CleanCounts

Public Consultation: Clarification of Registry Metering Requirements

Consultation Process and Timing

CleanCounts is accepting stakeholder feedback on the following proposed CleanCounts Metering & Measurement Guide through **Monday, February 23, 2026**. Stakeholders are encouraged to submit feedback using the provided **Excel feedback form** found on CleanCounts Blog posting related to this consultation. Stakeholders should put "Public Consultation" in the subject line of their email with their attached Excel spreadsheet response form. Spreadsheet feedback can be submitted by email to feedback@cleancounts.org.

Questions? Please contact James Critchfield, Head of Registry & Market Integrity at james@cleancounts.org.

Submitted comments—and the names of any individuals or organizations—will not be attributed or made public as part of this consultation.

Questions for Stakeholder Feedback

Stakeholders are invited to provide feedback on the following question areas. Please provide related supporting documentation related to comments (please provide links or citations that easily identify the source and other relevant information in your response):

1. **Hierarchy of Metering Standards and Applicability**
   Are there additional standards that should be recognized? Is the proposed hierarchy clear and workable across project types? Are there cases where alternative standards should be pre-approved?

2. **Measurement Boundary and Eligible Use**
   Do the proposed definitions of Project Boundary and Measurement Boundary clearly identify the "last metering plane" that should govern issuance for electricity, fuels, and molecules?

3. **Pressure, Temperature, Dry Basis, and Energy Content (HHV)**
   Are the proposed normalization and HHV requirements clear? Is the proposed gas quality summary sufficient? Are there practical challenges with gas chromatography placement?

4. **Evidence-Based Meter Application and Installation Verification**
   Are the proposed evidence requirements reasonable? Are there additional elements that should be included or removed and why? Are photo documentation requirements an efficient approach?

5. **Change Control, Data Governance, and Registry Status**
   Are the proposed change-control triggers appropriate? Are there additional governance elements that should be addressed?

6. **Risk-Based Oversight and Escalation**
   Is the proposed risk-based approach appropriate? Are the escalation mechanisms clear and proportional?

7. **Other feedback?** Stakeholders are encouraged to submit other comments and feedback as needed.

Consultation Framing and Purpose

CleanCounts is issuing this Metering and Measurement Guide for public consultation to clarify expectations related to the measurement, metering, and reporting of electricity, biogas/renewable natural gas (RNG), and hydrogen across registries administered by CleanCounts (including M-RETS registries).

Accurate and consistent measurement is foundational to the integrity of energy and molecule attribute certificates. CleanCounts relies on reported measurement data to issue certificates that are credible, auditable, and suitable for use in both voluntary and regulatory contexts. Variability in how projects define measurement locations, select metering instrumentation, document calibration, and report data has increased administrative burden for registrants, third-party reviewers, and registry staff, and has created uncertainty for certificate users.

The objective of this Guide is to establish a clear, consistent, and auditable framework for metering and measurement that:

- aligns with applicable legal metrology requirements across jurisdictions;
- supports consistent third-party verification and registry review; and
- improves transparency for certificate buyers and claimants.

This Guide is not intended to serve as a detailed engineering design manual or to prescribe specific technologies beyond those required to meet applicable standards. Responsibility for meter selection, system design, installation, and operation remains with project developers and operators, subject to verification by qualified third-party engineers or Independent Review Entities (IREs). CleanCounts' role is to define the minimum measurement, documentation, and reporting requirements necessary to support certificate issuance and registry integrity.

Stakeholder feedback is requested on the clarity, completeness, and practicality of the proposed framework, including whether the requirements appropriately balance measurement accuracy, administrative feasibility, and market applicability. Following the consultation period, CleanCounts will finalize this Guide and reference it as the authoritative source for metering and measurement requirements across applicable registries.

<< The pages hereafter represent the "Metering and Measurement Guide" for public comment >>

CleanCounts: Metering and Measurement Guide

Section 1. How to Use This Guide

This Guide defines (1) what is being measured, (2) where measurement must occur (Measurement Boundary), (3) how measurement must be performed (standards and accuracy), and (4) what must be retained and reported to CleanCounts. It is designed to be media-neutral across electricity, fuels, and molecules.

This Guide is intended for project developers, operators, engineers, Independent Review Entities, and registry administrators. This document establishes both jurisdiction-specific requirements that apply across all energy media and media-specific requirements that apply depending on the type of energy or molecule produced and measured.

Readers should first review Sections 2-6 for conceptual and boundary definitions before consulting jurisdiction-specific requirements in Section 7.

Global sections applicable to all projects:

- **Section 2:** Purpose, Scope, and Authority
- **Section 3:** Core Measurement Concepts and Eligibility
- **Section 4:** Project Boundary and Measurement Boundary
- **Section 5:** Useful Demand
- **Section 6:** Hierarchy of Metering Requirements

- **Section 8:** Meter Installation Requirements
- **Section 9:** Verification and Summary Reporting
- **Section 10:** Reporting Frequency, Data Submission, and Data Retention
- **Section 11:** Change Control, Calibration and Reverification
- **Section 12:** Compliance Status and Enforcement
- **Section 13:** Appendices

Project-specific section applicable to projects based on jurisdiction:

- **Section 7:** Jurisdiction-Specific Metering and Measurement Requirements
  - United States — Section 7.2
  - Canada — Section 7.3
  - Mexico — Section 7.4

Each subsection includes delivery modes, measurement basis, quality parameters (where applicable), reporting frequency, and applicable metering standards.

Section 2. Purpose, Scope, and Authority

2.1 Purpose

The purpose of this Guide is to establish minimum measurement and metering requirements that support accurate certificate issuance, prevent double counting, and preserve environmental integrity across CleanCounts registries.

This Guide establishes CleanCounts' minimum requirements for accurate measurement and metering of electricity, biogas/renewable natural gas (RNG), and hydrogen used to support certificate issuance across CleanCounts-administered registries.

The requirements ensure that all reported quantities:

- are derived from metering instrumentation meeting applicable standard measurement error limits;
- are appropriate for the energy carrier or molecular form being measured; and
- produce data that is traceable, auditable, and suitable for independent technical review.

This document defines what must be measured, where measurement must occur, how measurement accuracy must be demonstrated, and what documentation must be provided.

2.2 Scope and Relationship to Program and Policy Requirements

This framework applies to projects that generate or produce electricity, biogas/RNG, or hydrogen and seek issuance of certificates through a CleanCounts registry.

