Consultation Paper

Green Hydrogen Standard Certification Scheme

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EMSD

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Executive Summary

The Electrical and Mechanical Services Department (EMSD) has prepared this Consultation Paper to seek views from stakeholders and the public on the proposed **Green Hydrogen Standard Certification Scheme** ("the Certification Scheme") in Hong Kong.

Hydrogen energy is recognised globally as a clean energy carrier with a wide range of applications such as transport, power generation and energy storage. To help Hong Kong achieve carbon neutrality before 2050, the Government of the HKSAR published in June 2024 the Strategy of Hydrogen Development in Hong Kong. As undertaken in the Strategy, we have formulated the Certification Scheme for hydrogen energy that aims to establish a transparent and internationally aligned framework for certifying the greenhouse gas (GHG) emission performance of hydrogen products.

To capitalise on Hong Kong's roles as a "super connector" and a "super value-adder", the Certification Scheme is designed to foster interoperability and ensure consistent sustainability claims across economies. The proposed Certification Scheme can help reinforce Hong Kong's position as a demonstration platform for green and low-carbon technologies, and facilitate the export of technologies and products developed in the Chinese Mainland, Hong Kong and other parts of the world. It can also help attract green financing for low-carbon hydrogen technologies and products by providing clear, credible and transparent standards that can build investor confidence.

Drawing reference from **present frameworks and ongoing developments in the Chinese Mainland** and **international practices and standards**, including those requirements from the **European Union Renewable Energy Directive (EU RED)**[1], the proposed Certification Scheme will be **voluntary** and adopt the calculation methodology of **ISO/TS 19870** on "well to consumption gate" lifecycle emissions.

Two emission thresholds are proposed:

- **Green Hydrogen**: ≤ 3.384 kg CO_2eq/kg H_2
- **Low carbon Hydrogen**: ≤ 4.86 kg CO_2eq/kg H_2

Both categories will exclude hydrogen produced using coal or coal derived feedstock. The thresholds are aligned with the Phase 2A prototype of the **Hong Kong Taxonomy for Sustainable Finance**, facilitating the promotion of green and transition activities.

[1] The European Union Renewable Energy Directive (EU RED) establishes common rules and targets for the development of renewable energy across all sectors of the economy - Directive EU 2023/2413 EUR-Lex https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302413

The proposed **certification framework** comprises five key roles:

1. **Scheme Overseer** (EMSD) – to develop and maintain the standards;
2. **Scheme Holder** – to manage the scheme and related procedures;
3. **Independent Verification Body** – to assess compliance;
4. **Accreditation Body** – independent formal recognition body; and
5. **Issuance Body** – to issue certificates to qualified entities.

Implementation will proceed in three stages:

- **Stage I (by Q1 2026)**: Develop the approach and gather consultation feedback;
- **Stage II (by 2027)**: Finalise the framework and launch the scheme;
- **Stage III**: Undertake regular review and updates to maintain relevance to Hong Kong's evolving hydrogen sector.

EMSD welcomes views on the proposed Certification Scheme **on or before 17 April 2026** through the channels listed in this paper. Stakeholder views will help build a transparent and internationally aligned certification system suited to Hong Kong's context.

1 BACKGROUND

Hydrogen is widely recognised as a clean energy carrier with diverse applications in transport, power generation, and energy storage. To advance Hong Kong's goal of achieving carbon neutrality before 2050, the Government promulgated the Strategy of Hydrogen Development in Hong Kong in June 2024 to create an environment conducive to the development of hydrogen energy in Hong Kong in a prudent and orderly manner. One of the principal initiatives under the Strategy—and included in the Chief Executive's 2025 Policy Address—is the formulation of the approach of hydrogen standard certification applicable to Hong Kong to drive low-carbon transformation.

To explore the approach of certification suitable to Hong Kong, and to position Hong Kong as a bridge linking the Chinese Mainland and the rest of the world, EMSD has conducted a global benchmarking study to assess the state of hydrogen certification schemes and associated practices across five jurisdictions in addition to the Chinese Mainland: Australia, the European Union (EU), Japan, the United Kingdom (UK), and the United States (US). Among these, the Chinese Mainland and two other jurisdictions – the EU and Australia – have made significant progress in developing regional hydrogen development frameworks and practices associated with certification. The remaining three jurisdictions (i.e. Japan, the UK, and the US) are still in the stage of developing standards or schemes, and comprehensive public information is not yet available.

