Clean Hydrogen Trade Initiative 2024

Korea’s Clean Hydrogen Certification Scheme

2024. 5. 30. Hyejin Lee, KEEI

Contents

I

Backgrounds

Backgrounds

Hydrogen laws and regulations in Korea

Amendment to the Hydrogen Act to Promote the Clean Hydrogen Economy

2022.6.10	2023.11.21	2023.12.11	2024.3.4	2024.5.10
Hydrogen Law Amendment	Enforcement Decree Amendment	Enforcement Rule Amendment	Public notice Enactment	Rules for the clean hydrogen certification operating institution Enactment

- Clean Hydrogen Certification System
- Certification Standard
- Definition of Certification Grade
- Certification Governance
- Clean Hydrogen Certificate
- Certification Process
- Defining of Eligible Pathway
- Maintenance of Certificate
- Preliminary Review Consulting Process
- Operation of Committee & Sub-committee
- GHG Emission Accounting Methodology

Demand Creation

Power Generation

Dual-fuel Generation

Based on NDCs and the 10th Basic Plan of Long-term Electricity Supply and Demand, the dual-fuel power generation set out to grow **from 2.1% in 2030 to 7.1% in 2036**

Dual-fuel power generation to drive the **demand for clean hydrogen up to 800,000tons** to generate 13TWh of electricity in 2030

Transport Sector

Hydrogen Vehicles

Based on NDCs, **300,000 hydrogen vehicles to be deployed** (cumulatively) by 2030, **mainly as commercial vehicles** including hydrogen **buses** and **trucks**

Hydrogen Refueling stations

Sourced from hydrogen production hubs from domestic and abroad, clean hydrogen to be supplied to **660 refueling stations** at a competitive price **by 2030,** contributing to **reliable hydrogen supply**

Clean hydrogen demands is expected to reach over **390,000 tons by 2030,** driven by improvements in fuel efficiency and types.

Industrial Sector

In the **steel industry,** 90,000 tons of clean hydrogen to be supplied for demonstration project for a 1million ton scale **hydrogen reduction iron & steel making process**(from 2029) and **the technological application to be expanded** (2031~)

In **petrochemical industry,** reforming hydrogen from the traditional process **to be transitioned to clean hydrogen** and such **conventional feedstock** as natural gas (NG) and heavy oil **to be replaced by hydrogen/ammonia**

II

Certification Standard and GHG Accounting Rules

Certification Standard

Korea's Clean Hydrogen Certification Tier Level

4-tier level based on the 'well to gate' GHG emissions

Tier ($kgCO_2eq/kgH_2$)	Expected Technologies
Tier 1 (~0.10)	Linked w/ 100% Renewable Sources
Tier 2 (0.11~1.00)	Mixed with Grid/ Supply chain related Emissions
Tier 3 (1.01~2.00)	Clean Methane + CCS
Tier 4 (2.01~4.00)	General Blue w/90% capture rate

Plans to expand emissions calculation coverage

Phase1 Well-to-Gate	Phase2 Well-to-Port	Phase3 Well-to-Wheel
Intensive expansion of clean hydrogen production processes	Introduction of CO2-free fuels Propulsion Ship	Expanding domestic hydrogen supply infrastructure
Expansion of green & blue (with more than 90% capture) hydrogen production facilities	Securing new technology for energy carrier synthesis	Dedicated domestic hydrogen and ammonia pipelines
	Reliable operation of ammonia cracking technology	

GHG Accounting Rules

Eligible Hydrogen Production Pathways

- Limited to routes that can contribute to the mid- and long-term national GHG reduction targets in accordance with Article 8 of the 「Framework Act On Carbon Neutrality And Green Growth For Coping With Climate Crisis」
- In order to use hydrogen produced in existing facilities or hydrogen produced from existing compounds and mixed gases, the system boundary must be expanded and emissions calculated by comparing before and after the hydrogen production project to review the net reduction effect.