Where a program, policy, or contract requires stricter metering than this Guide, the stricter requirement governs. Where a program is less specific, this Guide provides default requirements.

If project developers or operators have questions regarding which metering or measurement requirements apply to a specific project configuration, they should contact systemadmin@cleancounts.org prior to generator registration.

2.3 Authority and Incorporation by Reference

This document is incorporated by reference into applicable CleanCounts registry operating procedures and serves as the authoritative source for metering and measurement requirements unless otherwise specified by a specific program or within the operating procedures themselves.

CleanCounts may incorporate by reference publicly available standards (e.g., ANSI, AGA, ISO, Measurement Canada) and may publish implementation notes where those standards allow multiple compliant pathways.

Section 3. Core Measurement Concepts and Eligibility

3.1 Quantities Measured

CleanCounts registries rely on accurate measurement of:

- **Electricity**: MWh (AC) measured at an eligible revenue-grade meter
- **Gas fuels**: MMBtu, dekatherms (Dth), scf, or mass units where conversion to energy is supported by gas quality/composition measurement
- **Hydrogen and other molecules**: mass (kg) and where applicable energy content based on defined measurement basis[1]

Measurement is required for quantities that cross the Project Boundary (see Section 4) and are delivered via delivery pathways that generally serve Useful Demand (see Section 5).

3.2 Measurement Error Limits

All metering instrumentation used to support certificate issuance shall meet measurement error limits defined by applicable legal metrology standards. Where a standard provides multiple accuracy classes, CleanCounts may specify a preferred class (e.g., revenue-grade) and allow alternatives only where justified by jurisdictional rules or project constraints and documented in the registration record.

[1] Consistent with emissions-intensity accounting frameworks such as IRC §45V

Meters shall conform to recognized, published standards defining maximum permissible error (MPE), operating range, sensitivity, calibration, data integrity and preservation, and verification requirements.

Instrumentation without a recognized, published performance standard defining maximum permissible error shall not be used unless explicitly pre-approved by CleanCounts.

3.3 Eligible Measurement Quantities

Quantities are eligible for certificate issuance only if all of the following conditions are met:

- the energy or molecules cross the Project Boundary;
- measurement occurs at the Measurement Boundary;
- the delivery pathway meets an eligible Delivery Class (defined below); and
- measurement complies with this framework.

Delivery Classes (for purposes of Section 3.3):

Delivery Classes define the recognized delivery configurations under which CleanCounts can rely on measured output as evidence that energy or molecules are delivered for potential useful demand. Each output stream must be assigned one Delivery Class at registration and updated upon any material change. Delivery Classes are not a compliance determination about tariffs; they are an administrative classification that anchors measurement location, reporting, and audit expectations.

1. **Energy System Interconnection (Network Delivery)**: Delivery across the Project Boundary into a electric grid (identified by balancing authority), common-carrier / tariffed gas pipeline, local distribution company gas system, or other regulated energy delivery network, as evidenced by an interconnection, injection point, or operator/utility measurement point.
2. **Custody Transfer (Direct Delivery)**: Delivery across the Project Boundary to a receiving party under a Qualified Custody Transfer arrangement (see Section 5.3), evidenced by executed commercial terms and metered transfer at the Measurement Boundary.
3. **Transported Batch Delivery**: Delivery across the Project Boundary by transport vessel (e.g., tube truck, trailer, railcar, ISO container) where custody transfer is evidenced by chain-of-custody documentation and metered quantity is reconciled at loading and unloading points (the lower reconciled quantity governs issuance unless a stricter rule applies).
4. **Approved Self-Use (Onsite End Use)**: Delivery across the Project Boundary to an end-use load owned or operated by the same organization or an affiliate, where Qualified Custody Transfer cannot be demonstrated, and where the project demonstrates Useful Demand per Section 5.1 and meets certificate transfer restrictions in Section 5.3.

Quantities not eligible for certificate issuance include flaring, venting, parasitic loads, station service, and losses within the Project or Measurement Boundary. “Internal consumption” is not eligible unless it is (i) separately metered as an Approved Self-Use Delivery Class under Section 5.1 and (ii) issued under the transfer restrictions in Section 5.3. Where parasitic load or station service can be separately metered, CleanCounts may require netting adjustments consistent with the registry’s issuance methodology for the relevant media type.

3.4 Energy Conversion and Exclusivity

Where a primary energy source or molecule is converted into a secondary energy form within the same Project Boundary and without a custody transfer to a distinct party, CleanCounts may issue certificates for the secondary output only if the attributes of the primary input are not simultaneously being claimed by another party for the same quantity of energy.

CleanCounts does not prohibit issuance of primary certificates; however, where primary certificates represent

an input that is used to produce a secondary product (e.g., electricity used for electrolysis), primary certificates must be (i) retired, or (ii) explicitly allocated to the secondary production via a documented allocation method, before the secondary product may be represented as carrying those primary attributes for the same quantity of energy. Examples:

- **Biogas/RNG → Electricity**: Where biogenic gas certificates are issued, electricity certificates must not represent the same attributes for the same underlying energy unless there is a clear allocation and no double claim.
- **Electricity → Hydrogen**: Hydrogen may be designated as "renewable/clean" only where the electricity attributes are demonstrated through retirement or allocation of the corresponding electricity certificates covering the claimed input energy.
- **Hydrogen → Electricity**: Where low emissions intensity electricity is produced from hydrogen, the attributes of hydrogen must be reflected and allocated to the electricity production.
- **Hydrogen → Ammonia**: Where hydrogen attributes are claimed in derivative molecules, the allocation method must be documented and auditable.

This framework does not prevent eligibility for other environmental instruments (e.g., offsets) where methane destruction is the outcome.

Section 4. Project Boundary and Measurement Boundary

4.1 Project Boundary

The Project Boundary defines the physical and operational scope of activities involved in the production and measurement of energy or molecules prior to delivery across the Project Boundary.

This includes the activities of production, upgrading, conditioning, compression, buffer/temporary storage, flaring, parasitic loads, energy conversion, and internal losses. The Project Boundary includes points of interconnection/injection, and the metering infrastructure regardless of meter ownership (e.g., some utilities and grid operators control metering infrastructure).