The EU RED establishes common rules and targets for the development of renewable energy including hydrogen energy, and the certification schemes in the EU recognized by the European Commission (EC) provide a comprehensive framework for verifying compliance with the EU RED requirements. The Chinese Mainland has also achieved significant progress, having introduced the China Group Standard and China Industry Standard, and is in the process of developing a comprehensive standard. On the other hand, Australia is still in the process of developing its hydrogen standard, and has not yet launched a local certification scheme.

EMSD has drawn on these findings in developing a hydrogen certification scheme for Hong Kong. These schemes serve as valuable benchmarks and references that are suitable and relevant to Hong Kong's context.

To leverage Hong Kong's roles as a "super connector" and a "super value-adder" to attract overseas and Chinese Mainland enterprises, the proposed hydrogen certification scheme strives to obtain recognition from the Chinese Mainland and Europe, as well as aligning with Hong Kong's development needs and long-term carbon reduction goals. Additionally, the scheme would facilitate the showcasing of Chinese Mainland hydrogen products and technologies to the world market, recognizing the EU compliance via Hong Kong's certification scheme.

2 PROPOSED GREEN HYDROGEN STANDARD CERTIFICATION SCHEME

A robust standard certification scheme requires an up-to-date standard and methodology to accommodate the technological advancement and applications of hydrogen, along with a clear and comprehensive certification framework, as illustrated in **Figure 1** below.

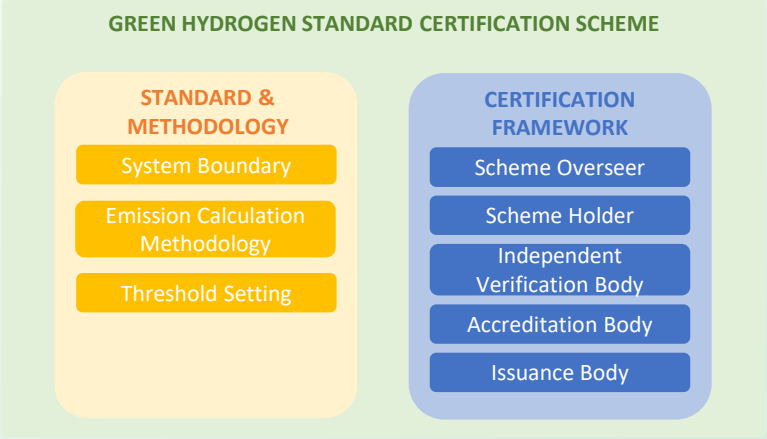


Figure 1 Green Hydrogen Standard Certification Scheme

The Certification Scheme in Hong Kong is voluntary, similar to the practices in the Chinese Mainland and the EU. Applicants are encouraged to submit their applications for assessment on the hydrogen certification according to the standard and methodology discussed below.

2.1 Standard and Methodology

System Boundary

A system boundary is a prerequisite for calculation of the Greenhouse Gas (GHG) emissions. The system boundary adopted by the proposed Certification Scheme should cover the entire lifecycle of a product, with a view to holistically reflecting the GHG emission of the entire lifecycle. It is therefore proposed to establish a "well-to-consumption gate" system boundary in the Certification Scheme, covering the (i) production, (ii) conditioning/conversion and (iii) transportation throughout the entire value chain of ready-to-use hydrogen before the consumption point. This aligns with the production to delivery storage point for the functional unit (i.e. "well-to-consumption gate") as specified in ISO/TS 19870 [2].

The certification schemes in the EU define their scope to encompass activities up to the immediate storage facilities at the point of consumption (i.e. "well-to-wheel"). On the other hand, present practice that is currently being adopted in the Chinese Mainland typically focuses on processes and practices at the production stage. The system boundary in the proposed Certification Scheme are more similar to the system boundary adopted in the EU that both covers the whole value chain up to the consumption gate or wheel.