GHG Emission Accounting

Threshold Value	Well-to-Gate, 4kgCO_2e/kg of H_2	Purity	Over 99%(vol%)

Exclusion from the Accounting of emissions

1. Considering trends in carbon-free fueled vessel technology development, emissions from ship transportation* are temporarily excluded.
   * Procurement of raw materials for hydrogen production, transport of CO_2 captured during the hydrogen production, transport of hydrogen carriers (NH_3, etc.)
2. Energy such as waste heat is excluded from emissions after review (comparison with alternative routes) only in cases where it was not utilized prior to the hydrogen production.
3. Emissions from activities not directly related to hydrogen production are excluded. (emissions from compression for transportation, emissions related to equipment manufacturing, etc.)

Conversion Standards for Hydrogen Compounds

- The amount of hydrogen compounds confirmed to be imported at domestic ports is converted based on LHV and applied as the amount of hydrogen
  * (e.g.) Ammonia 6.45kgNH_3 (LHV: 18.6MJ/kgNH_3) → Hydrogen 1kgH_2 (LHV: 120MJ/H_2)

Offset Mechanism

- Any reduction unrelated to hydrogen production activities is not allowed
- Only direct allocation methods related to hydrogen will be allowed

GHG Accounting Rules

Green Hydrogen

- Monthly temporal correlation*, Geographical correlation is limited to the same grid as the hydrogen production facility
  * Apply only to the facilities come into operation by 2030
- Direct and indirect connection methods(PPA, REC, etc.) with renewable energy facilities are permitted.
  * Due to the intermittency of renewable energy, up to 10% of the electricity can be procured from the spot market.

Blue/Turquoise Hydrogen

- In case of producing clean hydrogen through CO_2 capture and storage(CCS), a CO_2 capture rate of 90% or more is required.
  * The US and EU are also considering the CO_2 capture rate of over 90% for clean hydrogen production.
- Extend the GHG emissions boundary through system expansion until final disposal of carbon-containing materials
  * Grant credits for the emission reduction effect(-) by replacing raw materials and fuels through system expansion, aggregates the penalty(+) resulting from disposal.

Bio-waste Hydrogen

- Bio-waste for hydrogen production are recognized only if they are “wastes” that have no other use other than hydrogen production.
- New bio-waste sources will be reviewed whether hydrogen production paths are feasible compared to alternative paths such as thermal and electricity production.

Pink Hydrogen

- Calculate the total amount of emissions from a series of uranium procurement processes
  (Uranium mining, refining, conversion, enrichment, molding process, etc.)

