Discussion and consultation paper:

Approach and method for assessment and certification of renewable gas production

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Certified Energy
New Zealand Energy Certificate System

I. Table of Contents

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.
Biomethane	Methane gas deemed to be renewable due to use of renewable waste feedstocks.
Certification	The process of transferring attributes via digital certificate, requiring assessment and verification of Production Device characteristics.
Construction emissions	Emissions caused by the process of constructing the Production Device and and manufacturing major equipment.
Displaced fuel	Business as usual or predominant fuel source that would otherwise be used were renewable gas not available.
Embodied emissions	Greenhouse gas emissions that are released as a result of the production of renewable gas. For the purpose of this document, embodied emissions include Upstream Emissions and Production Emissions.
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.
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 CO2-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 impact assessment (LCA)	A process to quantitatively assess the type and extent of environmental impacts that may arise from a set of activities.
Life cycle impact 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 originating from the production of renewable energy, for the purposes of this paper predominantly renewable gas.
Registrant	A user within the NZECS with authority to act on the behalf of a Production Device.
System Users	Parties registered on the NZECS to issue and/or redeem renewable gas certificates.
Verification	Confirmation of the accuracy of information provided for the purposes of assessment of characteristics of the Production Device.

III. Purpose of this Document

This document introduces the approach that Certified Energy intends to take to verify and communicate characteristics of renewable gas production in New Zealand, via the New Zealand Energy Certificate System.

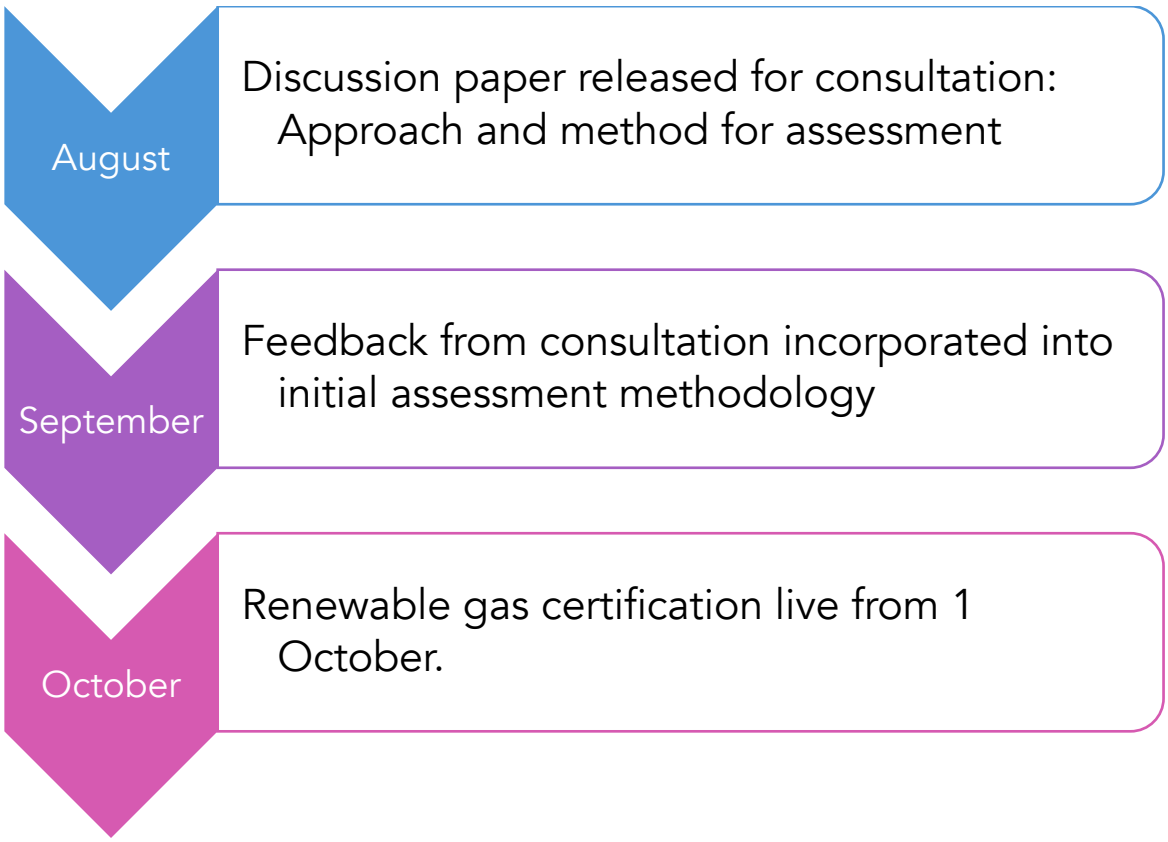
Feedback is sought from interested industry members and stakeholders, in order to ensure that the approach is credible and robust whilst still being practically achievable for users of the system.

