

F.No. 353/69/2024-NT
Government of India
Ministry of New and Renewable Energy
(Hydrogen Division)

Atal Akshay Urja Bhawan
Lodhi Road, New Delhi – 110003
4th September 2024

OFFICE MEMORANDUM

Subject: Request for comments on draft Green Hydrogen Certification Scheme of India.

The Ministry of New & Renewable Energy (MNRE) is implementing the National Green Hydrogen Mission (NGHM) with an objective to make India a global hub for the production, usage, and export of Green Hydrogen (GH₂) and its derivatives. It will contribute to India's goal to become Atmanirbhar (self-reliant) through clean energy and serve as an inspiration for the global clean energy transition.

2. As part of the Mission, Ministry of New and Renewable Energy (MNRE) is in the process of finalizing the proposed Green Hydrogen Certification Scheme of India (GHCI).
3. MNRE seeks views/comments/suggestions from the stakeholders on the proposed draft scheme attached as **Annexure-A**.
4. Views/comments/suggestions on the proposed scheme may be sent latest by 27th September 2024 by email to mdnghm.mnre@gov.in & abhilash.rajwanshi@gov.in

Encl: As above



Abhilash Rajwanshi
(Program Director- Technology)
National Green Hydrogen Mission Secretariat

To
All Stakeholders.



Green Hydrogen Certification Scheme of India
Draft
for Stakeholder Consultation

Draft



F. No. XXXXXXX/2023-NGHM

Government of India
Ministry of New and Renewable Energy
(Hydrogen Division)
Atal Akshay Urja Bhawan
Lodhi Road, New Delhi, 110003
Date: XX March 2024

Sub: Green Hydrogen Certification Scheme of India under the National Green Hydrogen Mission (NGHM)- draft for stakeholder consultation.

1. Introduction

- 1.1. The National Green Hydrogen Mission, hereafter referred as 'Mission', was launched on 04th January 2023 by the Government with an outlay of Rs. 19,744 Crore, aiming to make India a global hub for the production, usage, and export of Green Hydrogen (GH₂) and its derivatives. It will contribute to India's goal to become **Atmanirbhar** (self-reliant) through clean energy and serve as an inspiration for the global clean energy transition. The Mission will lead to significant decarbonization of the economy, reduced dependence on fossil fuel imports, and enable India to assume technology and market leadership in Green Hydrogen. Under the Mission, along with other initiatives, the Ministry of New & Renewable Energy (MNRE) proposes to implement pilot projects for replacing fossil fuels and fossil fuel-based feedstock with Green Hydrogen and its derivatives.
- 1.2. The Ministry of New and Renewable Energy, through OM No 353/35/2022-NT dated 18 August 2023, defined Green Hydrogen standard, establishing specific criteria for its production. The definition incorporates a threshold for greenhouse gas emissions (non-biogenic) at 2 kgCO_{2eq}/kg H₂ for system boundaries as defined in section 7. The threshold is measured as an average over the last 12 months.
- 1.3. The Ministry also envisaged to develop detailed methodology for the measurement, monitoring, reporting, onsite verification, and certification of Green Hydrogen and its derivatives. It has designated the Bureau of Energy Efficiency (BEE) as the nodal authority responsible for accrediting agencies for the monitoring, verification, and certification of Green Hydrogen projects.
- 1.4. In line with these requirements, the Ministry of New and Renewable Energy (MNRE) is now specifying a certification scheme under the National Green Hydrogen Mission (NGHM). The scheme shall be called Green Hydrogen Certification Scheme of India (GHCI).



2. Definitions

- 2.1. **“Accredited Carbon Verification (ACV) Agency”** means an agency accredited by the Bureau of Energy Efficiency to carry out validation and verification activities under the carbon credit trading scheme (offset ACV Agency).
- 2.2. **‘Combustion GHG Emissions’** means emissions of greenhouse gases resulting from the chemical reaction of solid, liquid, or gaseous fuel with oxygen, typically involving the release of carbon dioxide (CO₂) and other relevant greenhouse gases.
- 2.3. **‘Data control’** activities involve implementing policies and procedures to effectively manage and govern processes, ensuring they meet objectives, mitigate risks, and provide safeguards for maintaining data integrity.
- 2.4. **‘Evaluation cycle’** is a time period of one financial year to be considered for hydrogen production for which the quantified figure for the GHG emissions is representative. For the first year of operation, the period shall be from the date of commencement of operations to the end of that financial year.
- 2.5. **‘Functional unit’** is defined as the quantified performance of a product system for use as a reference unit and in case of hydrogen is one kilogram of hydrogen.
- 2.6. **‘Greenhouse Gas (GHG)’** refers to gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, atmosphere, and clouds. GHG currently includes Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O). Other GHGs shall not be included.
- 2.7. **‘Green Hydrogen’** as defined by MNRE.
- 2.8. **‘Indirect GHG emissions’** means GHG emissions that are a consequence of the activities of the Green Hydrogen producer but occurred at sources outside the Green Hydrogen project includes emissions from electricity and heat imported for hydrogen production.
- 2.9. **‘Monitoring plan’** is a comprehensive document outlining the details of Green Hydrogen project's boundary, activity data, and other relevant information necessary for the transparent monitoring and calculation of GHG emissions relating to hydrogen production.
- 2.10. **‘System boundary’** means processes for Green Hydrogen production which are a part of the GHG emission intensity calculation.
- 2.11. **‘Verification’** activity is an independent process conducted by an ACV agency appointed by respective hydrogen producers for assessment of greenhouse gas emission intensity during the evaluation cycle.