III

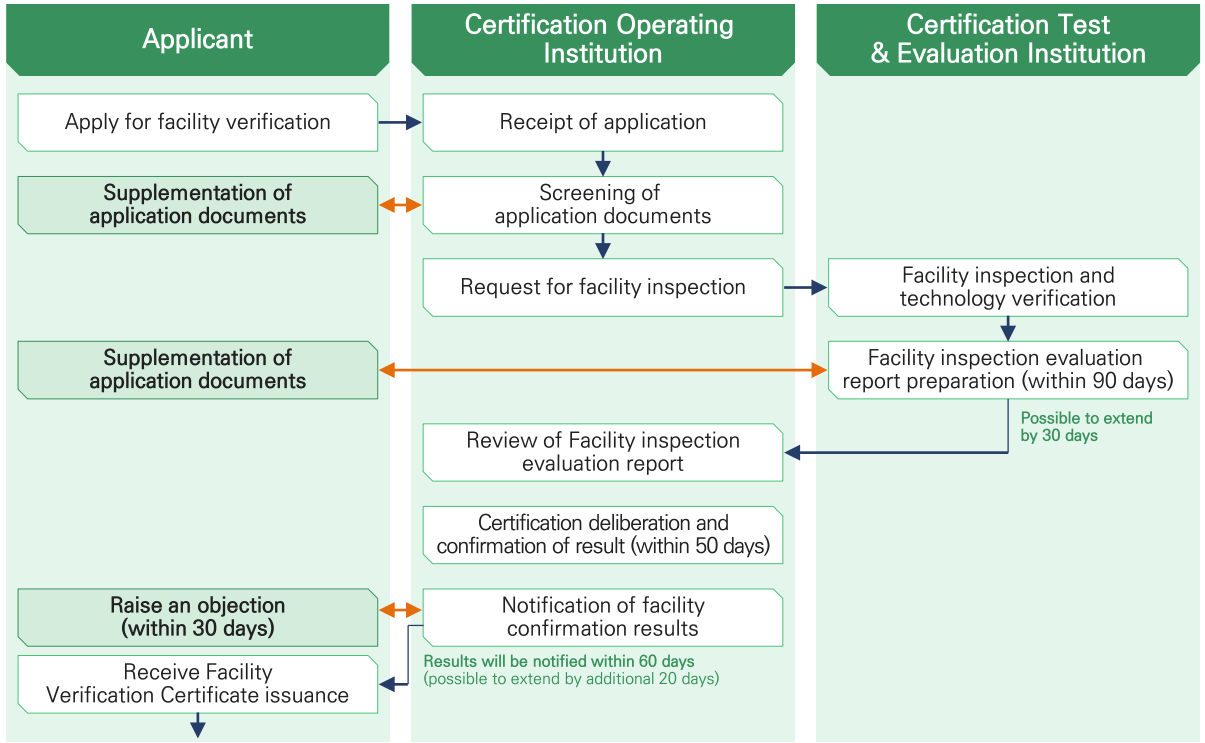
Scheme Operation

Certification Process

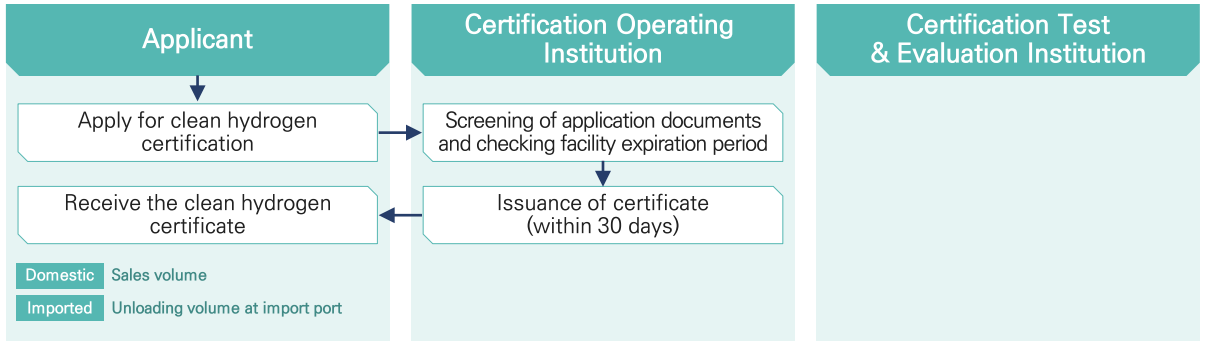
1 Facility Verification	Issuance 'Facility Verification Certificate' through on-site facility inspection
2 Certificate Issuance	Company holding a Facility Verification Certificate submits supporting documents(hydrogen volume), and a clean hydrogen certificate is issued
3 On-site Inspection	Review based on on-site data (operation data) for 6 months from initial issuance of the Facility Verification Certificate

* In the first certification stage, 'operation data' is limited, so screening is based on 'design data'