[2] ISO/TS 19870 Hydrogen technologies – Methodology for determining the greenhouse gas emissions associated with the production, conditioning and transport of hydrogen to consumption gate.

Emission Calculation Methodology

The Certification Scheme adopts a consistent calculation principle for GHG emissions associated with hydrogen, based on emission inventories as outlined in ISO/TS 19870. The methodology stated in ISO/TS 19870 serves as a suitable reference for the Certification Scheme, ensuring standardization in measuring hydrogen – related emissions. The proposed methodology in the Certification Scheme encompasses a range of hydrogen production, conditioning and transportation pathways, such as electrolysis, steam reforming, liquefaction and hydrogen carriers, road/sea/pipeline transport and other emerging technologies. It takes into account emissions inventory from fuel combustion, fugitive releases, energy supply, industrial processes, and embodied emissions, in accordance with ISO/TS 19870, ensuring a comprehensive assessment of the hydrogen value chain, as illustrated in **Figure 2**. This emission calculation methodology has also been adopted by different economies including the Chinese Mainland and the EU.

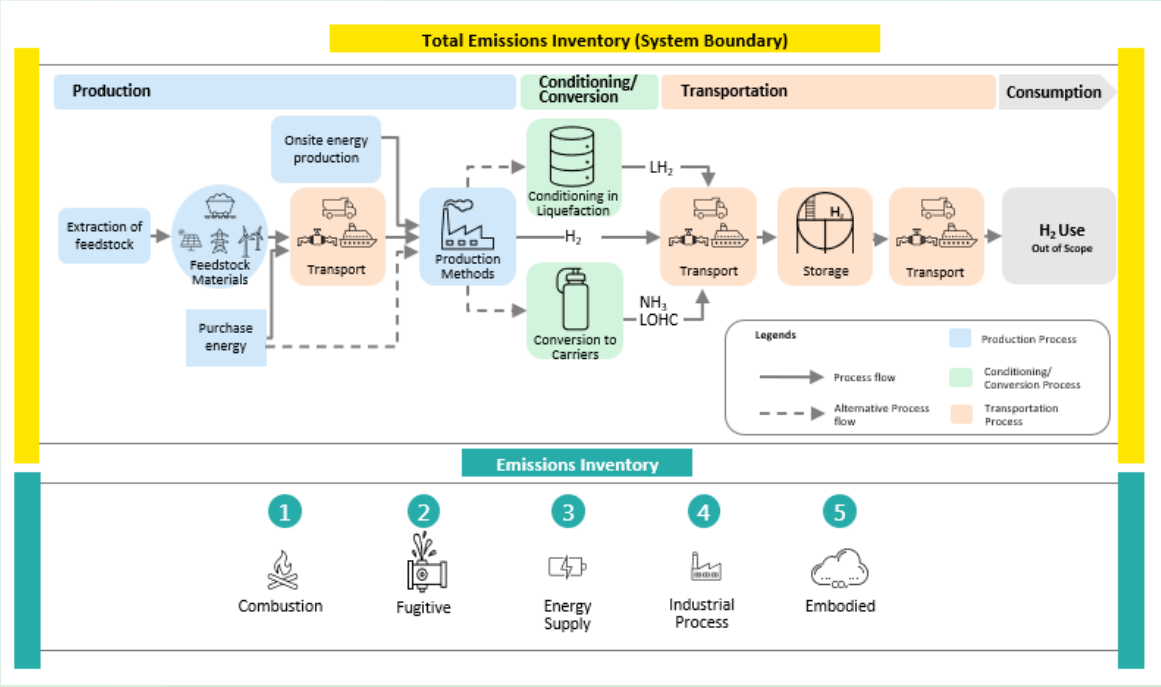


Figure 2 Emission inventory of the hydrogen value chain

The total GHG emission calculation in association with emission inventories of production, conditioning/conversion and transportation is provided below:

$$E_{total\ emissions\ inventory} = E_{emissions\ inventory\ production} + E_{emissions\ inventory\ conditioning/conversion} + E_{emissions\ inventory\ transport}$$