3. Objectives of Certification Scheme

3.1. The objectives of scheme are as follows:

- 3.1.1. To outline the governance structure of the certification scheme and further define roles and responsibilities for various stakeholders involved in the certification process.
- 3.1.2. To provide details of the certification scope and system boundaries for Green Hydrogen certification procedure.
- 3.1.3. To provide clear and transparent guidelines for calculating GHG emission intensity during Green Hydrogen production.
- 3.1.4. Define the monitoring requirements for Green Hydrogen production and its emissions, ensuring continuous assessment and improvement, and further specifying parameters and methodologies for ongoing monitoring to maintain transparency and compliance with Green Hydrogen standards.
- 3.1.5. Establish a robust verification approach for Green Hydrogen projects and designate Bureau of Energy Efficiency as the authority for accrediting verification agencies and issuing certification for Green Hydrogen as per the standard notified by the Government.
- 3.1.6. Develop a mechanism for reporting Green Hydrogen production and implement a system for continuous tracking of data (chain of custody) to ensure transparency and accountability in Green Hydrogen production and end use.
- 3.1.7. To establish the Green Hydrogen Certification procedure as a **Guarantee of Origin (GO)**, ensuring transparency and authenticity in the origin and production process of Green Hydrogen.

3.2. By addressing the above objectives, the GHCI aims to provide a holistic framework for the measurement, monitoring, and certification of Green Hydrogen production in India. It emphasizes transparency, accountability, aligning with national energy transition and climate goals, contributing to the overall success of the National Green Hydrogen Mission.

3.3. The scheme contains following key elements –

- Governance and Roles & Responsibilities of Stakeholders
- Certification Scope
- Eligible Pathways
- System Boundary
- Materiality Threshold
- Renewable Energy Consideration
- Evaluation Cycle
- GHG emission Quantification
- Data monitoring
- Verification



- Certification Process
- Penalty Clause
- Certification Details

4. Governance and Roles & Responsibilities of Stakeholders

- 4.1.** The governance structure for the certification scheme involves Bureau of Energy Efficiency (BEE) as the nodal authority mandating overall implementation and monitoring. A Technical Committee providing strategic direction, issuing Green Hydrogen certificates, Green Hydrogen production compliance and periodic verification. The ACV agency shall be mandated to conduct verification processes.
- 4.2.** The following are the roles and responsibilities of these stakeholders:
- 4.2.1.** Bureau of Energy Efficiency as a Nodal Authority for the scheme, shall lead the implementation and operationalization of the certification scheme, ensuring its effectiveness and shall provide policy guidance, directives, and necessary support for the scheme's execution. To assist BEE in its working, MNRE shall facilitate coordination among stakeholders and address any challenges that may arise during the scheme's implementation.
- 4.2.2.** Technical Committee, to be chaired by the Mission Director, National Green Hydrogen Mission, shall provide oversight and strategic direction for the certification scheme. The concerned Director, BEE shall be the convenor of the technical committee. The committee shall hold consultations with stakeholders including Ministry of Power, Ministry of Petroleum and Natural Gas, technical bodies, experts, and industry associations to seek policy recommendations. The committee shall conduct periodic reviews to ensure that the scheme aligns with latest industry standards and government priorities.
- 4.2.3.** Green Hydrogen producers shall follow the scheme guidelines and adhere to key aspects related to the calculation, monitoring, reporting and verification of emissions. The Green Hydrogen producers shall get conducted annual verification by an ACV agency for demonstrating their claim for Green Hydrogen. The producers shall also register on the designated Green Hydrogen Portal and provide necessary information as per the MRV framework to ensure compliance with the certification scheme.
- 4.2.4.** ACV Agency shall conduct the verification of Green Hydrogen production and its compliance with the Green Hydrogen standards and scheme. Agencies shall submit a detailed verification report to BEE (through Green Hydrogen Portal) on the emissions calculation, monitoring, reporting and compliance status of the producers.



5. Certification Scope

- 5.1. The GHCI shall operate at the project level of Green Hydrogen production, encompassing all stages up to the compression and purification of hydrogen for transport. However, processes such as transport and storage of hydrogen outside plant boundaries, conversion into hydrogen carriers, reconversions, and utilization are excluded from the certification scope.
- 5.2. The reporting metric/functional unit for GHG emission intensity shall be kg CO₂eq/kg H₂.
- 5.3. For eligibility under the GHCI, Green Hydrogen Producers shall comply with all national and local regulations, including environmental and safety requirements, ensuring responsible and lawful project installations and operations.

6. Eligible Pathways

- 6.1. The following Eligible Hydrogen Production Pathways are currently considered within scope of this scheme, and therefore eligible to apply:
 - 6.1.1. Electrolysis
 - 6.1.2. Conversion of Biomass
- 6.2. Each of the listed Eligible Hydrogen Production Pathways has the potential to produce hydrogen which complies with the GHCI. Inclusion on this list does not, however, guarantee the hydrogen produced shall comply with the scheme. Each Green Hydrogen Production Facility shall be designed, installed and operated in an appropriate way, so as to ensure the compliance is achieved in practice and on continual basis.
- 6.3. Stakeholders may propose new pathways to the above list and are required to submit an application along with the relevant evidence to BEE. The technical committee shall assess and review the application for inclusion of the proposed pathway(s) in the list of eligible pathways.