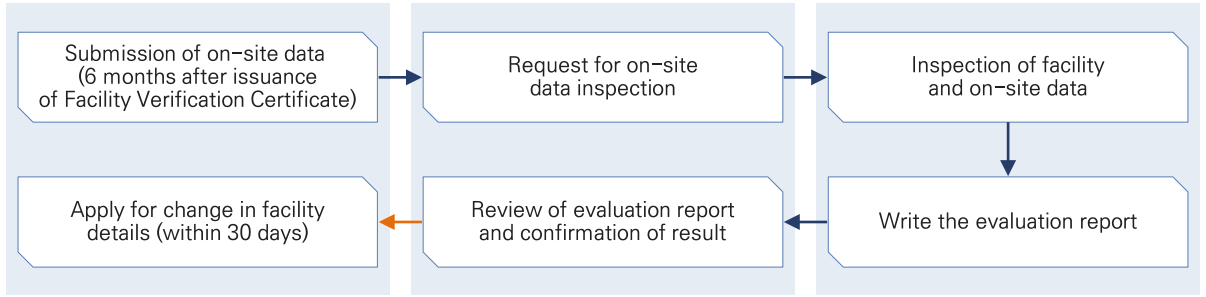
Facility Verification process



Certificate issuance process



First on-site inspection



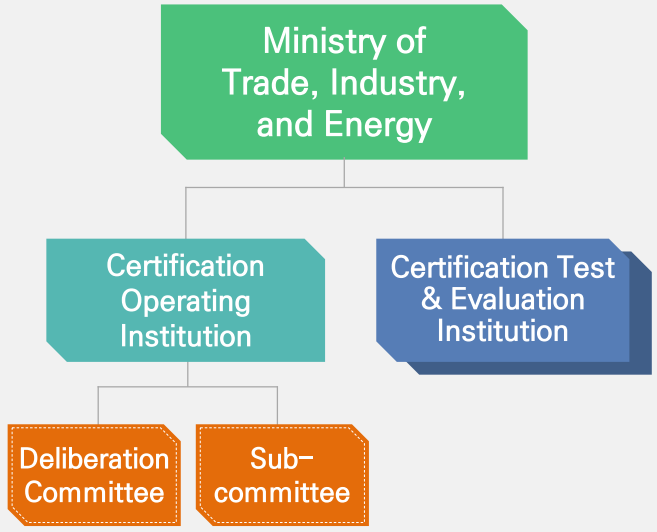
Certification Governance

Designating “Certification Operating Institution” and “Certification Test & Evaluation Institution” to secure expertise and efficiency

- **Certification Operating Institution** — Take responsibility of managing overall scheme and issuing certificates
- **Certification Test & Evaluation Institution(T&E)** — Verify compliance with the scheme

KEEI appointed as “Certification Operating Institution” and KTC & KTR appointed as “Certification Test & Evaluation Institution”

Certification Governance



Role of Certification Institution	
MOTIE	General Management of the Clean Hydrogen Certification System
Certification Operating Institution	▪ Certification Scheme Design ▪ Annual Certification Planning ▪ Issue Certificates ▪ LCA Platform management
Certification Test & Evaluation Institution	▪ Inspect on-site facilities to verify Compliance with certification standard ▪ Audit report
Certification Deliberation Committee	▪ Deliberation and resolution of the operation of the clean hydrogen certification system
Sub-committee	▪ Deliberation and mediation of the items to be presented to the Commission

IV

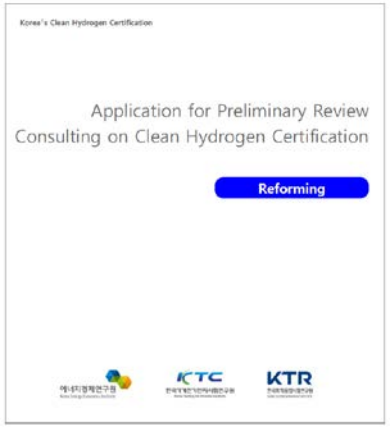
Preliminary Review Consulting on Clean Hydrogen Certification

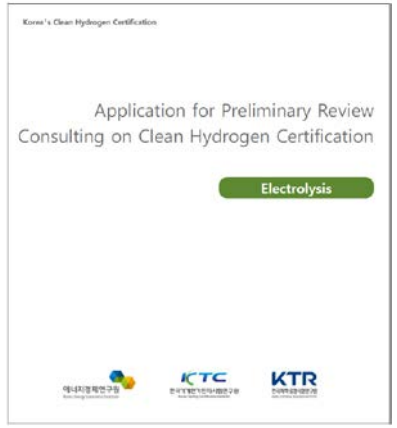
Preliminary Review Consulting

Definition : For the purpose of participating in CHPS, hydrogen production projects in the design stage are reviewed to determine whether they meet clean hydrogen standards through a LCA based on design data and operation plans