4.2 Measurement Boundary

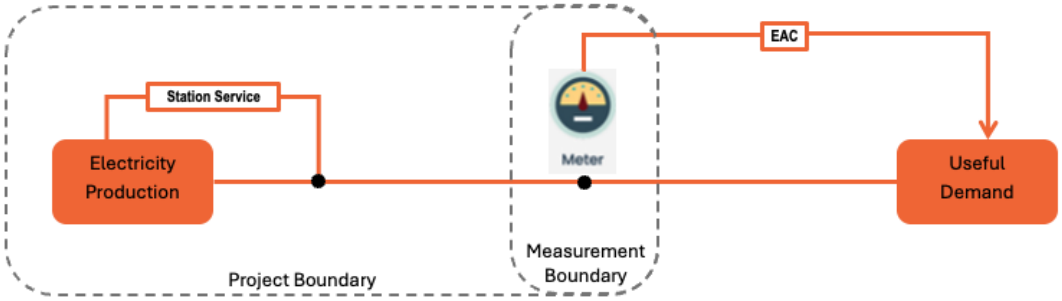
The Measurement Boundary is the defined metering plane at the Project Boundary exit where final quantity (and where applicable, quality) is established immediately before delivery across the Project Boundary under an eligible Delivery Class (Section 3.3).

The Measurement Boundary is inclusive of points of interconnection, injection, and the metering infrastructure regardless of ownership or control of the meter itself (e.g., some utilities and grid operators control metering infrastructure).

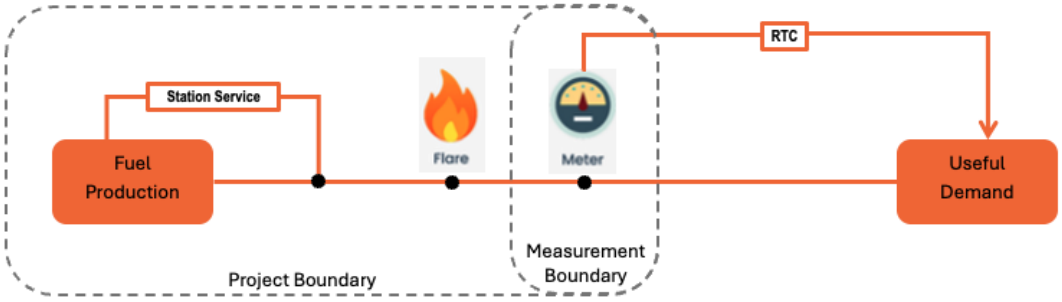
Measurement and metering shall occur after all production, upgrading, conditioning, compression, and internal handling steps (including buffer/temporary storage) and shall reflect net deliverable output after accounting for internal losses, parasitic loads, flaring, and other excluded quantities as applicable.

No activities or processing steps that alter quantity or quality may occur between the Measurement Boundary and delivery across the Project Boundary. Quantity and quality measurements shall be taken on the same stream and shall not be separated by intervening processing or handling.

Graphic A: Electricity Project Boundary and Measurement Boundary Diagram (Illustrative)



Graphic B: Biogas/RNG Project Boundary and Measurement Boundary Diagram (Illustrative)



4.3 Delivery Definition

"Delivery" means the physical transfer of energy or molecules across the Project Boundary under an eligible Delivery Class, evidenced by metered quantity at the Measurement Boundary (and where applicable, quality). "Delivery" does not require that the receiving party be a third party; Approved Self-Use is a recognized Delivery Class with restrictions.

Delivery may occur via system interconnection, custody transfer, or approved self-use configurations, as specified in Section 5.

Delivery modes involving transportation (e.g., tube truck, rail, or other transport vessels) require measurement at both the point of on-loading and off-loading of the energy or molecules, with the lower of the two measurements governing certificate issuance.

Section 5. Useful Demand

Useful demand is an end use application in which delivered energy or molecules:

- are delivered in the same physical form as conventional supply;
- do not support further production of energy or molecules; and
- presumptively reduce demand or emissions intensity for fossil-derived or fossil-mixed supply serving the same end use.

This presumption is based on delivery to systems or end-use applications that serve single or multiple end users or defined loads and that are served by established conventional sources.

5.1 Self-Use and Related-Party Use

Approved Self-Use requires the Participant to demonstrate Useful Demand with auditable evidence and to meet each of the following requirements**:**

- **Displacement demonstration (baseline and replacement)**: Provide evidence that the self-use load previously relied on a conventional supply of the same physical form (e.g., utility electricity, fossil gas, fossil hydrogen, fossil-derived liquid fuel), including baseline fuel/utility records and a description of the replaced supply.
- **No further production demonstration (no "making more energy/molecules")**: Demonstrate the delivered energy or molecules are not used to support further production, serve station service, upgrading, blending, recirculation, storage-as-process, or conversion intended to create additional energy or molecules for sale or certificate issuance.
- **Physical-form demonstration**: Demonstrate that the delivered energy or molecules are used in the same physical form as delivered (e.g., electricity used as electricity; gas used as gas), unless the project follows the conversion rules in Section 3.4 with required retirements.
- **Conversion exclusivity demonstration (Section 3.4)**: If any portion of the delivered energy or molecules is converted to a derived secondary product, demonstrate retirement of the corresponding primary certificates prior to seeking issuance of certificates for the derived product.

If a project seeks certificate issuance for self-use, the production facility must classify the energy or molecule stream as "Approved Self-Use" under Section 3.3.

CleanCounts may require additional documentation based on risk (e.g., one-line diagrams/PFDs, boundary diagrams, fuel train description, metering configuration, and an Independent Review Entity confirmation).

5.2 Transferability Restrictions for Approved Self-Use and Related-Party Use

Certificates issued for streams classified as Approved Self-Use (Section 5.1) and Qualified Custody Transfer (Section 5.3) are subject to the following restrictions:

- **Retire-only:** Such certificates may be issued to the producer/operator account but may not be transferred to another account holder. They must be retired by the producer/operator (or approved affiliate) prior to making claims or prior to using the energy/molecules in a conversion that supports derived certificates (Section 3.4).
- **No market sale:** These certificates are not eligible for sale, trade, or other conveyance to third parties through the registry.
- **Exception:** CleanCounts may authorize transferability only where the project demonstrates a Qualified Custody Transfer to an unaffiliated party and where the Operating Procedures for the relevant registry permit transfer.