Specific consultation questions are listed throughout this document, and a template response document will be provided. Additional feedback on any part of this approach and method is welcomed.

The process for incorporation of feedback is shown in Figure 1 below.

This document has been prepared by Certified Energy with the expert advice of Edge Environment.

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 2021, after public consultation.

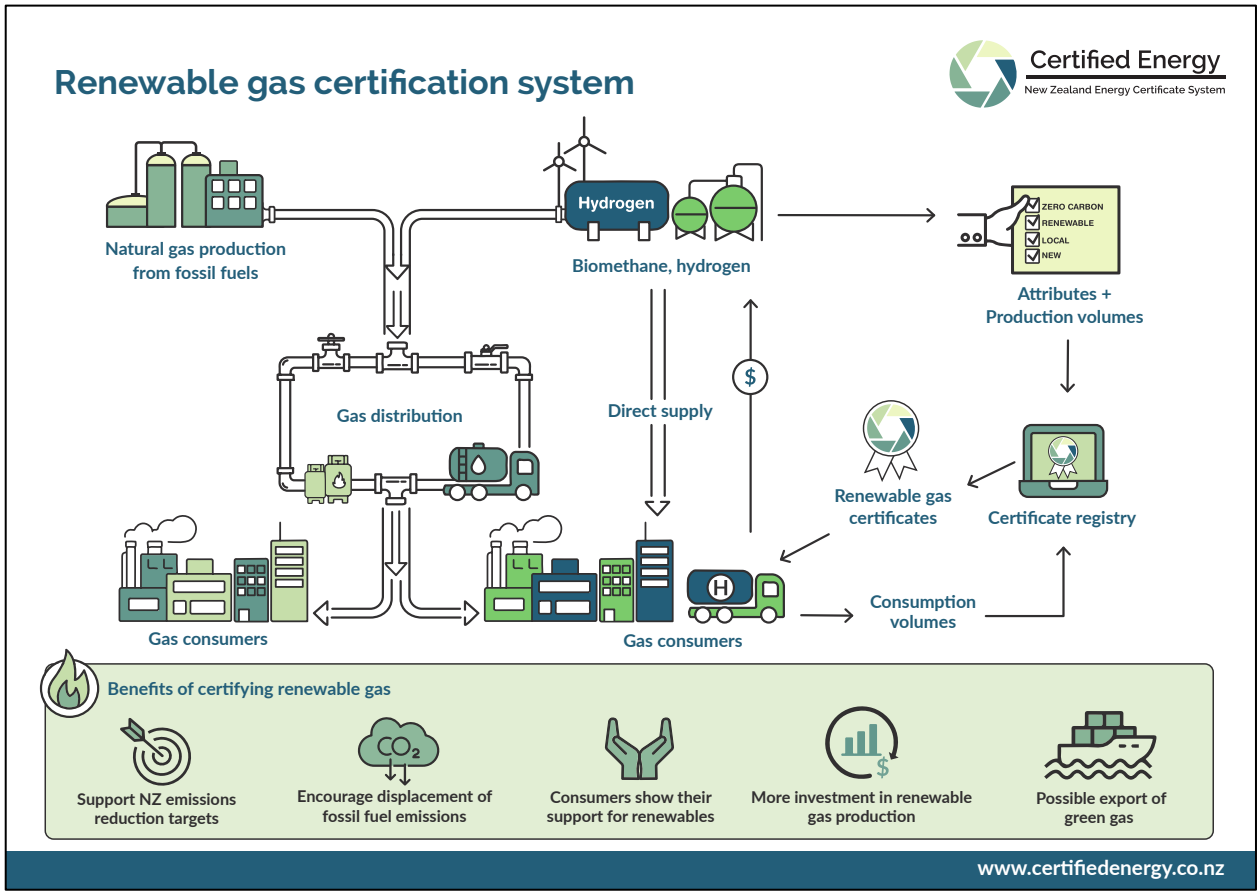
1. Introduction

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 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. Given the importance of Production Device assessment to the successful operation of the system, Certified Energy is seeking feedback on the intended approach. This document outlines the intended approach.

v. This document outlines the:
   - approach to communication of production characteristics,
   - scope of assessment,
   - required inclusions in assessment, and
   - steps to initiate registration and assessment.

vi. The intended assessment approach is built on international standards surrounding 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, so strict adherence to the ISO standards is not essential, but any departures from these standards must be justified.