7. System Boundary

- 7.1. The GHCI adopts a boundary which encompasses all direct emission sources and includes indirect emissions from the electricity and/or fuel used during the Green Hydrogen production process as defined in this scheme.
- 7.2. For Green Hydrogen produced through electrolysis, the non-biogenic greenhouse gas emissions arising from water treatment, electrolysis, gas purification, and drying and compression of hydrogen shall be included.
- 7.3. For Green Hydrogen produced through conversion of biomass (such as biogas reforming and biomass gasification) the non-biogenic greenhouse gas emissions arising from biomass processing, heat/steam generation,



- conversion of biomass to hydrogen, gas purification and drying and compression of hydrogen shall be included.
- 7.4.** The emissions from the construction, manufacturing, and decommissioning of the capital goods (including hydrogen production device, etc.), business travel, employee commuting, and upstream leased assets shall not be included in Green Hydrogen production boundary. The emissions owing to generation and transmission of renewable electricity shall also not be included. However, emissions of the processes mentioned in GHCI from upstream leased assets shall be covered.
- 7.5.** GHG emissions arising from the conversion/use of Input Materials onsite shall be included in the emission intensity calculations. The purpose of Input Materials is not to provide energy to the process, so would include, for example, water, oxygen, salts, catalysts, solvents, and acids. Only materials generated offsite and brought across the System Boundary into the Hydrogen Production Facility shall be accounted for within this Emission Category. All other flows that cross the System Boundary to generate any materials on site shall be accounted for within their corresponding Emission Categories.
- 7.6.** The system boundary shall include all the production stages till the purification and compression of hydrogen. Producers are required to provide the final composition of the hydrogen produced, as well as the pressure at which it has been produced. The composition and pressure level of the hydrogen shall be documented on the certificate.
- 8. Materiality Threshold**
- 8.1.** The Materiality Threshold for an Emission Source shall be 1% of the Total Emission Threshold. Furthermore, no more than a total of 5% of the Total Emission Threshold shall be excluded as being Immaterial Emission Sources.
- 8.1.1.** Therefore, if a single Emission Source contributes <1% of the Total Emission Threshold and in total, all the Immaterial Emission Sources contribute <5% of the Total Emission Threshold, the single Emission Source in question may be considered as an Immaterial Emission Source and may be excluded from the GHG Emission Intensity Calculation.
- 8.1.2.** Where a single Emission Source is <1% of the Total Emission Threshold but deeming it to be an Immaterial Emission Source would lead to >5% of the Total Emission Threshold being considered as Immaterial Emission Sources, this specific Emission Source shall be considered as a Material Emission Source and included in the GHG Emission Intensity Calculation.



- 8.2. Emissions from similar Emission Sources shall be considered together to avoid Green Hydrogen Production Facilities making multiple claims of Immaterial Emission Sources, which if aggregated would result in Material Emission Sources.
- 8.3. Designation of an Emission Source as an Immaterial Emission Source shall not impact on or negate other compliance, evidence or technical requirements.
- 8.4. The Materiality assessment shall be included within the scope of verification by ACV agency to check that Emission Sources have been appropriately excluded.
- 9. Renewable Energy Consideration**
- 9.1. The Green Hydrogen standard by MNRE specifies the applicability of renewable energy for certification purposes. The definition of renewable energy includes electricity generated from renewable sources, which is either stored in an energy storage system or banked with the grid as per the policy directive/regulations.
- 9.2. Renewable energy supply for Green Hydrogen production may be sourced from a renewable energy project and transmitting power either through dedicated or common transmission line.
- 9.3. Claims of energy as renewable, based on renewable energy certificates, or carbon credits, shall not be considered under this scheme. However, claims of energy as renewable from green tariffs mechanisms and power exchange (such as: G-DAM) may be considered.
- 9.4. Green hydrogen producers may count electricity as fully renewable if the producer has concluded one (or more) power purchase agreements (PPAs) with operators producing renewable electricity in one (or more) installations, generating renewable electricity for an amount that is at least equivalent to the amount of electricity that is claimed as fully renewable, and the electricity claimed is effectively produced in these installations.
- 9.5. If energy from any source other than RE has been consumed during the production of hydrogen, GHG emissions resulting from the use of such energy consumption shall be included in the overall GHG emission intensity calculation.
- 9.6. The obligation to prove the renewable nature of source and quantum of energy used rests solely on Green Hydrogen producer.
- 10. Evaluation Cycle**
- 10.1. The evaluation cycle for GHG emission intensity calculation for Green Hydrogen production under the GHCI shall be one financial year. However,