5.3 Qualified Custody Transfer

Qualified Custody Transfer means a transfer to a receiving party evidenced by executed commercial terms (e.g., contract, invoice, bill of lading, interconnection settlement) and metered transfer at the Measurement Boundary. Qualified Custody Transfer is demonstrated by:

- a written agreement (or tariff/program equivalent) identifying the buyer/receiver, delivery point, and product;
- metered transfer at the Measurement Boundary at the Project Boundary exit; and
- records sufficient to audit chain of custody (e.g., invoices, tickets/bills of lading, interconnect statements, nomination/measurement statements where applicable).

Related-party transfers: Transfers between affiliates or entities under common control are not presumed to be Qualified Custody Transfer for purposes of Useful Demand. Such transfers shall either (i) meet the Approved Self-Use requirements in Section 5.1, or (ii) be specifically approved by CleanCounts with additional controls to prevent double claiming (including, at minimum, transfer restrictions in Section 5.2). Transfer restrictions apply to Approved Self-Use to prevent detached attribute trading where there is no credible third-party delivery evidence.

Section 6. Hierarchy of Metering Requirements

CleanCounts applies the following hierarchy when determining acceptable metering:

1. Jurisdictional legal requirements (utility, regulator, Measurement Canada, CRE/Normas, etc.)
2. Applicable industry standards (ANSI/AGA/ISO, etc.)
3. CleanCounts default requirements where 1 and 2 are silent or allow multiple options

For the jurisdictions of the United States, Canada, and Mexico, national legal metrology standards are expected to apply to electricity, gaseous fuels, and hydrogen.

Metering requirements default to the jurisdiction of production unless otherwise required by an eligible program or policy.

Industry standards apply only where national legal metrology standards are silent. Use of industry standards must be justified and documented.

Section 7. Jurisdiction-Specific Metering and Measurement Requirements

7.1 General Applicability (All Jurisdictions and All Media)

The tables in Section 7 identify jurisdiction-relevant metrology requirements for acceptable measurement systems. Inclusion of a meter technology does not guarantee acceptability unless installation pattern, calibration/reverification, and required device identifiers are satisfied.

- Minimum metering system identifiers (where applicable):
- Meter serial number and model
- Meter firmware/software version (or revision)
- Flow computer make/model and configuration file identifier (or checksum/version)
- Pressure transmitter identifier and calibration reference
- Temperature transmitter identifier and calibration reference
- Gas chromatograph identifier and method/configuration identifier (where GC is used)
- Seal identifier(s) where seals are required by legal metrology or utility practice
- For CT/PT systems: CT/PT ratios, accuracy class, and identification

Records retention: retain metering, calibration/reverification, configuration, and supporting documentation consistent with registry audit practice (default 7 years unless superseded by applicable program requirements).

7.2 United States

In the United States, metering and measurement requirements default to applicable U.S. legal metrology and widely used custody-transfer measurement standards where relevant. Program- or policy-specific requirements

prevail where explicitly defined.

7.2.A Electricity — United States

Table 7.2.A: United States Electricity Metering Standards

Parameter	Requirement
Jurisdiction	United States
Meter Category	Electricity
Meter Technology	Revenue-grade electric meter (utility-accepted or ANSI C12 compliant)
Energy form	Electric energy (AC)
Measurement accuracy / Performance Reference	ANSI C12.20 Class 0.2 preferred; Class 0.5 acceptable only where allowed by applicable program rules.
Calibration / Reverification	Utility/program recertification schedule or ≤ 10 years; event-based recertification following meter replacement, CT/PT changes, seal breach, or configuration change.
Installation Requirements	Utility-accepted installation practice; CT/PT class verified where used.
Required Identifiers	Meter serial number; firmware/software version; seal ID (if present); CT/PT ratios and class (if present).
Applicable Standards	ANSI C12.1; ANSI C12.20

Notes (US Electricity):

- Where higher-granularity reporting is required (e.g., hourly), Class 0.2 meters are strongly preferred.
- Net-export-only meters are not acceptable where they do not represent the required measurement basis for issuance (see issuance methodology elsewhere in the Guide).

7.2.B Biogas / Renewable Natural Gas (RNG) — United States

Table 7.2.B: United States Biogas/RNG Metering Standards

Parameter	Requirements		
Jurisdiction	United States		
Meter Category	Gas	Gas	Gas
Meter Technology	Ultrasonic	Turbine	Coriolis
Energy form	Gas	Gas	Gas (single-phase only)
Measurement accuracy / Performance Reference	AGA Report No. 9 (Ultrasonic)	AGA Report No. 7 (Turbine)	ISO 10790 (Coriolis)
Calibration / Reverification	≤ 5 years full recalibration; annual diagnostics/verification, or per operator verification regime where operator owns the meter	≤ 3 years recalibration (≤ 2 years commonly applied in contaminant-prone service); or per operator verification regime	≤ 3 years recalibration; annual zero verification, or per operator verification regime
Installation Requirements	Straight-run/flow conditioner per manufacturer; filtration and liquid management where applicable	Upstream filtration; conditioning to prevent fouling/liquid carryover	Verify single-phase conditions; filtration where applicable
Required Identifiers	Meter serial number; firmware/software version; diagnostics ID (if applicable); flow computer configuration ID (if used)	Meter serial number; rotor factor (if applicable); calibration certificate ID; flow computer configuration ID (if used)	Meter serial number; firmware/software version; density/configuration identifier (if applicable); flow computer configuration ID (if used)

Applicable Standards	AGA Report No. 9; ISO 17089 (where applicable)	AGA Report No. 7	ISO 10790

Notes (US Biogas/RNG):

- Biogas service commonly warrants shorter verification intervals based on moisture/contaminants and manufacturer guidance.
- If gas quality instrumentation is part of the measurement system, report device identifiers per Section 7.1 (GC ID, method/config ID, etc.). (Substantive gas-quality criteria are addressed elsewhere in the Guide and in the RNG consultation).