2. Approach to certification of a renewable gas Production Device.

This section seeks to outline the conceptual approach that will be taken to certification.

2.1. Overall Approach

i. The process of certification will assess total incremental Production Emissions from the processes within the 'cradle–to–gate' system boundary[1]. This boundary includes extraction of feedstock materials, transport of feedstock, pre-processing, production, storage and provision of gas to adjoining distribution pathways.

CONSULTATION QUESTION 1: Is this boundary suitable for a Production Emission Factor? If not, why not, and what is a more appropriate alternative?

ii. This Production Emissions factor is the primary reporting factor expected to be used by purchasing parties.

iii. Where material, Upstream Emissions will also be assessed. Inclusion of Upstream Emissions will provide information on emissions related to dedicated infrastructure and major equipment established for the purposes of production of the renewable gas.

iv. In addition, Avoided Emissions may also be assessed and communicated via the process of certification.

v. Avoided emissions will be defined as the emissions that would otherwise occur if the renewable gas had not produced and used. These avoided emissions are expected to originate primarily from the diversion of waste into renewable gas and the use of the renewable gas in place of fossil fuels.

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

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 emissions impact of production and use of renewable gas.

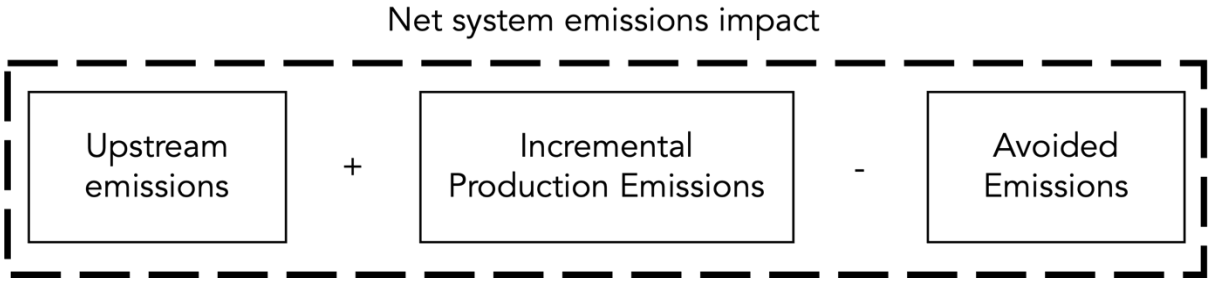


Figure 3: Depiction of emissions categories to be assessed and communicated within NZECS gas certification

CONSULTATION QUESTION 2: Is the assessment of avoided emissions, in order to enable the estimation of net system emissions impact, a useful addition to the method? If not, why not?

2.2. Allocation of Embodied Emissions

i. Embodied Emissions will be allocated proportionally to all production outputs. Where a Production Device produces by-products[2], total Embodied Emissions shall be allocated to all products in proportion to their relative economic value, with these allocations then broken down by output units.

2.3. Recognised Production Methods

i. At the outset, only processes for verification of the characteristics of renewable gas (biomethane) from anaerobic digestion, and renewable gas (hydrogen) from electrolysis have been defined in this document.

CONSULTATION QUESTION 3: Are there other gas production methods that will need to be assessed in the short-term? If so, what are they?

[2] Such as bio-digestate.

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

2.3.1. Biomethane from anaerobic digestion

i. For production to qualify as biomethane within the NZECS it must use 100% organic waste feedstocks from biogenic origin, namely:
   - Municipal, industrial and commercial wastewater;
   - The organic component of municipal solid waste (separated at source or prior to landfill);
   - Uncontaminated food waste, and food and beverage processing waste;
   - Vegetative matter (including garden waste), and timber waste[3];
   - Animal waste, specifically (but not limited to) agricultural waste; and
   - Sewage sludge.

