Request for Proposal (RFP)

Consultancy Services for

Hydrogen Supply Chain and Techno-Economic Study: Production, Distribution, and End-Use

Institute for Essential Services Reform

Tebet Timur Raya No.48B, Tebet

Jakarta Selatan

Indonesia

13 May 2025

Consultant for

Hydrogen Supply Chain and Techno-Economic Study: Production, Distribution, and End-Use

1. Background

Indonesia has an estimated 333 GW of renewable energy potential, offering significant opportunities not only for power generation but also for the production of green hydrogen. Green hydrogen is strategically important to support the decarbonization of hard-to-abate sectors, enhance national energy security, and facilitate renewable energy integration by serving as a flexible load and energy storage medium. Furthermore, it presents opportunities to expand access to clean energy in remote areas.

A critical factor in developing a hydrogen economy is the maturity of the hydrogen supply chain. Given its wide range of potential applications, it is essential to assess the current state and future prospects of Indonesia's hydrogen ecosystem. This includes identifying existing stakeholders, production technologies, and supply chain readiness.

While several studies have analyzed the techno-economics of hydrogen production, few have comprehensively addressed the full value chain, including distribution and storage, which significantly affect the cost-competitiveness of hydrogen products. With growing global momentum and increasing domestic initiatives through MoUs and collaborations, it is important to conduct a holistic techno-economic study covering the entire hydrogen supply chain.

To address this need, IESR invites qualified experts to support a supply chain and techno-economic analysis of hydrogen and its derivatives in Indonesia, providing actionable insights and recommendations to accelerate cost reduction and market competitiveness of green hydrogen.

2. Objectives

The consultant is expected to support the IESR team in developing the supply chain assessment and techno-economic model or levelized cost analysis for hydrogen and its derivatives. The consultant's responsibilities include, but are not limited to, the following:

1. Deliver an overview of the current hydrogen supply chain in Indonesia and analyze its future development prospects.
2. Present best practices and examples from other countries, highlighting their current conditions and approaches to developing hydrogen ecosystems.
3. Develop a techno-economic modeling framework adaptable to spatial and regional variations.
4. Provide updated technical and economic data to inform modeling assumptions.
5. Provide insights on hydrogen technologies' technical and economic comparison to other alternative fuels.

3. Project Scope

In this project, the consultant will undertake the following key tasks.

1. Assess and visualize the current hydrogen supply chain in Indonesia and its potential future development.
2. Identify existing manufacturers, buyers, and key stakeholders involved in hydrogen and its derivatives in Indonesia.
3. Review best practices and case studies from other countries on the development of their hydrogen supply chain, including but not limited to Southeast Asia, Asia, Europe, and Latin America.
4. Develop a techno-economic system modeling framework, including assessment process flow diagrams for each study object.
5. Define modeling parameters, key assumptions, and levelized cost formulas for hydrogen and its derivatives.
6. Collect the latest relevant technical and economic data and information needed, including the spatial variations (land costs and logistics).
7. Conduct techno-economic assessment for products of hydrogen and its derivatives in Indonesia.
8. Develop future cost projections based on learning curves, market scaling, and technological improvements.
9. Compare technical performance and cost of hydrogen-based products with alternative fuels (e.g., biofuels, natural gas, LNG, e-fuels).

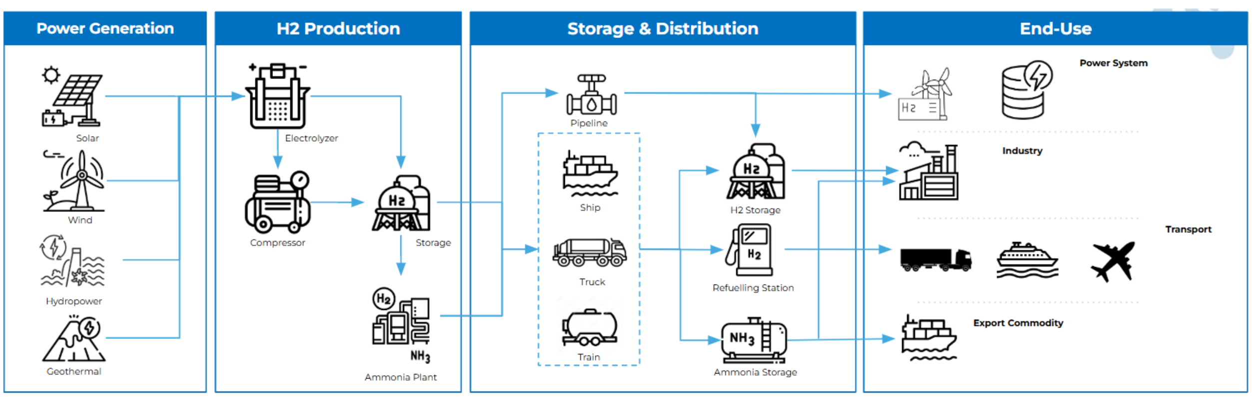

Figure 1. Hydrogen Value Chain in Indonesia

The spatial model for levelised cost assessment will be conducted for the potential products of hydrogen and its derivatives in Indonesia with details to the locational or regional influences. The LCO and spatial model will be covered in whole Indonesia positions to facilitate the market studies that IESR conducts. The value chain of hydrogen that is expected to be techno-economically studied is as Figure 1.