- the hydrogen producers may apply for provisional certificate by considering evaluation at minimum one month interval.
- 10.2.** In no circumstances shall the period of evaluation extend more than 12 months.
- 11. GHG Emissions Quantification**
- 11.1.** Hydrogen producers participating in the Green Hydrogen Certification Scheme in India shall calculate the GHG emissions intensity for hydrogen production. The calculation process shall follow the MNRE developed Green Hydrogen Emission Calculation Methodology (refer to annexure).
- 11.2.** The calculated emission intensity shall be based on the following points for rounding-off
- 11.2.1.** The total emission intensity shall be rounded-off to the nearest whole number up to one decimal place.
- 11.2.2.** The value shall be rounded off to respective significant figures, as per IS 2:1960. For e.g.: Emission Intensity of 1.949 kg CO_{2eq}/kg H₂ shall be considered as 1.9 kg CO_{2eq}/kg H₂ and the emission Intensity from 1.950 kg CO_{2eq}/kg H₂ up to 1.999 kg CO_{2eq}/kg H₂ shall be considered as 2.0 kg CO_{2eq}/kg H₂.
- 11.3.** The Green Hydrogen producers shall prepare a monitoring plan for GHG emission quantification and monitoring. The monitoring plan shall include – details on emission sources, emission source streams, activity data monitoring, monitoring instruments, written procedure on data control, written procedure on calibration of monitoring instruments, frequency of data monitoring and recording, emission factor details and other relevant information required for transparent and effective monitoring of production and GHG emissions.
- 11.4.** The scope and boundary for emissions calculation have been defined within the scheme, ensuring a standardized and comprehensive assessment.
- 11.5.** The hydrogen producers shall estimate both emissions and emission intensity associated with hydrogen production.
- 11.6.** For calculation purposes, energy supply emissions resulting from the purchase of electricity shall be taken into account. In the case of grid-purchased electricity which has not been certified as fully renewable, losses from transmission and distribution-related energy shall also be added to the emission intensity calculation. Such emissions shall be estimated using the Weighted Average Grid Emission Factor (GEF) as published by CEA for the financial year. In case the GEF is not available for the year at the time of certification, the latest available GEF shall be used.



- 11.7. As regards to the transmission and distribution losses of grid-purchased electricity which has not been certified as fully renewable, the latest corresponding central-level T&D losses data as published by Central Electricity Authority shall be used.
- 11.8. Hydrogen production may result in co-products. Emission may be allocated to co-products such as oxygen, biochar only if the co-products have been valorized. The allocation of emissions to the co-product shall be based upon the Economic Value Allocation Method as per Green Hydrogen Emission Calculation Methodology (refer to annexure).
- 11.9. The production process may take heat from another existing process outside the control of the applicant. In such a case, the emissions attributed to the heat input shall be the increase in the emissions of the other process associated with the heat export. Thus, if the heat is truly “waste heat”, no emissions shall be attributable to the same. However, if extra fuel needs to be burnt to replace the heat in the existing process, the emissions from burning that extra fuel shall be included in the emission intensity calculation.
- 11.10. The Certificate shall contain a Product Carbon Footprint as calculated by Green Hydrogen Emission Calculation Methodology (refer to annexure).
- 12. Data Monitoring**
- 12.1. The Green hydrogen producers shall maintain detailed records of the hydrogen production (covering production to consumption processes) for at least five evaluation cycles or from the date of commencement of operations if the date of commencement of Green Hydrogen Production Facility is less than five years.
- 12.2. This includes adherence to the Green Hydrogen MRV framework ensuring a consistent and reliable approach to emission intensity calculation.
- 12.3. Following the Green Hydrogen MRV framework, the Green Hydrogen producers shall meet and maintain specific data quality requirements to enhance the accuracy and reliability of the emissions intensity calculation.
- 12.4. The records shall be subject to verification by ACV agency. These comprehensive records contribute to a thorough understanding of the environmental impact and resource usage associated with Hydrogen production.
- 12.5. To ensure transparency and clarity regarding the entire lifecycle of Hydrogen production and utilization, Green Hydrogen producers shall also keep records on the final use of Hydrogen generated or sold by them and may also specify whether the hydrogen is further converted into a Hydrogen carrier for subsequent use or transportation. However, this data is meant only for record keeping. It shall not have any impact on the



- issuance of the certificate. Any sensitive commercial data shall not be disclosed in the certificate. The ACV agency shall not insist on production of sensitive commercial data such as offtake contracts.
- 12.6.** The Hydrogen producers shall maintain daily records of hydrogen production, its parameters (physical and chemical) and energy consumption from various sources, both aggregated and disaggregated figures. In addition to fuel and electricity consumption, producers shall keep detailed records of water consumption, feedstock consumption, losses, and other relevant information related to the production process.
- 13. Verification**
- 13.1.** The Green Hydrogen Producers, aiming to claim the Green Hydrogen credential, shall engage an ACV agency for verification of GHG emissions and compliance with the certification scheme requirements within one month of completion of evaluation cycle.
- 13.2.** The ACV agency shall follow the verification process as per the Green Hydrogen MRV framework.
- 13.3.** Upon completion of the verification with reasonable assurance, the ACV agency shall submit the verification report and verification statement through the Green Hydrogen Portal. The verification statement, reflecting emissions, emission intensity, and compliance with scheme requirements, shall be issued by the ACV agency.
- 14. Certification Process**
- 14.1.** Two (02) types of certificates may be issued for each of the Hydrogen production facilities under GHCI namely, concept certificate and facility level certificate. Details of the two certificates have been given in clauses 14.2 to 14.3.
- 14.2. Concept Certificate:**
- 14.2.1.** Concept Certificate is a voluntary certificate. Concept Certificate certifies that the **design of** Green Hydrogen production facility has met the pre-requisite requirements as specified in Green Hydrogen MRV framework to enable them to produce Green Hydrogen according to GHCI.
- 14.2.2.** The Green Hydrogen producer may apply for the concept certificate any time after the design/concept/FEED (front-end engineering design) approval.
- 14.2.3.** The Green Hydrogen producer shall have all the documents and data as specified in Green Hydrogen MRV Framework verified by an ACV agency. Post verification, the producer shall submit the application along with all required documents on the Green Hydrogen portal. The



technical committee shall review the documents and the certificate shall be issued during the subsequent month in which the application has been submitted.

14.2.4. In case of any discrepancies in the submitted application, the technical committee shall request clarifications by the last date of the subsequent month in which the application has been submitted.