Each emission inventory can be further disaggregated into its respective elements, as shown below:

$$E_{emissions\ inventory} = E_{combustion\ emissions} + E_{fugitive\ emissions} + E_{industrial\ process\ emissions} + E_{energy\ supply\ emissions} + E_{embodied\ emissions}$$

During the processes of production, conditioning/conversion, and transportation, GHG are emitted from combustion in energy provision, fugitive emissions due to leakages and accidental losses, energy supply such as electricity generated, industrial refrigeration and cooling systems, as well as embodied emissions due to upstream production activities, as detailed in **Table 1**.

Table 1 Definition of Emission inventory

Emission Inventory	Definition
Combustion	Emission of carbon dioxide, methane, and nitrous oxide released from the combustion of relevant solid, liquid and/or gaseous fuels including (but not limited to) coal, diesel and natural gas, for production processes or energy provision.
Fugitive	This source includes all structural and operational losses associated with the deployed technology and plant management. Therefore, leakages, accidental losses, and other losses resulting from improper management of plant operations are also considered.
Energy Supply	Emissions of carbon dioxide, methane and nitrous oxide (as applicable), associated with supply of energy, which includes electricity, heat, etc.
Industrial Process	Emission of relevant GHG released from industrial process activity, such as hydrofluorocarbons used in industrial refrigeration and/or cooling systems, and sulphur hexafluoride used in electrical switchgear for electrical conduction isolation.
Embodied	Emissions of specific GHG associated with upstream and supply-chain activities involved in hydrogen production. These are emissions that occur indirectly due to the processes used to obtain raw materials, transportation, storage, and other supporting activities in the boundary.

GHG emission inventory data used for calculations can be classified into two categories: primary data and secondary data. Primary data is derived from direct measurements or calculations based on such measurements, e.g. on-site fuel consumption records, energy meter readings, or direct emissions monitoring results. Data that does not meet the criteria for primary data is classified as secondary data, which may include information from databases, published literature, default emission factors from national inventories, calculated estimates, or other representative data validated by the Scheme Overseer. Secondary data could be obtained by multiplying the corresponding activity data by the emission factor associated with that activity. For example, GHG emission from electricity ($kgCO_2eq$) can be calculated by multiplying the actual electricity consumed (kWh) by the recognised emission factor ($kgCO_2eq/kWh$).

Threshold Setting

Transport Sector contributes a significant amount of GHG emissions in Hong Kong. The Certification Schemes establishes a threshold based on calculating the GHG emissions reduction target with the use of hydrogen in the Transport Sector.

A distinct divergence in strategic approach was observed in the threshold settings across various practices, including those from the Chinese Mainland and the EU. The EU scheme prioritises the expansion of renewable energy usage as a key strategy to achieve a 70% reduction in carbon emissions, which is similar to our approach in the Certification Scheme. In contrast, the present practice in the Chinese Mainland adopts an industry-compatible direction, leveraging technological advancements to reduce GHG emissions for subsidy provision.

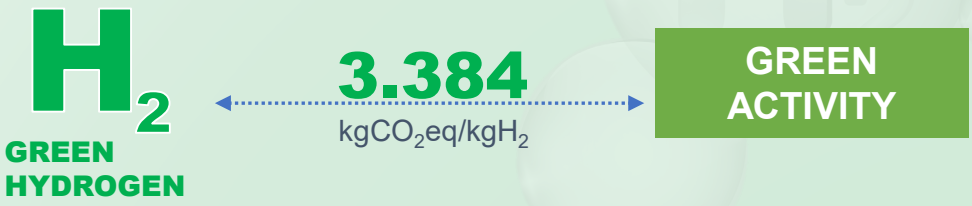
As derived from the EU calculations, the green hydrogen threshold of 3.384 $kgCO_2eq/kgH_2$ which is based on the entire value chain and Europe transportation carbon emissions, is similar to the approach of the Certification Scheme. Meanwhile, the present emissions calculation that is currently being adopted in the Chinese Mainland's practice focuses on the production phase, without fully accounting on the post-production phase, such as transportation and storage prior to consumption. The calculated threshold for green hydrogen in Hong Kong is only slightly lower than the threshold of the EU and Hong Kong will adopt the same green hydrogen threshold as the EU, which is 3.384 $kgCO_2eq/kgH_2$.