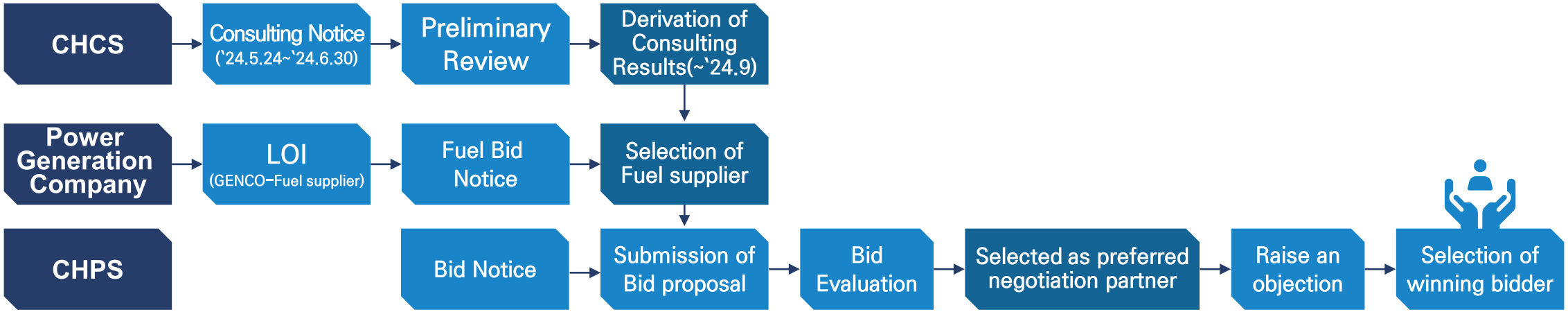
* First consulting was announced in March and is currently in progress / Second consulting notice was announced on May 17 and is currently being accepted.

Target	**Before facility operation** (design stage)
Consulting contents	Confirm whether clean hydrogen certification standards are met based on the design data and operation plan of the hydrogen production facility A monthly operation plan must be presented taking into account seasonal fluctuations and climate conditions in power generation demand
Outputs	Provide whether clean hydrogen certification standards are met based on the operation plan of hydrogen production facility Proposal for business direction through sensitivity analysis of key elements LCA consulting report on major scenarios