7.2.C Hydrogen — United States

Table 7.2.C: United States Hydrogen Metering Standards

Parameter	Requirements		
Jurisdiction	United States		
Meter Category	Hydrogen (pre-mixing)	Hydrogen (pre-mixing)	Hydrogen (post-mixing)
Meter Technology	Ultrasonic	Coriolis	Ultrasonic
Fluid State	Gas (H_2)	Gas (H_2)	Gas (H_2 + carrier gas)
Measurement Accuracy / Performance Reference	AGA Report No. 9 / ISO 17089; MPE defined by meter class and operating envelope	ISO 10790; mass accuracy and density limits per standard	AGA Report No. 9 with validated blend correction modeling; GC-supported composition inputs required
Calibration / Reverification	≤ 5 years recalibration; annual diagnostics and verification	≤ 3 years recalibration; annual zero verification	≤ 5 years recalibration; GC verification at frequency established at registration
Installation Requirements	Installed at Measurement Boundary; manufacturer-defined straight runs; materials compatible with hydrogen service (including embrittlement considerations)	Installed at Measurement Boundary; vibration control; leak integrity; hydrogen-compatible materials	Installed at Measurement Boundary; filtration; continuous or periodic composition measurement required to support blend modeling
Required Identifiers	Meter serial number; firmware/software version; diagnostics ID	Meter serial number; firmware/software version; density configuration	Meter ID; GC ID; firmware/software version
Applicable Standards	AGA Report No. 9; ISO 17089	ISO 10790	AGA Report No. 9; GERG-2008; AGA Report No. 8

Notes (US Hydrogen):

- "Pre-mixing" refers to measurement prior to blending hydrogen with other gases.
- "Post-mixing" measurement requires gas chromatography and validated composition models sufficient to support accurate blend correction.
- Hydrogen material compatibility includes seals, alloys, and components susceptible to embrittlement.

7.3 Canada

In Canada, Measurement Canada approval requirements are the default legal metrology basis for electricity and gas measurement where within scope. Program- or policy-specific requirements prevail where explicitly defined.

7.3.A Electricity — Canada

Table 7.3.A: Canadian Electricity Metering Standards

Parameters	Requirements
Jurisdiction	Canada
Meter Category	Electricity
Meter Technology	Revenue electricity meter compliant with applicable Measurement Canada and utility requirements.
Energy Form	Electrical energy (AC)
Measurement Accuracy / Performance Reference	Measurement Canada approved accuracy class / approval basis as defined in applicable Measurement Canada specifications and approvals; accuracy class defines maximum permissible error over the operating range.
Calibration / Reverification	Per Measurement Canada requirements; event-based reverification upon meter replacement, seal break, CT/PT changes, or configuration changes
Installation Requirements	Utility-accepted installation practice; CT/PT class verified where used
Required Identifiers	Meter serial number; Measurement Canada seal; firmware/software version; CT/PT ratios and class (if present)
Applicable Standards	Electricity and Gas Inspection Act; Measurement Canada specifications

7.3.B Biogas / Renewable Natural Gas (RNG) — Canada

Table 7.3.B: Canadian Biogas/RNG Metering Standards

Parameters	Requirements
Jurisdiction	Canada
Meter Category	Gas
Meter Technology	Measurement Canada approved gas meter (technology per Notice of Approval scope).
Energy Form	Gas
Measurement Accuracy / Performance Reference	Measurement Canada Notice of Approval (NOA) defines operating envelope and maximum permissible error.
Calibration / Reverification	As required by NOA and applicable Measurement Canada requirements; event-based reverification following meter replacement, seal break, or configuration change.
Installation Requirements	Installation per approved pattern and NOA conditions; filtration/liquid management where applicable.
Required Identifiers	NOA number; meter serial number; Measurement Canada seal; firmware/software version.
Applicable Standards	Electricity and Gas Inspection Act; Measurement Canada gas metering specifications and applicable Notices of Approval (NOA), including approved installation patterns and conditions of approval.

Notes (Canada Biogas/RNG):

- Where an operator/utility owns metering or quality instrumentation used for the measurement system, operator-issued documentation may be used provided the required device identifiers and evidence of metrology status are available.

7.3.C Hydrogen — Canada

Table 7.3.C: Canadian Hydrogen Metering Standards

Parameters	Requirements
Jurisdiction	Canada
Meter Category	Hydrogen

Meter Technology	Measurement Canada approved (where within scope); otherwise ISO-based instrumentation may be accepted subject to documented metrology basis
Energy Form	Gas (H_2 or hydrogen-containing blend)
Measurement Accuracy / Performance Reference	Measurement Canada (where applicable); otherwise ISO 17089 (ultrasonic) or ISO 10790 (Coriolis) accuracy classes.
Calibration / Reverification	Per applicable approval/certification basis; event-based reverification following meter replacement or configuration change
Installation Requirements	Hydrogen-compatible materials/seals; installation pattern per manufacturer and applicable standard
Required Identifiers	NOA (if applicable) or ISO certificate reference; meter serial number; firmware/software version
Applicable Standards	Measurement Canada (where applicable); ISO 17089; ISO 10790

7.4 Mexico

In Mexico, applicable NOM (Normas Oficiales Mexicanas) and relevant utility/operator requirements establish the legal metrology baseline for electricity and gas measurement where defined. Where NOM requirements are silent or do not address a specific application, internationally recognized standards may be used with documentation of the metrology basis applied.

7.4.A Electricity — Mexico

Table 7.4.A: Mexico Electricity Metering Standards

Parameters	Requirements
Jurisdiction	Mexico
Meter Category	Electricity
Meter Technology	Revenue electricity meter compliant with applicable NOM and utility/operator requirements
Energy Form	Electrical energy (AC)
Measurement Accuracy / Performance Reference	NOM-defined accuracy class (or utility/operator requirement where applied)
Calibration / Reverification	Per utility/operator program requirements; event-based reverification upon meter replacement, seal breach, CT/PT changes, or configuration changes
Installation Requirements	Utility/operator accepted installation practice; CT/PT class verified where used
Required Identifiers	Meter serial number; NOM approval identifier (where applicable); firmware/software version; CT/PT ratios and class (if present)
Applicable Standards	Applicable NOM standards; utility/operator interconnection and metering requirements

7.4.B Biogas / Renewable Natural Gas (RNG) — Mexico

Table 7.4.B: Mexico Biogas/RNG Metering Standards

Parameters	Requirements
Jurisdiction	Mexico
Meter Category	Gas
Meter Technology	NOM-approved gas meter where applicable; otherwise custody-transfer grade instrumentation justified by applied standard
Energy Form	Gas

Measurement Accuracy / Performance Reference	NOM approval basis where applicable; otherwise ISO 17089 (ultrasonic) / ISO 10790 (Coriolis) / equivalent custody-transfer basis as documented
Calibration / Reverification	≤ 5 years recalibration unless NOM/operator/manufacturer requires more frequent; event-based reverification following meter replacement, seal breach, or configuration change
Installation Requirements	Installation per approved pattern/manufacturer requirements; filtration/liquid management where applicable
Required Identifiers	Meter serial number; approval/certificate ID (NOM or equivalent basis); firmware/software version; flow computer configuration ID (if used)
Applicable Standards	Applicable NOM standards; utility/operator requirements; ISO standards where used as the documented metrology basis

Notes:

- Where ISO (or other non-NOM) standards are used as the metrology basis, the registration record should identify the applied standard and the reason it was used (e.g., NOM scope not applicable to the instrument/application).

