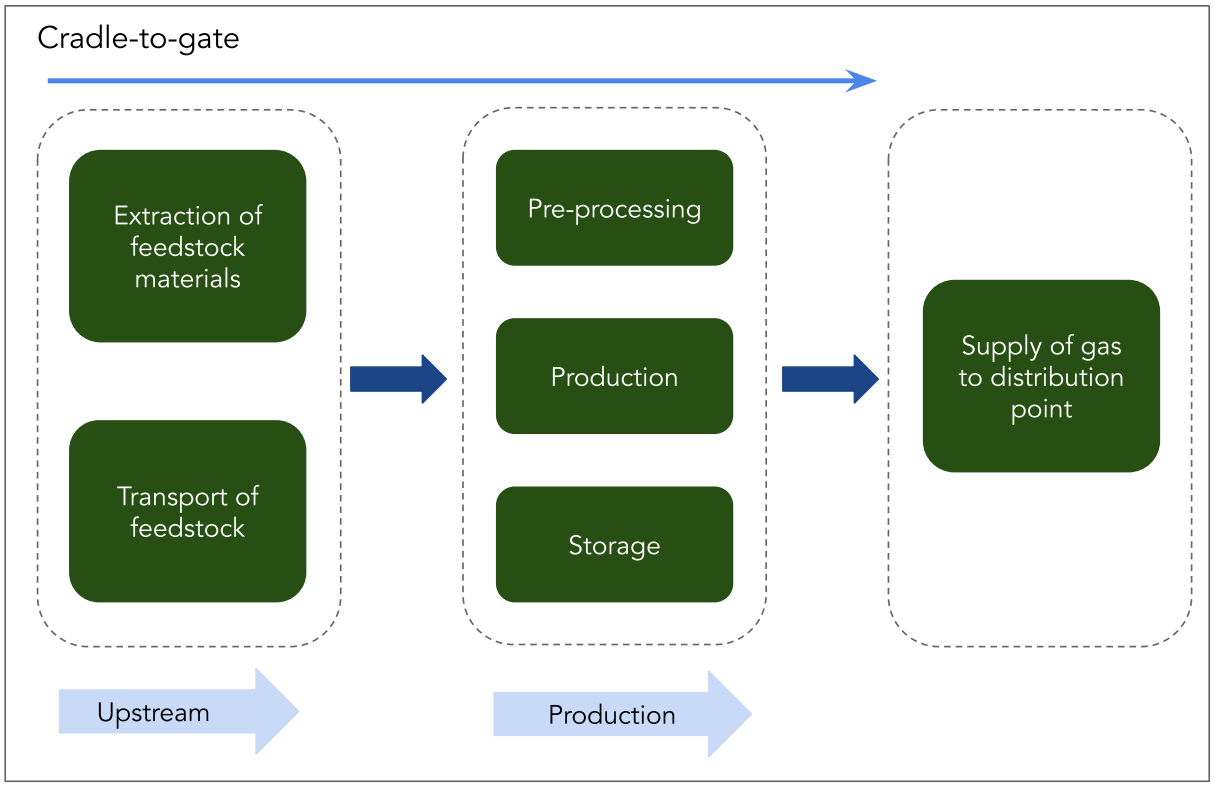
[2] Timber waste can only be included if it is genuine waste material from the timber industry. We note examples internationally where virgin forests have been harvested for fuel and a similar process would not be certifiable in New Zealand.

[3] A move to kWh may happen soon

[4] A system boundary specifies the unit processes that need to be included in the life cycle assessment (LCA).

feedstock materials, transport of feedstock), production (pre-processing, production, storage) and provision of gas to adjoining distribution pathways, shown in Figure 3.

Figure 3: System boundary



ii. The gate is the point of departure from the production facility to shipper, distributor, or consumer. For example, for pipeline-injected biomethane, this is the point of injection into the pipeline at the required pipeline pressure.

Emissions associated with transporting the renewable fuel to the end consumer are not currently included in the scope for Production Emissions. Certified Energy may include this in future versions, if research suggests that this life cycle stage is a significant contributor to the overall potential impact of the renewable fuel.

iii. Upstream emissions are from the life cycle stage prior to production and include feedstock exploration, development and extraction/production and transport of feedstock to the production site. Fugitive emissions should be included.

iv. Incremental Production Emissions relate to the main production stage, and should ensure that the real world impact of the Production Device is assessed in all relevant life cycle stages (cradle-to-gate). Fugitive emissions should be included, such as methane and dinitrogen oxide emissions from wastewater treatment, discharged effluent, and biogas system and engine (refer to Farago et

al, 2022)[5].