Currently, local development of green hydrogen production is limited due to geographic constraints and scarce natural resources such as solar and wind energy. Nonetheless, it is pragmatic to adopt the Certification Scheme in Hong Kong to recognise the transition from high-carbon emission hydrogen to low-carbon hydrogen (with decarbonisation measures like Carbon Capture Utilization and Storage (CCUS)). To this end, a two-tiered emission threshold is recommended:

"Green Hydrogen", with a threshold of 3.384 $kgCO_2eq/kgH_2$, is eligible for any hydrogen production pathways except those using coal or coal derivatives as feedstock and dedicated energy source from oil, coal or coal derivatives, biomass from primary sources. This exclusion ensures alignment with global decarbonization goals, as coal-based hydrogen production relies on fossil fuels with high carbon intensity, resulting in significant GHG emissions.

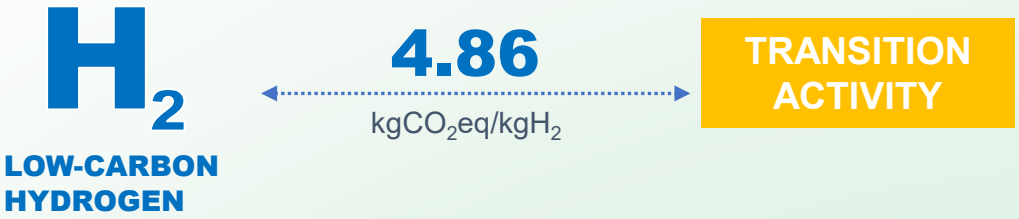
The Certification Scheme defines "Green Hydrogen" in alignment with the threshold requirement specified in the EU directive, which is 3.384 $kgCO_2eq/kgH_2$. Specifically, this scheme offers greater flexibility to address diverse technological developments and limited renewable energy in Hong Kong, without imposing the exclusive use of renewable energy under the EU requirement. This relaxation of the exclusive use of renewable energy for "Green Hydrogen" in the Certification Scheme acknowledges the limited availability of renewable energy resources in Hong Kong and enhances the adaptability of the industry. Under the proposed approach, hydrogen would be classified as "Green Hydrogen" as long as the established threshold and conditions are met, regardless of the adoption of renewable energy. For hydrogen that is produced by renewable energy and meets the criteria for "Green Hydrogen" under the Certification Scheme, apart from obtaining "Green Hydrogen" recognition, the Certification Scheme can also provide additional information on the certificate (i.e. produced by renewable energy) to facilitate the applicants to obtain green hydrogen recognition under the EU framework.

This provision provides an adaptable approach to promoting green hydrogen, while aligning with international standards and advancement of hydrogen technologies.



"Low-carbon Hydrogen", with a threshold of 4.86 $kgCO_2eq/kgH_2$, is eligible for any hydrogen production pathways except those using coal or coal derivatives as feedstock and dedicated energy source from oil, coal or coal derivatives, biomass from primary sources.

This unique low-carbon hydrogen category, which is not present in the EU standards, offers flexibility for hydrogen producers while promoting decarbonisation efforts and low-carbon hydrogen production. This transitional tier could incentivise the exploration of emerging technologies in Hong Kong, such as biomass gasification and CCUS, to lower greenhouse gas emissions in hydrogen production. By recognizing low-carbon hydrogen, a broader transition towards cleaner hydrogen production methods is encouraged.



To promote green financing for hydrogen development, the emissions thresholds for "Green Hydrogen" and "Low-carbon Hydrogen" under the Certification Scheme have been aligned with the thresholds of "Green Activity" and "Transition Activity" respectively of the Phase 2A prototype of the Hong Kong Taxonomy for Sustainable Finance (HK Taxonomy) for the manufacture of hydrogen. The HK Taxonomy imposes specific requirements for "Green Activity" and "Transition Activity", including criteria for feedstock and energy source, apart from the threshold requirements. Applicants of the proposed Certification Scheme are encouraged to achieve "Taxonomy-aligned" status under the "Green Hydrogen" and "Low-carbon Hydrogen" with further assessment on the feedstock and energy sources. The threshold requirement with production pathway qualifier of the two-tier proposal, i.e. "Green Hydrogen" and "Low-carbon Hydrogen" are summarized in **Table 2**.