14.2.5. The Green Hydrogen producer shall resubmit the application by the last date of the subsequent month in which the clarification has been requested.

14.2.6. Post re-submission of application, the technical committee shall review the resubmitted application and the certificate shall be issued during the subsequent month in which the application has been re-submitted.

14.3. Facility Level Certificate:

14.3.1. Facility-level certificate is mandatory for Green Hydrogen production facilities to apply for a provisional or final certificate. Facility-Level Certificate certifies that the Green Hydrogen production facility has met the pre-requisite requirements as specified in Green Hydrogen MRV framework to produce Green Hydrogen according to GHCI.

14.3.2. The Green Hydrogen producers may apply for the facility-level certificate any time after obtaining the consent to operate for the Green Hydrogen production facility.

14.3.3. The Green Hydrogen producer shall offer the facility to undergo on-site verification by an ACV agency. Post verification, the producer shall submit the application along with all required documents on the Green Hydrogen portal. The technical committee shall review the documents and the certificate shall be issued by the last date of the subsequent month in which the application has been submitted.

14.3.4. In case of any discrepancies in the submitted application, the technical committee shall request clarifications by the last date of the subsequent month in which the application has been submitted.

14.3.5. The Green Hydrogen producer shall resubmit the application by the last date of the subsequent month in which the clarification has been requested.

14.3.6. Post re-submission of application, the technical committee shall review the resubmitted application and the certificate shall be issued by the last date of the subsequent month in which the application has been re-submitted.

14.4. 2 types of certificates shall be issued for Green Hydrogen production under GHCI namely, provisional certificate and final certificate. Details of the 2 certificates have been given in clauses 14.5 to 14.6.



14.5. Provisional Certificate:

- 14.5.1. This is an auto-generated voluntary certificate, and Green Hydrogen producers may apply for it through the Green Hydrogen portal by submitting actual production details related to the hydrogen production as specified in the Green Hydrogen MRV Framework.
- 14.5.2. This provisional certificate **reports** that the hydrogen produced during the specified period is green as per GHCI based on the data provided by the Green Hydrogen producer. However, the product carbon footprint shall not be mentioned on the provisional certificate.
- 14.5.3. The minimum duration for which a producer may apply for a provisional certificate is one calendar month. Applications for a given calendar month shall be submitted by the end of the next calendar month. The number of months for which the provisional certificate can be applied has to be a natural number greater than or equal to one and less than or equal to eleven.
- 14.5.4. For the first month of operations, the provisional certificate shall be issued from the date of commencement of operations to the end of that calendar month.
- 14.5.5. For example, a producer may apply for a provisional certificate for the month of June (i.e. from 1st June to 30th June) anytime between 1st July to 31st July. However, if the operations of the facility started on 15th June, provisional certificate may be applied from 15th June to 30th June anytime between 1st July to 31st July.
- 14.5.6. In cases where a Green Hydrogen production facility has received facility-level certificate after the commencement of operations, the provisional certificate shall be issued from the date of issuance of certificate to the end of that calendar month for the first month of issuance of facility-level certificate.
- 14.5.7. In cases where a Green Hydrogen production facility has received facility-level certificate after the commencement of operations, the provisional certificate shall not be issued for the period before the issuance of facility-level certificate.
- 14.5.8. In cases where a Green Hydrogen production facility has been issued a provisional certificate, the next provisional certificate in the same evaluation cycle may be applied for any month/period (as specified in 14.5.3) after the period of the latest provisional certificate in that evaluation cycle, but not for any period before.
- 14.5.9. For instance, if the previous provisional certificate has been issued for the period from 1st May to 30th May, the next provisional certificate may be applied for a period starting from 1st June but not before May in the same evaluation cycle.



14.5.10. A producer may apply for a maximum eleven months of provisional certificates in the evaluation cycle.

14.6. Final Certificate:

14.6.1. Applying for the final certificate is mandatory for any Green Hydrogen Production Facility/Green Hydrogen Producer claiming that Green Hydrogen has been produced in India.

14.6.2. The final certificate **guarantees** that the hydrogen produced during the specified evaluation cycle is Green as per GHCI.

14.6.3. The final certificate shall mention the Product Carbon Footprint during the production of Green Hydrogen.

14.6.4. The final certificate shall be issued once every financial year i.e. after the financial year end. The Green Hydrogen producer shall submit all the relevant proofs, documentation, and data post verification by ACV agency by 31st May of the subsequent evaluation cycle on the Green Hydrogen portal.

14.6.5. Post submission of data, the technical committee shall review the application and the certificate shall be issued by the 30th June.

14.6.6. In case of any discrepancies in the submitted application, the technical committee shall request clarifications by 30th June and the Green Hydrogen producer shall resubmit the application by 31st July.

14.6.7. Post re-submission of data, the technical committee shall review the resubmitted application and the certificate shall be issued by the 31st August.

14.7. MNRE or its designated agency may conduct random audit any during or after the financial year.

14.8. This certification shall not constitute any statutory clearance for establishing a Green Hydrogen plant.

15. Penalty Clause

15.1. MNRE or its designated agency shall levy a penalty to Green Hydrogen producer/Green Hydrogen production facility under three (03) cases as mentioned below:

15.1.1. If the Green Hydrogen Producer/Green Hydrogen Production Facility has been issued provisional certificates for at least eight months in any one evaluation cycle and the actual emissions for that evaluation cycle post the review by the technical committee for the final certificate is above the emission threshold.