Products/objects of study:

- **Green Hydrogen:** The Levelized Cost of Hydrogen (LCOH) will be calculated based on production using various renewable energy sources: solar, wind, hydropower, and geothermal. The analysis must account for renewable energy capacity factors that vary by technology and location, allowing for spatial differentiation of LCOH values. Electrolyzer technologies to be considered include low-temperature electrolyzers (Alkaline and PEM) and high-temperature electrolyzers (Solid Oxide Electrolysis Cell/SOEC). Sensitivity analysis could include: electricity price, electrolyzer efficiency, capacity factor, scale of production, discount rate/WACC.
- **Hydrogen Storage:** The study will estimate the cost of hydrogen storage in USD/kgH_2, considering storage methods such as compressed gas, liquefied hydrogen, and potentially metal hydrides or underground storage. Factors such as storage duration, pressure requirements, and safety infrastructure should be considered in the cost structure.
- **Hydrogen transportation:** The study will evaluate multiple transportation modes for hydrogen in its various forms (molecular, liquefied, or converted), including: Pipeline transport for compressed hydrogen, road transport using trailers or tankers, shipping, especially for inter-island or export distribution, and hydrogen carriers, such as liquefied hydrogen, green ammonia, or liquid organic hydrogen carriers (LOHCs). Costs should be provided per kg of hydrogen transported and differentiated by distance, mode, and carrier type.
- **Green Ammonia:** The analysis will calculate the production cost of ammonia (USD/kg) derived from green hydrogen and nitrogen, assuming Haber-Bosch or alternative synthesis technologies. The study should include the cost of hydrogen input, synthesis process efficiency, and associated capital and operational expenditures.
- **Hydrogen as FCEV Fuel from Hydrogen Refueling Station (HRS):** Assess the cost structure of hydrogen as a fuel for Fuel Cell Electric Vehicles (FCEVs). Include CAPEX and OPEX of HRS, energy losses during compression or dispensing, and their impact on the final delivered hydrogen price (USD/kg).
- **Electricity from Hydrogen gas turbines:** Calculate the LCOE from power generation using: 100% hydrogen-fired gas turbines, ammonia combustion in steam turbines, and hydrogen or ammonia co-firing in existing fossil-based power plants. Include combustion efficiency, fuel transport costs, retrofitting requirements, and operational profiles.
- **Electricity from Power-to-Power System/Fuel Cell:** Estimate the LCOE for systems where renewable electricity is stored as hydrogen and reconverted into power via fuel cells or turbines, such as a renewable system from HDF.
- **Heat for Industrial use:** Evaluate the cost of producing heat from hydrogen combustion or direct use of hydrogen in industrial processes (e.g., kilns, furnaces, boilers). Consider temperature requirements, equipment modifications, and fuel delivery infrastructure.
- **E-Fuels:** Assess the techno-economics of converting green hydrogen into e-fuels via synthesis with captured CO_2 or other feedstocks. Include production pathways for E-Ethanol (C_2H_5OH), E-Methanol (CH_3OH), E-Diesel, E-Kerosene / SAF, E-Methane (CH_4), with costs expressed in USD per unit of fuel/product.

The consultant hired for this project will work collaboratively with the IESR Team. The consultant is expected to recommend suitable modeling software or tools. Sensitivity analyses on key parameters should be conducted. Deliverables must be provided in editable formats. The model result will be part of IESR's analysis and knowledge product.

4. Expected Outcomes

The study is expected to provide deliverables:

Supply Chain Assessment

1. A detailed visualization of Indonesia's current and future hydrogen supply chain, highlighting key components, actors, and infrastructure.
2. A comparative review of international best practices and case studies on hydrogen ecosystem development, providing insights and recommendations applicable to the Indonesian context.

Techno-Economic Datasets and Modeling Framework

3. Technical and economic datasets for hydrogen supply chain components, with spatial and non-spatial variations, suitable for GIS visualization.
4. A robust techno-economic modeling framework or levelized cost formula for hydrogen and its derivatives. This framework should be adaptable to spatial data inputs, allowing cost variations to be assessed across different geographic contexts.