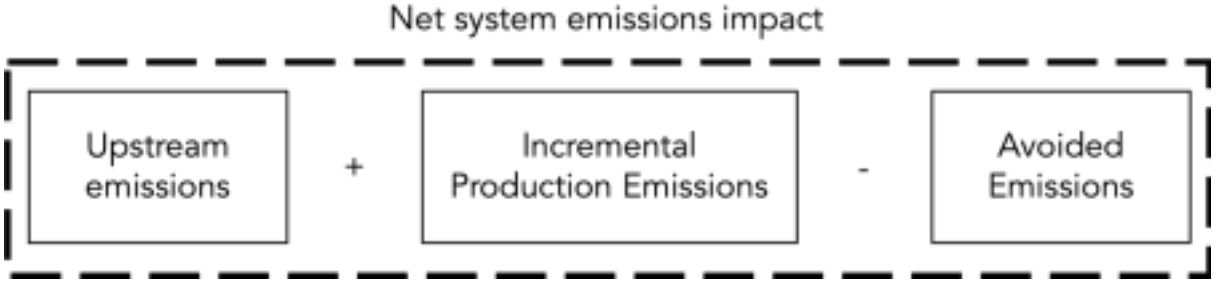
v. Avoided Emissions must be assessed and are expected to originate primarily from the diversion of waste into renewable gas and the subsequent reduction in methane emissions to atmosphere e.g., from landfills or anaerobic ponds, where methane may not be captured or may be captured and flared. Avoided emissions relating to the beneficial reuse of co-products, such as the use of stabilised digestate as fertiliser or soil conditioner, should also be included. These two categories of avoided emissions (i.e. repurposing of waste and generation of co-products) must be assessed.

The use of the renewable gas in place of fossil fuels may also be included, using publicly accepted emissions factors for alternative fuels where available[6]. For example, given the large amount of renewable electricity generated in New Zealand, a larger benefit may result if the renewable gas is used in heating or transport applications rather than for electricity generation.

To achieve a final avoided figure of emissions beyond the gate, utilisation emissions should also be assessed. This could include transportation or distribution of gas, or emissions associated with pumping, storing or changing the state of the gas before use. If the Production Device requires additional dedicated physical infrastructure (roads, rails, pipelines, etc), the emissions from these shall be included, if assessed as material.

vi. The net impact on system emissions of production from the Production Device will be deemed to be the sum of Upstream Emissions and Production Emissions minus any verified Avoided Emissions, as shown in Figure 3 below. Consideration of these three emissions categories will enable clear communication of the system impact of production and use of renewable gas.

Figure 3: Depiction of emissions categories to be assessed and communicated within NZECS gas certification



[5] Faragò, M., Damgaard, A., Rebsdorf, M., Nielsen, P. H., Rygaard,M., Challenges in carbon footprint evaluations of state-of-the-art municipal wastewater resource recovery facilities, Journal of Environmental Management, Volume 320, 2022, https://doi.org/10.1016/j.jenvman.2022.115715

[6] For example those provided by the Ministry for the Environment as described in the document – Measuring emissions: A guide for organisations: https://environment.govt.nz/publications/measuring-emissions-a-guide-for-organisations-2022-summary-of-emission-factors/

vii. All processes and flows within the system boundary are to be included. If a material/energy flow can be demonstrated to be immaterial compared to the overall footprint (less than 1% of total), that flow may be excluded, for example by comparing with previous studies of comparable production devices or providing a calculation, in line with ISO requirements (ISO 14067 Section 6.3.4.3 and ISO 14044:2006 Section 4.2.3.3). The effect of any exclusions on the outcome of the assessment should be included in the final report.

viii The geographical scope of the Production Devices under assessment is in New Zealand's exclusive economic zone.

2.2.4 Data on electricity input

i. Certification requires electricity used in the process of gas production to be included in assessment, with attributes clearly stated.

ii. Where electricity has been purchased it should have attributes tracked either explicitly through the use of NZ-ECs, or implicitly via application of the NZECS Residual Supply Mix (RSM).

iii. Where electricity has been sourced from on-site generation, attributes may be directly allocated, provided that these attributes have not been allocated elsewhere.

iv. There will be no requirement for time-matching i.e. redemption of certificates originating from electricity generation that occurred in the same period as consumption.

2.2.5 Time boundary for assessment

There will be no requirement for Production Devices to have been built after a particular date.

2.2.6 Allocation procedures for co-products such as digestate, heat etc

Allocation should follow the usual ISO hierarchy (ISO 14044:2006, section 4.3.4.2/ ISO 14067:2018 section 6.4.6.2), namely 1) subdivision 2) system expansion with use of the additional functions relating to the co-product 3) physical allocation (mass, energy) or 4) economic allocation. The choice of allocation method should be documented and justified. Certified Energy will provide further guidance on allocation for different Production Devices.