Table 2 Summary of "Green Hydrogen" and "Low-carbon Hydrogen" Classifications

	Green Hydrogen	Low-carbon Hydrogen
GHG emission threshold ($kgCO_2eq/kgH_2$)	≤ 3.384	≤ 4.86
Production Pathway Qualifier	Any hydrogen production pathways except those using coal or coal derivatives as feedstock and dedicated energy source from oil, coal or coal derivatives, biomass from primary sources	
HK Taxonomy Analogy	Green Activities	Transition Activities

The aforementioned thresholds and criteria under "Green Hydrogen" and "Low-carbon Hydrogen" will be reviewed and updated regularly to accommodate the technological advancements and evolving industry circumstances.

2.2 Certification Framework

The certification framework of the Certification Scheme was developed based on the benchmarking analysis of global practices and certification schemes, including those from Australia, the Chinese Mainland, the EU, Japan, the UK and the US. Key components commonly adopted in these practices and certification schemes were identified which generally align with the requirements of the Hydrogen Certification 101[3] Framework. Upon consideration, the proposed certification framework is recommended to be based on Hydrogen Certification 101 for consistency with international standards.

Certification Framework of the Certification Scheme

With the key components constituting the proposed certification framework, the major roles of the Scheme Overseer, Scheme Holder, Accreditation Body, Independent Verification Body and Issuance Body are illustrated in **Figure 3**.