Techno-Economic Analysis

5. Levelized cost calculations (LCOX) specific to the Indonesian context, covering both current (baseline) conditions and future projections. The analysis should include:
    a. Green Hydrogen (detailed on Section 3. Project Scope)
    b. Hydrogen Storage
    c. Green Ammonia
    d. Hydrogen Transportation
    e. Hydrogen as FCEV Fuel from Hydrogen Refueling Station (HRS)
    f. Electricity from Hydrogen/Ammonia combustion (gas or steam turbines)
    g. Electricity from Fuel Cell
    h. Heat for Industrial use
    i. E-Fuels (include the CO_2 processing cost):
        i. E-Ethanol (C_2H_5OH)
        ii. E-Methanol (CH_3OH)
        iii. E-Diesel
        iv. E-Kerosene / SAF
        v. E-Methane (CH_4)
6. Provide inputs for the comparison between hydrogen-based products and other alternative fuels. This includes comparing technical performance metrics and economic feasibility to support decision-making for energy and industrial applications.

Report

7. Written inputs for the full study report, which should include clearly visualized findings.

5. Required Skills and Experience

The qualifications of consultant are as follows:

1. Lead by at least a PhD degree in energy economics, business/market analysis, or other related field (Master's degree with extensive experience may also be considered).
2. A minimum of 5 years of experience for PhD (or 8 years for Master's degree) in related fields.
3. Demonstrated track record or previous studies on levelised cost and supply chain evaluations.
4. Excellent organizational skills, attention to detail, and time management.
5. Working proficiency in English and Bahasa Indonesia.

This opportunity is open to **independent consultants** (with a supporting team) and **consulting firms**.

6. Timeline

The project must commence in the **1st week of June 2025**, and the results of the project must be finalized no later than **1st week of September 2025** as presented below. Consultant could provide a suggested timeline in completing the project as long as it is still in the period mentioned.

- Outcome 1 & 2 (4th week of June 2025)
- Outcome 3 & 4 (3rd week of July 2025)
- Outcome 5 & 6 (2nd week of August 2025)
- Outcome 7 (1st week of September 2025)

Activity/Deliverables	Suggested Timeline	Payment
Kick off meeting of the project	**June 4, 2025**	
Outcome 1 & 2 Development	June 10-24, 2025	
Progress meeting 1	**June 25, 2025**	**40%**
Outcome 3 & 4 Development	June 26 – July 17, 2025	
Progress meeting 2	**July 18, 2025**	
Outcome 5 & 6 Development	July 21 - August 14, 2025	
Progress meeting 3	**August 15, 2025**	**40%**
Development of final report (Outcome 7)	August 18-28, 2025	
Finalization meeting of final report	**August 29, 2025**	
Final report and Handover	**September 4, 2025**	**20%***

**Final payment is subject to acceptance and approval of the final report.*

IESR team will be involved in supervision of the project and writing of the report, with some revisions and feedback given for the consultant to perform adjustments according to the contract

7. Proposal Guidelines

The potential service provider has to submit a proposal package, which consists of a technical proposal (background, task to be conducted, methodology, schedule), a cost proposal, relevant resume, and portfolios. The submitted proposals must be signed by said individual. Please itemize all costs and include a description of associated services. Contract terms and conditions will be negotiated upon selecting the winning bidder for this RFP.

If the individual submitting a proposal must outsource or contract any work to meet the requirements, this must be clearly stated in the proposal. Additionally, costs included in proposals must consist of any outsourced or contracted work. Any outsourcing or contracting organization must be named and described in the proposal.

All proposals must include proposed costs (in Indonesian Rupiah/IDR) to complete the tasks described in the project scope. Costs should be stated as one-time or non-recurring costs (NRC). A more detailed proposal cost is encouraged to ease the selection process. The budget ceiling for this proposal is **IDR 300,000,000** for all costs required during the study period (including tax).

All required documents are expected to be received to IESR before 17:00 p.m. Indonesian Western Standard Time (WIB, GMT+7) on **Thursday, May 22, 2025**. Any proposals received after this date and time will be regarded as inadmissible. The selection decision for the winning bidder will be made by the latest **Monday, June 2, 2025**.

Bidders must submit a digital copy of their proposal via email to Green Energy Transition Indonesia (GETI) Manager at erina@iesr.or.id, and cc to GETI Analyst at rheza@iesr.or.id, Project Officer at aulia@iesr.or.id, and IESR Senior Analyst at farid@iesr.or.id.

Please include **"RFP Response – Consultant for Supply Chain and Techno-Economic Analysis of Hydrogen and Its Derivatives"** in the subject line.

Contract negotiations with the winning bidder will commence immediately after selection.