15.1.2. If the Green Hydrogen Producer/Green Hydrogen Production Facility has been issued the provisional certificate for at least 8 months and the actual quantity of Green Hydrogen produced post the review by the



technical committee for the final certificate is less than the quantity of hydrogen claimed as Green Hydrogen produced in the provisional certificates.

- 15.1.3.** If the Green Hydrogen Producer/Green Hydrogen Production Facility has been issued at least one provisional certificate and fails to apply for the final certificate before the deadline.

15.2 Penalty Calculation for High Emission Intensity:

- 15.2.1** For clause no. 15.1.1., Total Penalty for High Emission Intensity (INR) = Green Hydrogen Penalty Quantity (tons) * Multiplier

$$P_{ei} = Q_{gh2} * M$$

Where,

P_{ei} = Total Penalty for High Emission Intensity (INR)

Q_{gh2} = Green Hydrogen Penalty Quantity (tons)

M= Multiplier

- 15.2.2** For clause no. 15.2.1., Green Hydrogen Penalty Quantity (tons) refers to the Hydrogen Produced (tons) during the evaluation cycle.

- 15.2.3** Multiplier is based on the actual emissions (kg CO_{2eq}/kg H₂) during the evaluation for the final certificate.. (Latest multiplier value to be referred as notified by BEE)

For, Illustration, if.

| Detail | Multiplier |
|--|------------|
| >2-2.2 kg CO _{2eq} /kg H ₂ | 30000 |
| >2.2-2.4 kg CO _{2eq} /kg H ₂ | 40000 |
| >2.4 kg CO _{2eq} /kg H ₂ | 50000 |

If a producer produces 20000MT of Hydrogen annually and claims the emission intensity of ≤ 2 KgCO_{2eq}/kg H₂ for provisional certificates for at least eight months but after review by technical committee, the actual annual emission intensity is 2.1 KgCO₂/Kg H₂ in evaluation cycle. Then, The Total Penalty for High Emission Intensity:
 P_{ei} (INR)= 20,000 x 30,000 = 60 Cr. (INR).

15.3 Penalty for Mismatch of Quantity:

- 15.3.1** For clause no. 15.1.2., Total Penalty for Mismatch of Quantity (INR)= (Green Hydrogen Claimed – Actual Green Hydrogen Produced (tons)) * Multiplier

$$P_{mq} = Q_d * M$$

Where,

P_{mq} = Total Penalty for Mismatch of Quantity (INR)

Q_d = (Green Hydrogen Claimed – Actual Green Hydrogen Produced)(Ton)



M= Multiplier

- 15.3.2** Green Hydrogen penalty quantity (tons) refers to the difference between Green Hydrogen claimed as per provisional certificates and actual Green Hydrogen produced (tons) during the evaluation cycle (on an annual basis).
- 15.3.3** Multiplier value shall be half of the production cost of Green Hydrogen as notified by BEE. (Latest multiplier value to be referred as notified by BEE).

For, Illustration,

| | |
|---|-----|
| Green Hydrogen Production Cost (INR/Kg) | 350 |
| Multiplier | 175 |

If the Green Hydrogen producer claims the total hydrogen production quantity of 80000MT for at least eight months of provisional certificates but after the review by technical committee, the actual total annual production is only 50000MT in the evaluation cycle.

Then, Total penalty for mismatch of quantity:

$$\text{Pmq (INR)} = (80000 - 50000) \times 175 = 52.50 \text{ Lakh (INR)}$$

- 15.4** For Clause no. 15.1.3, If the Green Hydrogen Producer/Green Hydrogen Production Facility has been issued at least one provisional certificate and fails to apply for the final certificate before the deadline then the issued provisional certificate shall be cancelled.
- 15.5** For 15.1.1. to 15.1.3., in addition to the Total Penalty, below penalty shall also be levied:
- 15.5.1** For the first occurrence of any event mentioned under clause(s) 15.1.1 to 15.1.3, Green Hydrogen Producer/Green Hydrogen Production Facility shall not be eligible to apply for the provisional certificate for the next evaluation cycle. Any provisional certificate already issued for that evaluation cycle shall be cancelled.
- 15.5.2** For the second occurrence of any event mentioned under clause(s) 15.1.1. to 15.1.3. within 3 years from the first occurrence, the Green Hydrogen Producer/Green Hydrogen Production Facility shall not be eligible to apply for provisional certificate for the next three evaluation cycles. Any provisional certificate already issued for these evaluation cycles shall be cancelled.
- 15.6** No penalty shall be levied under clause no. 15.1.1., if the total emission intensity of Green Hydrogen production facility is $\leq 2 \text{ Kg CO}_2\text{eq/kg H}_2$ in an evaluation cycle.
- 15.7** No penalty shall be levied under clause no. 15.1.2., if the total production of Green Hydrogen is equal or more than the claimed quantity in an evaluation cycle.



16. Certificate Details

- 16.1. The issued certificate shall contain a unique identification for each ton of hydrogen produced, specifying project details, production year, and emission intensity values. The certification shall be conditional upon the average emission intensity meeting or being below 2 kg CO_{2eq}/kg H₂ within defined scheme conditions. In case any Green Hydrogen production facility exceeds the limit of 2 kg CO_{2eq}/kg H₂, taken as an average in a particular financial year, then no Hydrogen produced during the year from that facility shall be certified as 'Green'.
- 16.2. The Green Hydrogen certificate serves only as a label which guarantees the origin (GO) of the Green Hydrogen and its attributes, and the certificate is non-transferable or tradeable.
- 16.3. The certificate does not represent a mitigation outcome and cannot be claimed for any emission reduction credits. However, the certification and hydrogen emission intensity may be referred for the purpose of highlighting possible emission reduction due to production or replacement of hydrogen (or any other fossil fuel) with the Green Hydrogen.
- 16.4. A certification fee on the final certificate of Rs. 0.25 per kg of Green Hydrogen certified shall be charged by MNRE or its designated agency.