7.4.C Hydrogen — Mexico

Table 7.4.C: Mexico Hydrogen Metering Standards

Parameters	Requirements
Jurisdiction	Mexico
Meter Category	Hydrogen
Meter Technology	NOM-approved where defined; otherwise ISO 17089 (ultrasonic) / ISO 10790 (Coriolis) instrumentation with documented metrology basis
Energy Form	Gas (H_2 or hydrogen-containing blend)
Measurement Accuracy / Performance Reference	NOM basis where applicable; otherwise ISO-based accuracy class and maximum permissible error as documented
Calibration / Reverification	≤ 5 years recalibration unless NOM/operator/manufacturer requires more frequent; event-based reverification required following meter replacement or configuration change
Installation Requirements	Hydrogen-compatible materials/seals; installation pattern per manufacturer and applied standard
Required Identifiers	Meter serial number; approval/certificate ID (NOM or applied standard basis); firmware/software version; composition device identifier where used for correction
Applicable Standards	Applicable NOM standards; utility/operator requirements; ISO 17089; ISO 10790

Section 8. Meter Installation Requirements

Meters shall be selected for the specific energy or molecule medium and installed at the Measurement Boundary.

Installation shall meet manufacturer and applicable standard requirements, including straight runs, flow conditioning, orientation, and environmental considerations, including environmental conditions (temperature, vibration, electromagnetic interference) that may affect accuracy.

Pressure, temperature, and composition sensors shall be verified to be located to avoid introducing measurement bias.

Installation conformance shall be validated either (i) through a third-party engineering review, or (ii) through documented evidence acceptable to CleanCounts (e.g., as-built drawings, commissioning records,

utility/operator sign-off, or Independent Review Entity verification), based on project risk and delivery configuration.

Section 9. Verification and Summary Reporting

Engineers and Independent Review Entities shall verify meter selection, installation, calibration, configuration, and operation to the extent necessary to confirm compliance with this Guide and the project's registration record.

A standardized summary sheet shall accompany verification reports and summarize key parameters without replacing the full report.

See Appendix A: Standardized Summary Sheet.
The summary sheet shall, at minimum, identify the metering system components (meter, flow computer, sensors, GC where applicable), calibration status, installation verification basis, and any exceptions or corrective actions.

Section 10. Reporting Frequency, Data Submission, and Data Retention

10.1 Reporting Frequency by Energy or Molecule Type

Generators shall report measured quantities to CleanCounts at the minimum frequencies specified in Table 10-1, unless a higher reporting frequency is required by an applicable program, policy, or registry election (e.g., hourly reporting).

All reported quantities shall reflect measurements taken at the Measurement Boundary and shall comply with this Metering and Measurement Framework.

"Monthly" reporting means submission for a calendar month within the registry's required submission window following month-end.

Table 10-1 establishes the minimum floor for reporting frequency, data granularity, and metrology evidence necessary to support energy determination and (where applicable) product designation for certificate issuance; Operating Procedures, applicable programs, or jurisdictional requirements may require higher frequency, additional parameters, or stricter verification, and CleanCounts may approve equivalent methods where the Participant provides documented justification and evidence of representativeness.

Table 10-1: Minimum Reporting Frequency Requirements

Energy / Molecule Type	Measurement Basis	Minimum Reporting Frequency	Data Granularity	Additional Requirements
Electricity	MWh (gross generator production)	Monthly	Monthly totals (hourly where elected/required)	Meter ID, CT/PT ratios (if applicable), and any utility/program settlement statement or meter read evidence used to substantiate monthly totals
Biogas	Dth (energy basis)	Monthly	Monthly totals	Flow quantity + energy conversion basis: (i) volumetric/mass quantity at metered conditions, (ii) HHV (or equivalent energy factor) basis, (iii) reference conditions/basis (e.g., dry basis where

				applicable). Gas quality sampling frequency must be at least quarterly unless the project demonstrates stability and CleanCounts approves a different cadence.
Renewable Natural Gas (RNG)	Dth (energy basis)	Monthly	Monthly totals	Flow quantity + gas quality evidence sufficient to support RNG designation and energy determination: at minimum HHV and Wobbe Index (HHV basis) plus CO_2, N_2, O_2, total inerts (and other parameters required by the applicable designation standard). Minimum gas quality coverage must be either: (A) continuous (hourly or daily-average) measurement, or (B) periodic sampling no less than weekly with time-stamped results and documented representativeness. Alternative equivalent methodologies require pre-approval.
Hydrogen	Mass (kg H_2)	Monthly	Monthly totals	Mass quantity + purity/composition basis where used for claims or conversions: at minimum H_2 purity and any blend composition inputs used for correction factors; report reference conditions where volumetric measures are used as an input.

10.2 Calibration Status and Reporting Obligations

All meters used to support certificate issuance shall operate under a documented calibration and recalibration plan consistent with manufacturer recommendations and applicable standards.

Projects shall report:

- the date of last calibration;
- the calibration frequency; and
- the next scheduled recalibration date.

Failure to demonstrate that required recalibration has occurred shall result in the project being placed into Pending status for the affected measurement period(s) until calibration documentation is received and accepted.

10.3 Impact of Calibration Non-Compliance

Energy or molecule production occurring during periods in which required calibration or recalibration is overdue or non-compliant may not be back-reported for the purpose of certificate issuance. This does not prevent future issuance once compliance is reestablished for subsequent periods.

10.4 Data Retention

Projects shall retain measurement, calibration, and supporting documentation for periods consistent with applicable regulatory, contractual, or program requirements. CleanCounts will retain data submitted to the registry in accordance with its data governance policies. Where no external requirement applies, Participants shall retain such records for at least seven (7) years.

Section 11. Change Control, Calibration, and Reverification

Projects shall notify CleanCounts of changes affecting feedstocks, equipment, metering systems, or delivery pathways that could reasonably affect reported quantity or quality. Examples include meter replacement, flow computer reconfiguration, sensor replacement, GC method/configuration changes, major process changes affecting gas composition, or changes to custody-transfer/measurement arrangements.