CONSULTATION QUESTION 4: Is this list of acceptable feedstocks proper and complete?

ii. All biomethane production from these feedstocks will be classified as renewable. Emissions originating from processing, storage, and the transportation of organic waste from collection sites to the Production Device site will be included and assessed in the verification of production emissions.

2.3.2. Hydrogen from electrolysis

i. Hydrogen produced using a range of production technologies classed as electrolysers will qualify within the NZECS.

ii. In order to be classed as renewable, all inputs into the production process, such as electricity or steam, must originate from renewable source.

[3] 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.

2.4. Greenhouse Gases

i. Greenhouse gas (GHG) emissions will be assessed per unit of production, discussed in Section 2.6. The following GHGs will be assessed[4]:

- CO_2 (carbon dioxide)
- CH_4, (methane) and
- N_2O (nitrous oxide).

2.4.1. Global Warming Potential (GWPs)

i. Global warming potentials (GWPs) 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, as they may be subject to change. Emissions for every category shall be reported as a single score measured in carbon dioxide equivalents (CO_2-e).

2.5. Other Attributes

i. In addition to GHG emissions, other production characteristics (attributes) may be verified and communicated via certificate. The following additional attributes could be considered as part of the Production Device assessment process and may be communicated via certificate.

2.5.1. Renewable nature of the gas

i. Certified Energy recognizes 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.

2.5.2. Water

i. 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.

ii. Further, discharge of water will be considered as part of the wider environmental impact within the certification process. Specific

[4] Synthetic greenhouse gases that are included in the New Zealand Emissions Trading Scheme (NZ ETS) - hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) - are not included in this methodology.

guidance and methods will be referenced from available best practice methods.

2.5.3. Additional attributes

i. 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.

CONSULTATION QUESTION 5: Should all labels be verified? Are there particular labels that are of importance to stakeholders?

2.6. Production Device Eligibility

2.6.1. Age

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

ii. If the Production Device requires additional dedicated physical infrastructure (roads, rails, pipelines, etc.), the emissions from these shall be included.

2.6.2. Location

i. Production Devices must be located in New Zealand for participation in the NZECS.

2.7. Functional Unit

2.7.1. Emissions per MWh

i. The unit of denomination for all NZ-ECs is MWh. Emissions and other characteristics for gas certification will therefore be denoted as per MWh of energy content, higher heating value[5].

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.

[5] A move to kWh may happen soon.

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.

2.8. Use of Offsets

i. Use of offsets will not be recognised within the assessment process to reduce emissions.

ii. However, it is expected that renewable gas consumers may choose to purchase offsets to adjust for net emissions within their reporting program, and renewable gas retail products may be 'pre-offset' in order for a carbon neutral product to be presented to a consumer.

2.9. Use of New Zealand Energy Certificates (NZ-ECs)

i. NZ-ECs may be used to demonstrate that the nature of electricity used in the production process is of a specific nature.

ii. 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.

2.10. Relevant Concepts

2.10.1. Materiality

i. In general, all processes and flows that are attributable to the process system shall be included. However, emissions below a certain level can be deemed to be immaterial. If found to be immaterial, these may be excluded for practical reasons and shall be reported as data exclusions[6].

ii. Consistent cut-off criteria that allow the exclusion of certain processes of minor importance shall be defined within the goal and scope definition phase. The effect of the selected cut-off criteria on the

[6] This exclusion of factors deemed immaterial is aligned with the cut-off criteria outlined in ISO 14067 Section 6.3.4.3 and ISO 14044:2006 Section 4.2.3.3.

outcome of the study shall also be assessed and described in the final report.

iii. To determine materiality, energy and/or environmental significance should be used as the cut-off criteria in this process. This is seen as LCA best practice in ISO 14044. Note similar cut-off criteria can also be applied to identify the outputs to include.

2.10.2. Management of digestate and other process byproducts

i. The process of treatment or disposal of production byproducts is deemed to be part of the production process (as is pumping or distributing heat). As such, emissions from these processes are to be included in calculations of incremental production emissions and will be verified during the certification process.

3. Method for assessment of renewable gas production

This section seeks to provide more information on the method of assessment, including any defined criteria required to be met.