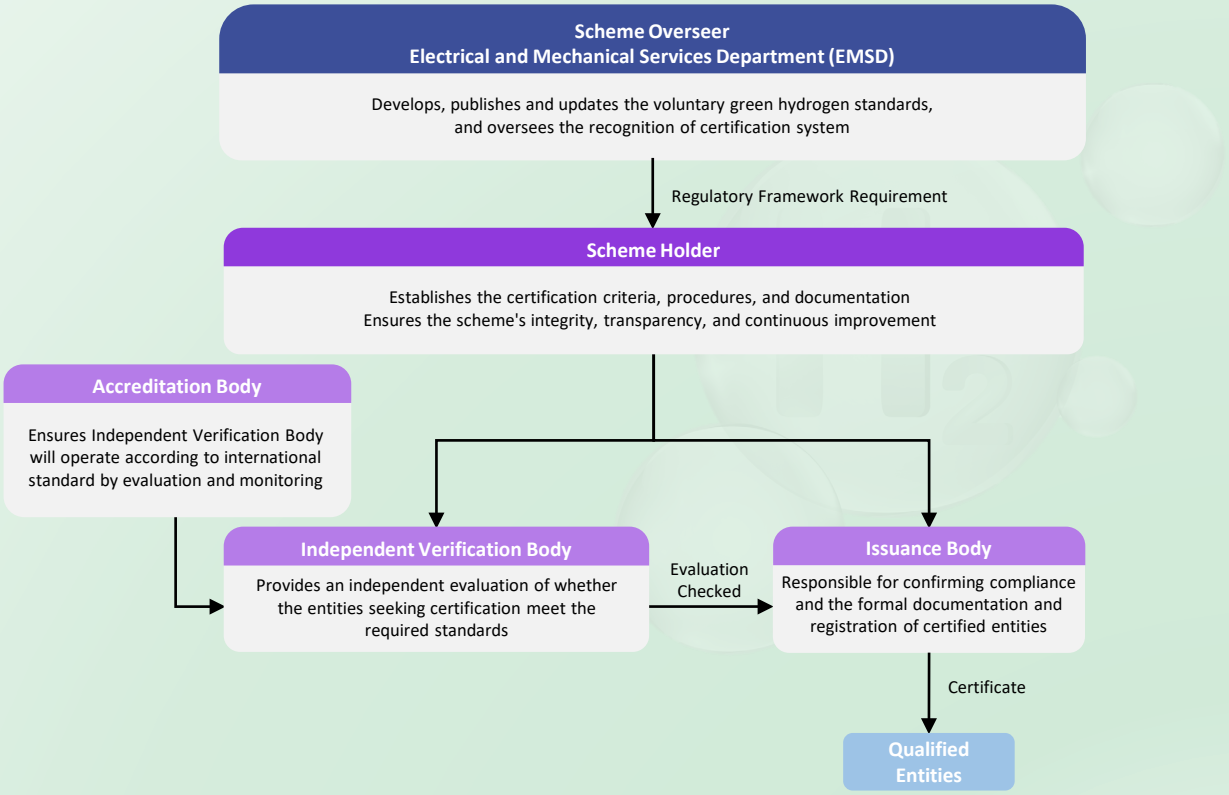


Figure 3 Major roles of the key components in proposed certification framework

[3] Hydrogen Certification 101, developed under the Breakthrough Agenda's Hydrogen Breakthrough priority action, aims to clarify terminology, explain certification scheme functions, and outline basic design principles, including the concept of mutual recognition. The framework was developed under the coordination of IPHE (International Partnership for Hydrogen and Fuel Cells in the Economy) and International Energy Agency Hydrogen TCP (Hydrogen Technology Collaboration Programme).

Detailed Functions of Key Components

The detailed functions of each key component are shown in **Table 3** below.

Table 3 Role and Function of Key Components

Key Components	Role and Function
Scheme Overseer	EMSD would serve as the Scheme Overseer in the Certification Scheme with the responsibilities to develop, publish and update the voluntary green hydrogen standards, and oversee the recognition of certification system.
Scheme Holder	The Scheme Holder is the organisation that develops, maintains, and manages the Certification Scheme. It establishes the certification criteria, procedures, and documentation. It also ensures the scheme's integrity, transparency, and continuous improvement.
Independent Verification Body [4] (i.e. bodies accredited by official accreditation body to provide verification/audit services)	Independent verification involves independent auditors who assess compliance with the certification standards. The Independent Verification Body provides an unbiased evaluation of whether the entities seeking certification meet the required standards. This process enhances credibility and trust in the Certification Scheme.
Accreditation Body (i.e. official accreditation body such as the Hong Kong Accreditation Service)	The Accreditation Body is the independent formal recognition body that recognises Independent Verification Bodies being competent to carry out specific tasks. It ensures that Independent Verification Bodies operate according to international standards, providing confidence in their assessments. Accreditation Bodies evaluate and monitor verification bodies to maintain high standards.
Issuance Body	Issuance refers to the process of granting certificates to entities that meet the certification criteria. The Issuance Body is responsible for the official documentation and registration of qualified entities, confirming their compliance with the Certification Scheme but they are not involved in establishing certification criteria. Normally, the Scheme Holder also assumes the role of Issuance Body but the Scheme Holder may designate the role to other organisations such as the Independent Verification Body.

[4] The Scheme Holder can be the Independent Verification Body, which is subject to the final arrangement made by the Scheme Holder.

3 ROAD MAP

The implementation roadmap of the Certification Scheme consists of 3 stages as below:

Stage I

To develop approach for Green Hydrogen Standard Certification Scheme by Q1 2026

Stage II

To identify all key components of the certification framework, such as Scheme Holder, Independent Verification Body, Accreditation Body, Issuance Body, etc. and work out the detailed standard and methodology for launching the Green Hydrogen Standard Certification Scheme by 2027

Stage III

Periodical Review and Update

This consultation exercise is a Stage 1 activity aiming to formulate an approach for a robust and effective Certification Scheme in Hong Kong. Your participation and views are important to achieve our goal.

4 COLLECTION OF VIEWS

EMSD welcomes views from interested parties on the proposed Certification Scheme **on or before 17 April 2026**. Please submit the Response Form in Appendix A of this paper, through either one of the following channels:

Mail: Gas Standards Office
Electrical and Mechanical Services Department
3 Kai Shing Street
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