17. Monitoring

A scheme monitoring committee (SMC) under the chairmanship of Secretary, MNRE, and comprising representatives from MNRE, BEE and experts from other organizations as may be required for the purpose, shall periodically review the status of implementation of the scheme. The committee will facilitate/ recommend measures to resolve difficulties, if any, which have been observed during the implementation of the scheme.



Green Hydrogen Emission Calculation Methodology

The Green Hydrogen Production Facility outlines the methodology for calculating greenhouse gas (GHG) emissions associated with the production of green hydrogen as per GHCI. Green hydrogen producers shall follow this methodology to apply for the certification under GHCI.

Electrolysis Pathway

GHG Emission Intensity Calculation

Following the System Boundary, Green Hydrogen Production Facilities shall apply the following Equation 1 for the purpose of calculating the total GHG emissions.

$$\text{Equation 1} \quad E_{Total,electrolysis} = E_{Feedstock Supply} + E_{Electricity Supply} + E_{Fuel Supply} + E_{Steam Supply} + E_{Input Materials} - E_{A_{Co-product}} \quad \text{where}$$

$E_{Total,electrolysis}$ = the total GHG emissions in kg CO_{2eq}/kg H₂

and each term on the right-hand side of Equation 1 represents an Emission Category within the scope of the GHCI.

Feedstock Supply

Feedstock Supply emissions shall be calculated with Equation 2:

$$\text{Equation 2} \quad E_{Feedstock Supply} = \frac{[(Q_{Feedstock,1} * EF_{Feedstock,1}) + (Q_{Feedstock,2} * EF_{Feedstock,2}) + \dots + (Q_{Feedstock,n} * EF_{Feedstock,n})] * 1000}{P_{Hydrogen} * 1000}$$

where

$E_{Feedstock Supply}$ = the total GHG emissions from feedstock used in the process in kg CO_{2eq}/kg H₂

$Q_{Feedstock,i}$ = the total quantity of feedstock used in tons

$EF_{Feedstock,i}$ = the emission factor of feedstock used in Kg CO_{2eq}/Kg¹

$P_{Hydrogen}$ = the total hydrogen produced in tons

For the electrolysis pathway, water and steam should be considered as feedstock.

Electricity Supply

Electricity Supply emissions shall be calculated with Equation 3:

Equation 3

$$E_{Electricity Supply} = E_{Grid Electricity} + E_{Non-Captive Power Plant}$$

where

$E_{Electricity Supply}$ = the total GHG emissions from electricity used in the process in kg CO_{2eq}/kg H₂

$E_{Grid Electricity}$ = the total GHG emissions from grid electricity used in the process in kg CO_{2eq}/kg H₂

$E_{Non-RE Captive Power Plant}$ = the total GHG emissions from electricity from captive power plant (non-renewable) used in the process in kg CO_{2eq}/kg H₂

¹ UK Low Carbon Hydrogen Standard



Equation 4

$$E_{Grid\ Electricity} = \frac{Q_{Grid\ Electricity} * [EF_{Grid\ Electricity} / (1 - T\&D\ Losses)]}{P_{Hydrogen} * 1000}$$

where

$Q_{Grid\ Electricity}$ = the total amount of grid electricity used in kWh

$EF_{Grid\ Electricity}$ = the emission factor of grid electricity used in Kg CO_{2eq}/kWh²

T&D Losses = Transmission and Distribution losses of the state in which the plant has been setup³

Equation 5

$$E_{Non-RE\ Captive\ Power\ Plant} = \frac{[(Q_{Fuel,1} * EF_{Fuel,1}) + (Q_{Fuel,2} * EF_{Fuel,2}) + .. + (Q_{Fuel,n} * EF_{Fuel,n})] * 1000}{P_{Hydrogen} * 1000}$$

where

$Q_{Fuel,i}$ = the total quantity of fuel used in tons

$EF_{Fuel,i}$ = the emission factor of fuel used in Kg CO_{2eq}/Kg⁴

Fuel Supply

Fuel Supply emissions shall be calculated with Equation 6:

Equation 6

$$E_{Fuel\ Supply} = \frac{[(Q_{Fuel,1} * EF_{Fuel,1}) + (Q_{Fuel,2} * EF_{Fuel,2}) + .. + (Q_{Fuel,n} * EF_{Fuel,n})] * 1000}{P_{Hydrogen} * 1000}$$

where

$E_{Fuel\ Supply}$ = the total GHG emissions from fuel used in the process in kg CO_{2eq}/kg H₂

$Q_{Fuel,i}$ = the total quantity of fuel used in tons

$EF_{Fuel,i}$ = the emission factor of fuel used in Kg CO_{2eq}/Kg⁵

Steam Supply

Steam Supply emissions shall be calculated with Equation 7:

Equation 7

$$E_{Steam\ Supply} = \frac{[(Q_{Fuel,1} * EF_{Fuel,1}) + (Q_{Fuel,2} * EF_{Fuel,2}) + .. + (Q_{Fuel,n} * EF_{Fuel,n})] * 1000}{P_{Hydrogen} * 1000}$$

Where

$E_{Steam\ Supply}$ = the total GHG emissions from steam used in the process in kg CO_{2eq}/kg H₂