2.2.7 Environmental indicators

i. Global warming potentials for 100 years (GWP100) will be used to estimate the global impact of GHGs from renewable gas production. The methodology and specific GWP values shall be aligned with the latest report of the Intergovernmental Panel on Climate Change (IPCC), as they may be subject to change.

ii. Water use per unit of production will be assessed. Water may not be a critical resource in New Zealand; however, water use will be considered to enable equivalence with international certification frameworks. Avoided emissions should be reported separately and the sources of avoided emissions clearly documented.

iii. Discharge of water will be considered as part of the wider environmental impact within the certification process. Specific guidance and methods will be referenced from available best practice methods.

iv. Tracking of additional attributes is possible, however recording of non core attributes may be done informally via "labels". A label may be added to a certificate by the operator of a Production Device as a descriptor, and may not be formally verified by Certified Energy. This could include consideration of the impact of cultural and biodiversity outcomes of the project. For example, Certified Energy recognises that for some groups, purchase of 'renewable' gas or energy may be required, as opposed to a focus on emissions. As CO_2-e emissions reduction may not be the focus for specific groups, renewability will be verified and clearly communicated within the certificate.

3. Reporting

3.1 Assessment reports

The following is required reporting to NZECS for assessment and verification:

- LCA report
- Production device information (including location and contact information)

The LCA Report should follow the general ISO guidance, with particular attention to

- Ensuring that all assumptions are documented,
- Identifying which data sources are used for characterisation factors for converting emissions, to CO_2-e e.g. which IPCC report,
- Identifying where secondary data is sourced from, and
- Identifying the source of the feedstock and water.

3.2 Type and format of report

i. A LCA report should be prepared by the party wishing to register a Production Device (Registrant), as part of the process of registration and provided to Certified Energy for verification.

ii. The report should be generally consistent with the ISO 14044/14067 requirements. The table in Appendix A of this document should be used in conjunction with ISO 14044, as it provides examples of the type of information to be included. It is not an exhaustive list.

iii. Emissions for each life cycle stage (upstream, production) shall be reported as a single score measured in carbon dioxide equivalents (CO_2-e), with biogenic carbon, direct land use change (dLUC), soil carbon changes, fossil fuel emissions and offsets (e.g. NZECs from purchase of renewable electricity) reported separately.

iv. Total gross CO_2-e, Production Emissions, will be the primary output value for the certificate. Avoided emissions value, expressed in CO_2-e, will be reported separately. Production Emissions should also be expressed as an intensity of CO_2-e per MWh.

3.3 Annual Reporting

Production Devices shall report annually the amount of renewable gas generated and supplied to the point of transfer to a distributor or consumer in MWh. This should include the relevant emissions intensity.

The initial LCA report must be updated if one of the environmental indicators (greenhouse, water) has worsened by more than 10% compared with the original study.

3.4. Transition Projects

Production Devices that transition from earlier versions of this assessment method shall be eligible to use the previous version of the method up until the following gas Production Year. For example, if the assessment method was updated to version 3 during the Production Year of 2024, assessment under version 2 of the method will be valid until 31 October 2024, however prior versions will not be permitted. Version 1 is the first version created, there are no previous versions.

4. Contact

New Zealand Energy Certificate System (NZECS)

W: www.certifiedenergy.co.nz

E: contact@nzecs.co.nz

Appendix A: Example Report table

The items in the table below are expected to be included in the report submitted to Certified Energy, alongside the requirements under ISO 14040/14044/14067. This is not a comprehensive or prescriptive list; it is a sample of the types of information to be supplied. This table is illustrative for those new to the LCA process and certification.

Production Device name	
Production year	
Assessment method version	
Contact information	
Feedstock	
Feedstock source	
Production process	
Time period for which data and information have been collected	
Exclusions	
Rationale for exclusions	
For subsequent inventories, a link to previous inventory reports and description of any methodological changes	
Life cycle stage definitions and descriptions	
A system boundary diagram / process map including attributable processes in the inventory	
Disclosure and justification of the methods used to manage multi-functionality, co-products and recycling eg subdivision, system expansion, allocation	
A qualitative statement on inventory sources, assumptions, uncertainty and methodological choices.	

Biogenic and non-biogenic emissions and removals separately when applicable (including dLUC, soil carbon and offsets)	
Emissions intensity per MWh	
Total production emissions CO_2-e	
Total avoided emissions (CO_2-e)	
Net CO_2-e (Total less avoided)	