Calibration shall follow manufacturer and applicable standard requirements.

Failure to meet calibration schedules may place projects into Pending status.

Section 12. Compliance Status and Enforcement

Projects may be designated Active, Pending, Suspended, or Inactive.

Projects in Pending status will not receive certificates until metering and measurement issues are resolved.

CleanCounts may apply status changes at the project level or for specific reporting periods depending on the scope of the identified issue.

Section 13. Appendices

Appendix A — Independent Verification Checklist and Documentation Requirements

Appendix B — Glossary

Appendix A: Independent Verification Checklist and Documentation Requirements

✓	Pass / Fail / NA	Verification Category	Verification Item	What the Verifier Must Confirm	Acceptance Criteria	Evidence Collected	Applicable Standard / Reference
☐		Meter Identification	Meter model & serial number	Meter model and serial number match registry submission and documentation	Exact match	Photo; nameplate record	Registry submission; manufacturer data
☐		Meter Identification	Firmware / software version	Firmware version recorded and matches certified configuration	Matches documented version	Screenshot / photo	Manufacturer cert; type approval
☐		Meter Identification	Flow computer make/model & config ID	Flow computer make/model and configuration identifier matches registry submission	Exact match; config file version/checksum recorded	Screenshot/export; configuration file ID; photo	Registry submission; manufacturer docs
☐		Meter Identification	Seal / tamper evidence ID (where applicable)	Presence and identifier of seal(s) or tamper-evident controls where required by legal metrology or utility/operator practice	Seal/tamper controls present; IDs recorded; no evidence of breach	Photo of seals; seal ID record	Legal metrology / utility requirements
☐		Meter Identification / Configuration	Meter configuration settings (as-installed)	Key configuration values match the registration record (e.g., units, base/reference conditions, K-factor/meter factor or pulse constant, scaling, pressure/temperature compensation settings, density basis where applicable).	Exact match to documented configuration; any changes are recorded and approved.	Configuration export/screenshots; commissioning sheet.	Manufacturer manual; applicable standard (AGA/ISO/ANSI).
☐		Sensors	Pressure transmitter ID & calibration	Pressure sensor ID and last calibration date	Calibration current; instrument within required class/spec	Calibration certificate; nameplate photo; recalibration date	Applicable standard/manufacturer; ISO/IEC 17025 where used
☐		Sensors	Temperature transmitter ID & calibration	Temperature sensor ID and last calibration date	Calibration current; instrument within required class/spec	Calibration certificate; nameplate photo; recalibration date	Applicable standard/manufacturer; ISO/IEC 17025 where used
☐		Electrical (where applicable)	CT / PT ratios & accuracy class	CT/PT ratios, accuracy class, and identifiers match registry submission	Exact match; CT/PT class meets applicable requirement	CT/PT nameplate photos; utility documentation; wiring diagram excerpt	ANSI C12; utility requirements
☐		Electrical (where applicable)	Meter multiplier / register setup	Meter register/multiplier matches CT/PT ratios and wiring.	Consistent; no scaling mismatch.	Meter programming screenshot; commissioning sheet.	Utility practice; ANSI C12.
☐		Meter Technology	Meter technology	Technology is appropriate for energy type, phase, and application	Meter technology matches the registered meter category and is within the applicable standard's scope for the fluid state and service conditions (pressure/temperature range).	Visual inspection + meter datasheet/model scope evidence	Registry metering table
☐		Meter Technology	Meter size / range and operating envelope	Meter sizing and expected operating range (flow, pressure, temperature) are within the approved/certified operating envelope	Expected operating conditions fall within meter's approved range; no persistent operation below minimum turndown	Meter datasheet; design/operations range summary; commissioning records	Type approval scope; manufacturer specs
☐		Measurement Phase	Fluid / phase	Meter is measuring correct phase (gas, liquid, steam, electricity)	Measured phase/medium matches registration record and P&ID (e.g., gas-only; single-phase as applicable)	Visual + process confirmation	Registry requirements
☐		Accuracy Standard	Applicable accuracy standard	Meter is certified / approved to the required accuracy standard	Valid type approval / certification exists, is within scope for the meter model and application, and is current (not expired/superseded).	Copy of approval/certificate (NOA/NOM/MID/utility approval) + scope page.	Country-specific standard
☐		Gas Quality	GC / Analyzer identification and method	GC/analyzer ID and method/configuration identifier used for reported HHV/Wobbe/composition	Instrument and method are documented and in service for the reporting period and calibration/validation is current for the reporting period.	Method printout; analyzer report; calibration/validation record	Applicable standard; manufacturer; lab accreditation where relevant