3.1. Scope of Verification

3.1.1. Cut off criteria

i. All processes and flows within the system boundary are to be included. If a material/energy flow can be demonstrated to be insignificant compared to the overall footprint (less than 1% of total), that flow may be excluded.

3.1.2. Definition of gate

i. For the purposes of establishing a system boundary, the gate shall be defined as the point of transfer to shipper, distributer, 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 inclusive any emissions associated with the process of transfer.

CONSULTATION QUESTION 6: Is this definition of a gate appropriate for actual production scenarios? If not, is there a more appropriate definition?

3.1.3. Input electricity

i. Certification requires electricity used in the process of gas production to be included in the process of 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. Assessment will only require inclusion of scope 1 & 2 emissions for input electricity only, with no allocation for ongoing facility maintenance required at this point.

3.1.4. Incremental Production Emissions

i. All incremental Production Emissions involved in the process of accessing inputs and feedstocks, bringing them to site and converting them into a final product are to be included. This includes activities such as material extraction, transport, pre-processing, production, storage and injection of gas.

ii. In addition, emissions associated with maintenance and on-going repair of the Production Device are to be included.

CONSULTATION QUESTION 7: Should emissions from on-going maintenance and repair be included in the Production Emissions factor? If not, why not?

iii. Fugitive emissions must be included in the assessment report, but it is proposed that these emissions are not included as being a result of production.

CONSULTATION QUESTION 8: Is it appropriate for fugitive emissions to be excluded from the Production Emissions factor? If not, why not?

3.1.5. Upstream Emissions

i. Upstream Emissions, where material, should be included in the assessment. Included in the assessment should be emissions from facility construction, operation and refurbishment, and decommissioning, as well as manufacture of major equipment.

3.1.6. Avoided Emissions

i. Avoided Emissions are intended to serve as an indication of the system benefit of the production, purchase and use of renewable gas, and so should generally describe a negative emissions value.

ii. Assessment of this factor is optional and is of use where transaction consequence is to be communicated.

iii. To estimate Avoided Emissions, assessment shall include us of pre-existing waste streams, any displacement of fossil fuels, and any material emissions included in the process of transportation or use of the renewable gas (utilisation), as described in sections 3.1.7 - 3.1.9 below.

iv. Through combination of Upstream, Production and Avoided Emissions, we are able to understand the net system impact of renewable gas.

3.1.7. Waste streams

i. Any avoided emissions from the recapture and use of pre-existing waste streams may be included and assessed.

3.1.8. Displaced fuels

i. Avoided emissions will require an understanding of the fuel to be displaced and an estimate of its emissions intensity. For initial calculations, this factor will be determined as the average emissions of alternative fuels. These alternative fuel emissions factors will be static within a given period. Alternative fuels may include fossil natural gas, or diesel or other liquid fuels.

ii. Publicly accepted emissions factors for alternative fuels shall be used where available, for example those provided by the Ministry for the Environment[7].

3.1.9. Transportation and use of the gas (utilization).

i. To achieve a final avoided figure of emissions beyond the gate, utilisation emissions should 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.

CONSULTATION QUESTION 9: Is this an acceptable methodology for determination of avoided emissions?

[7] 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/

3.2. Life Cycle Impact Assessment

i. As discussed further in section 5, a Life Cycle Impact Assessment report should be prepared by the party wishing to register a Production Device (Registrant), as part of the process of registration.

ii. Life cycle impact assessment of production should refer to ISO 14044. A life cycle assessment report should be prepared and provided to Certified Energy for verification. As an appendix to the report, the table in Appendix A of this document should be reproduced and filled out identifying the location where each requirement is contained within the report.

4. Registration, assessment and verification process

4.1. Initiating registration

i. In order to register a Production Device, a party must provide a range of information, a major component being the Life Cycle Impact Assessment report discussed in this document.

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

4.2. Preparation of assessment report

i. Assessment 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 assessment reports that meet these guidelines.

4.3. Verification of assessment report

i. Certified Energy will review the data provided in the assessment report to verify completeness and accuracy.

ii. Where the assessment report was prepared by an endorsed provider to agreed standards, Certified Energy may see that this verification is not required.

4.4. 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.

CONSULTATION QUESTION 10: Is this approach to registration and assessment manageable from the perspective of a Registrant? Is additional support required? If yes, what?