$Q_{Fuel,i}$ = the total quantity of fuel used in tons

$EF_{Fuel,i}$ = the emission factor of fuel used in Kg CO_{2eq}/Kg⁶

Other Input Materials

Other Input Materials emissions shall be calculated with Equation 8:

² All India Weighted Average CEA Grid Emission Factor (0.71 Kg CO_{2eq}/kWh)

³ CEA T&D Losses Data

⁴ IPCC Emission Factor

⁵ IPCC Emission Factor

⁶ IPCC Emission Factor



Equation 8

$$E_{Other\ Input\ Materials} = \frac{[(Q_{Input\ Material,1} * EF_{Input\ Material,1}) + (Q_{Input\ Material,2} * EF_{Input\ Material,2}) + \dots + (Q_{Input\ Material,n} * EF_{Input\ Material,n})] * 1000}{P_{Hydrogen} * 1000}$$

where

$E_{Other\ Input\ Materials}$ = the total GHG emissions from input materials used in the process in kgCO_{2eq}/kgH₂

$Q_{Input\ Material,i}$ = the total quantity of input material used in tons

$EF_{Input\ Material,i}$ = the emission factor of input material used in Kg CO_{2eq}/Kg⁷

Any Input Material with a negative GHG Emission Intensity shall be recorded as having a nil GHG Emission Intensity.

Co-Product

Emission Allocation to Co-product shall be calculated with Equation 9:

Equation 9

$$EA_{Co-product} = \frac{SP_{Co-product,oxygen} * Q_{Co-product,oxygen}}{(SP_{Hydrogen} * P_{Hydrogen}) + (SP_{Co-product,oxygen} * Q_{Co-product,oxygen})} * \left(\frac{E_{Feedstock\ Supply} + E_{Electricity\ Supply} + E_{Fuel\ Supply} + E_{Steam\ Supply} + E_{Input\ Materials} + E_{Compression\ and\ Purification}}{P_{Hydrogen} * 1000} \right)$$

where

$EA_{Co-product}$ = the total GHG emissions allocated to co-product produced during the production process in kg CO_{2eq}/kg H₂

$SP_{Co-product,oxygen}$ = the selling price of oxygen in INR/ton

$Q_{Co-product,oxygen}$ = the total quantity of oxygen sold in tons

$SP_{Hydrogen}$ = the selling price of hydrogen in INR/ton

Biomass Pathway

GHG Emission Intensity Calculation

Following the System Boundary, Green Hydrogen Production Facilities shall apply the following Equation 10 for the purpose of calculating the total GHG emissions.

Equation 10

$$E_{Total,biomass} = E_{Upstream\ Process} + E_{Production\ Process} - EA_{Co-product}$$

Where

E_{Total} = the total GHG emissions in kg CO_{2eq}/kg H₂ and each term on the right-hand side of Equation 10 represents an Emission Category within the scope of the GHCI.

Upstream Process

Upstream Process emissions shall be calculated with Equation 11:

Equation 11

$$E_{Upstream\ Process} = E_{biomass\ Pre-Treatment}$$

⁷ UK Low Carbon Hydrogen Standard



where

$E_{\text{Upstream Process}}$ = the total GHG emissions from the upstream process in kg CO_{2eq}/kg H₂

$E_{\text{Biomass Pre-Treatment/Treatment}}$ = the total GHG emissions from the Biomass Pre-Treatment and Treatment process in kg CO_{2eq}/kg H₂

Biomass Pre-Treatment/Treatment

Biomass Pre-Treatment/Treatment emissions shall be calculated with Equation 12:

Equation 12

$$E_{\text{Biomass Pre-Treatment/Treatment}} = E_{\text{Electricity Supply}} + E_{\text{Fuel Supply}} + E_{\text{Steam Supply}} + E_{\text{Input Materials}}$$

Calculation Methodology for right-hand side of the equation 12 is given in equation 3 to equation 8.

Production Process

Production Process emissions shall be calculated with Equation 13:

Equation 13

$$E_{\text{Production Process}} = E_{\text{Feedstock Supply}} + E_{\text{Electricity Supply}} + E_{\text{Fuel Supply}} + E_{\text{Steam Supply}} + E_{\text{Input Materials}}$$

where

$E_{\text{Production Process}}$ = the total GHG emissions from the production process in kg CO_{2eq}/kg H₂ Calculation Methodology for right-hand side of the equation 13 is given in equation 3 to equation 8.

Co-product

Emission Allocation to Co-product shall be calculated with Equation 14:

Equation 14

$$EA_{\text{Co-product}} = \frac{(SP_{\text{Co-product},1} * Q_{\text{Co-product},1}) + (SP_{\text{Co-product},2} * Q_{\text{Co-product},2}) + \dots + (SP_{\text{Co-product},n} * Q_{\text{Co-product},n})}{\left(\frac{E_{\text{Upstream Process}} + E_{\text{Production Process}} + E_{\text{Compression and Purification}}}{P_{\text{Hydrogen}} * 1000} \right) + (SP_{\text{Hydrogen}} * P_{\text{Hydrogen}})}$$

where

$EA_{\text{Co-product}}$ = the total GHG emissions allocated to co-product produced during the production process in kg CO_{2eq}/kg H₂

$SP_{\text{Co-product},i}$ = the selling price of co-product in INR/ton

$Q_{\text{Co-product},i}$ = the total quantity of co-product sold in tons

SP_{Hydrogen} = the selling price of hydrogen in INR/ton