☐		Gas Quality	Reference conditions / basis (HHV/Wobbe/composition)	Reported basis (dry/wet, standard conditions) is documented and consistent with calculation method.	Basis stated and consistent across reporting; any conversions documented.	Method statement; calculation worksheet; analyzer settings.	Applicable standard / Guide definitions.
☐		Gas Quality (where applicable)	Sampling location and representativeness (if lab sampling used)	Sample location matches documented measurement point; chain-of-custody maintained	Time-stamped samples; method documented; chain-of-custody complete	Sampling procedure; chain-of-custody forms; lab report	Applicable sampling/lab method; ISO/IEC 17025 lab where applicable
☐		Conformity Assessment	Third-party conformity evidence	Valid third-party conformity documentation exists and is in scope	Certificate valid and applicable	Copy of certificate	ISO/IEC 17065; national authority (or equivalent)
☐		Calibration	Calibration status	Calibration is current and within registry-defined interval	Calibration is current, traceable, and applies to the meter in the installed configuration (including firmware/version and measurement range).	Calibration report + lab accreditation reference (ISO/IEC 17025 where applicable) or utility/operator verification evidence.	ISO/IEC 17025
☐		Calibration	Traceability	Calibration traceable to national/international standards	Traceability stated	Calibration report	NIST / NRC / SI
☐		Data Systems (where applicable)	Time synchronization / timestamp integrity	Meter/flow computer/analyzer time settings and time zone basis are documented and consistent across devices used for reporting	Device clocks synchronized to an authoritative time source; timestamp basis documented	Screenshot of time settings; NTP configuration or operator attestation	Operator practice; reporting requirements
☐		Data Systems (where applicable)	Data completeness and gap treatment	Reporting period coverage, downtime logs, and method used to address missing data (if any).	No material gaps; any gaps are documented and treated per approved method (no silent interpolation).	Data completeness report; downtime/event logs; gap handling method.	Registry reporting requirements / Guide.
☐		Installation as-built/P&ID	Installation per manufacturer	Meter installed per manufacturer instructions	Installed per manufacturer instructions and any approval-specific installation pattern requirements.	As-built drawings or marked-up P&ID + photos.	Manufacturer manual
☐		Installation	Straight-run / conditioning	Required straight runs / flow conditioners present	Meets minimum lengths/specs	Measurement; photos	AGA / ISO / API
☐		Installation	Bypass/valve configuration and control	Any bypass lines, valves, or alternate flow paths are identified and controlled to prevent unmetered flow	No uncontrolled bypass; valve positions documented; sealing/locking where required	P&ID; photos; valve list; lock/seal records	Good engineering practice; operator procedures
☐		Project / Measurement Boundary	Meter placement and intervening processing	Meter placement relative to production equipment and delivery point; confirm no intervening processing/handling steps between metered output and delivery that would alter measured quantity/quality.	Placement matches Guide requirements; no unmetered bypass; no downstream processing that changes reported quantity/quality.	Line drawing/P&ID clearly indicating meter location and flow direction; photos; valve/bypass documentation.	CleanCounts Metering Guide
☐		Governance / Exceptions	Deviations / exceptions log	Any deviations from manufacturer installation, standards, or approved patterns are documented and approved	Deviation documented with rationale and approval; corrective actions tracked	Deviation memo; engineering approval; corrective action record	CleanCounts Guide; engineering judgement
☐		Governance / Controls (optional)	Access controls / change logging	Who can change meter/flow computer/GC configuration and whether changes are logged.	Change log available; access limited to authorized personnel.	User access list; change log excerpt; SOP.	Operator procedures; Guide.

Appendix B: Glossary

Glossary of Terms

AGA
American Gas Association. Develops technical reports and standards related to gas measurement and operations.

ANSI
American National Standards Institute. Accredits standards such as ANSI C12 for electricity metering accuracy.

Biogas
A gaseous fuel produced from the anaerobic digestion of organic material, typically containing methane, carbon dioxide, water vapor, and trace contaminants. Biogas may or may not meet pipeline quality standards.

Calibration
The process of comparing and adjusting a measurement instrument against a reference standard to ensure accuracy within defined limits.

Certificate
A tradable or trackable instrument representing the attributes of a defined quantity of energy or molecules produced from an eligible source.

CleanCounts
The registry operator administering energy and molecule attribute tracking systems, including M-RETS and RTC registries.

Common Carrier Pipeline
A pipeline system operated under a tariff/open-access regime (where applicable), evidenced by publicly available tariff terms or operator documentation.

Coriolis Meter
A mass flow meter that measures flow rate and density based on the Coriolis effect, typically used for liquids and single-phase gases.

Custody Transfer
The transfer of responsibility and operational control for measured energy or molecules between parties at a defined delivery point, typically governed by commercial terms, tariff provisions, or program rules and supported by auditable metered records.

Delivery Class
One of the recognized delivery pathways defined in Section 3.3 that establishes how energy or molecules are delivered across the Project Boundary for purposes of eligibility.

Delivery Mode
The physical method by which energy or molecules are delivered from a production facility to a point of use or interconnection (e.g., grid interconnection, pipeline injection, vehicle transport).

Dry Basis
A measurement basis in which water vapor is excluded from volume and energy calculations.

Electricity Gross Production
The total electrical output of a generating facility before any onsite consumption, losses, or netting against imports.

Gas Chromatograph (GC)
An analytical instrument used to measure gas composition, including methane content, heating value, and inerts.

Hydrogen (H_2)
A gaseous energy carrier measured on a mass basis, which may be produced through electrolysis, reforming, or other processes.

Independent Review Entity (IRE)
A qualified third party responsible for verifying project data, metering configurations, and compliance with registry requirements. Refer to definitions within registry Operating Procedure documentation.

ISO
International Organization for Standardization. Develops international standards applicable to metering and measurement.

Legal Metrology
The regulatory framework governing measurement accuracy, instrumentation approval, and verification for commercial and regulatory purposes.

Maximum Permissible Error (MPE)
The maximum allowable measurement error for a metering instrument as defined by an applicable standard or approval.

Measurement Boundary
The defined metering plane at the Project Boundary exit where energy or molecules are measured for certificate issuance at the last point of potential change before delivery across the Project Boundary under an eligible Delivery Class.

Measurement Canada (MC)
The Canadian authority responsible for legal metrology and measurement standards under the Electricity and Gas Inspection Act.

Meter Turndown Ratio
The ratio between the maximum and minimum flow rates over which a meter can accurately operate.

NOM
Norma Oficial Mexicana. Mandatory Mexican standards governing products and measurement, including metering instrumentation.

Project Boundary
The physical and operational boundary encompassing activities and equipment owned or controlled by the entity registering, owning, or operating the production facility, including production, conditioning, processing, and other onsite activities that may affect measured quantity or quality prior to delivery across the

Project Boundary.

Qualified Custody Transfer
A custody transfer that meets Section 5.3 and is presumed to demonstrate capability to serve useful demand without requiring end-use tracing.

Related Party / Affiliate
An entity under common ownership or control with the producer/operator, including parent, subsidiary, or commonly controlled entities. A conglomerate or holding company's businesses would be considered related parties and be responsible for meeting Self-Use requirements under Section 5.

Renewable Natural Gas (RNG)
Gas derived from renewable or biogenic sources that meets gas quality specifications for interchangeability with natural gas pipelines.

Retire-Only
A certificate status under which certificates may be issued but may not be transferred and must be retired by the holder, as specified in Section 5.2. This enforces the integrity and protects downstream energy and molecule conversions seeking secondary certificates.

Self-Use
Use of produced energy or molecules by the same organization (or an affiliate/related party) that owns or operates the production facility, rather than delivery to an unaffiliated third party. Self-use is not presumed to serve useful demand and is subject to Section 5.1 and transfer restrictions in Section 5.3.

Ultrasonic Meter
A gas flow meter that measures flow velocity using ultrasonic signals, commonly used for custody-transfer applications.

Useful Demand
An end-use application in which delivered energy or molecules (i) displace a conventional supply of the same physical form serving the same end use and (ii) are not used to support further production of energy or molecules, consistent with Section 5.