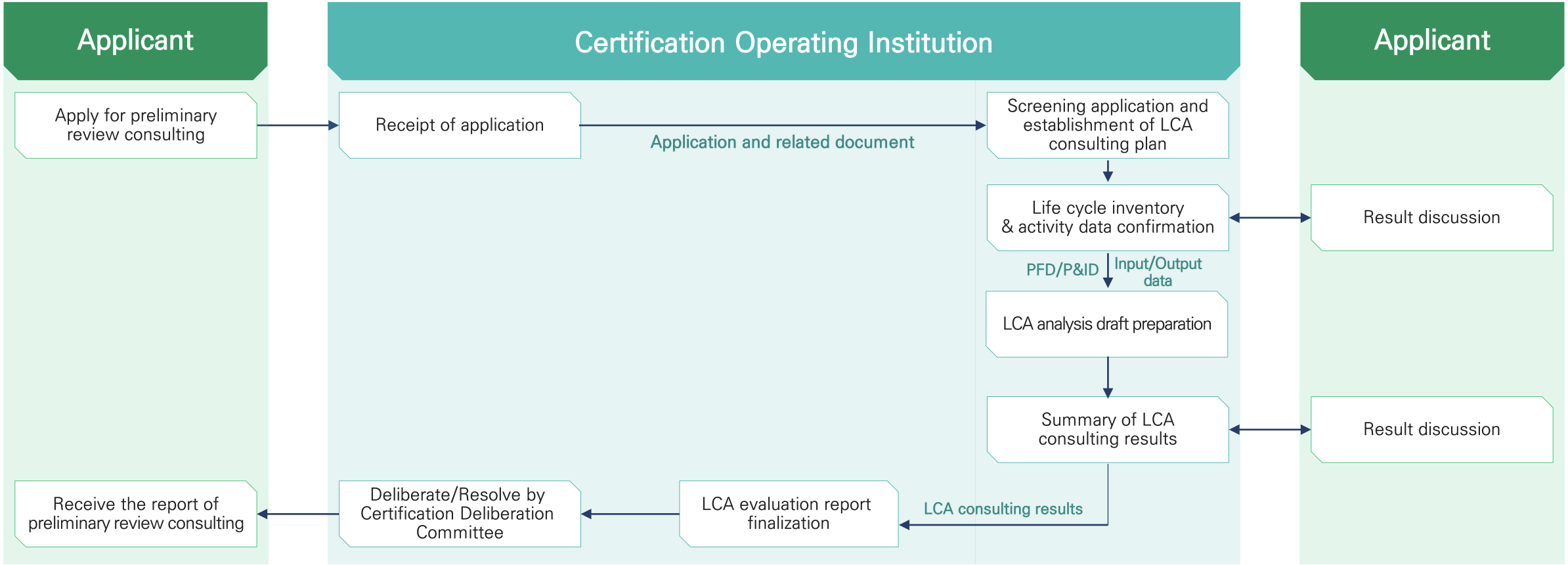
Use of Result : Clean hydrogen certification grade and emissions are derived to ensure consistency by considering areas beyond developer's control(e.g. electricity emission factor, etc.) and preparation level for each hydrogen project.



Consulting Process

Procedure

- **Applicant** — Apply for preliminary review consulting
- **Certification Operating Institution** — Life cycle assessment(LCA) and confirm the final certification result



Reference

Preliminary Review Consulting Disclaimer

The results of this clean hydrogen preliminary review consultation (hereinafter referred to as the "Preliminary Consultation") are based solely on the information provided by the applicant for the Preliminary Consultation (hereinafter referred to as the "Applicant") to the Certification Body up to the time of the application for the Preliminary Consultation (hereinafter referred to as the "Company Provided Information"), and are based on the assumption that the Company Provided Information is true and accurate. The results of the preliminary consultation are intended to be used as a reference for the project operator and related organizations during the [bidding process of the hydrogen power generation bidding market pursuant to Article 25.6 of the Act on the Promotion of Hydrogen Economy and Hydrogen Safety Management (hereinafter referred to as the "Hydrogen Act")] and shall not have any legal effect.

The Certification Body has not independently verified the accuracy, completeness or reliability of the information provided by the Company and does not provide any guarantees regarding the same. If there are any defects such as falsehoods, errors, mistakes, defects, etc. in the accuracy, completeness or reliability of the information provided by the Company, the conclusions of the preliminary consulting results may vary accordingly, and the Project Operator shall bear all responsibility for such defects. The results of this preliminary consulting shall be interpreted based on the situation at the time the project operator provided the corporate information to the certification body, and if there are any changes in relevant laws and regulations and corporate information in the future, a significant part of the results of this preliminary consulting may change accordingly.

In addition, the results of this preliminary consultation do not guarantee any results related to bidding in the hydrogen power generation bidding market pursuant to Article 25.6 of the Hydrogen Act or certification of clean hydrogen pursuant to Article 25.2 of the Hydrogen Act. If the Project Operator applies for certification of clean hydrogen pursuant to Article 25.2 of the Hydrogen Act (hereinafter referred to as "certification") in the future, the certification will be based solely on the laws, data and circumstances at the time the Project Operator applies for certification, and the results of the certification may differ from the results of this preliminary consultation.

Korea's Clean Hydrogen Certification Scheme

Thank you!