

TC Document

I. Basic Information for TC

▪ Country/Region:	REGIONAL
▪ TC Name:	Support for Acceleration of Clean Ammonia Development in LAC
▪ TC Number:	RG-T4475
▪ Team Leader/Members:	Gischler Blanco, Christiaan (INE/ENE) Team Leader; Echevarria Barbero, Carlos Jose (INE/ENE) Alternate Team Leader; Escobar Rangel, Lina Patricia (INE/ENE) Alternate Team Leader; Planas Marti, Maria Alexandra (INE/ENE) Alternate Team Leader; Nakagawa, Yumi (INE/ENE); Jimenez Mosquera, Javier I. (LEG/SGO); Martha Carvalho (INE/ENE); Juan Tulande Lopez (INE/ENE); Matilde Urquizo (INE/ENE);
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	N/A
▪ Date of TC Abstract authorization:	24 Apr 2024.
▪ Beneficiary:	Ministry of Mines and Energy in Colombia, PETROBRAS in Brazil, and Ministry of Energy (MINERGIA) in Chile
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	Japan Special Fund(JSF)
▪ IDB Funding Requested:	US\$800,000.00
▪ Local counterpart funding, if any:	US\$0
▪ Disbursement period (which includes Execution period):	36 months
▪ Required start date:	02 Sept 2024
▪ Types of consultants:	Firms
▪ Prepared by Unit:	INE/ENE-Energy
▪ Unit of Disbursement Responsibility:	INE/ENE-Energy
▪ TC included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	N/A
▪ Alignment to the Institutional Strategy IDBImpact+:	Social inclusion and equality; Productivity and innovation; Economic integration; Institutional capacity and rule of law; LGBTQ+; Indigenous People; Environmental sustainability; Gender equality; Diversity

II. Objectives and Justification of the TC

- 2.1 The objective of this TC is to support the policy formulations for accelerating clean ammonia development in Latin American and the Caribbean (LAC) by conducting studies on (i) challenges, opportunities, and benefits of producing, consuming and exporting clean ammonia for decarbonization of heavy industries, heavy transportation, and power generation sectors in selected countries, and strategies for its development; and (ii) gap analysis of regulatory, financial, technical, and environmental and social aspects, including safety measures. The TC will also aim to obtain and use existing knowledge and experience in public policy strategies, regulation, subsidies and incentives, and public-private partnerships of other countries. The countries of focus are Colombia, Brazil and Chile, considering their readiness of key enabling factors, including availability of clean energy resources and policy frameworks related to green hydrogen (a key precursor for green ammonia).
- 2.2 To limit global warming to 2°C, countries must prioritize the implementation of their National Determined Contributions (NDC)s through decarbonization policies towards

net-zero emissions. This involves, among other actions, leveraging Clean and Low-Carbon Hydrogen (CLCH). Notably, sectors like industry and transport, which account for nearly half of greenhouse gas (GHG) emissions, require significant interventions, and the LAC region is beginning to explore and slowly expand CLCH production, both for local use and export, with the Inter-American Development Bank (IDB) supporting 11 out of 12 countries in developing national hydrogen road maps and strategies, that include potential supply and demand. Infrastructure requirements, including transmission lines, pipelines, storage, ports, and logistics that are crucial for improving efficiency and competitiveness in CLCH development. IDB has identified 11 potential hubs based on renewable energy potential, existing projects, potential demand from hard-to-abate sectors and port infrastructure, with Colombia, Brazil, and Chile standing out as promising players in the CLCH development landscape.

- 2.3 At the same time, ammonia (NH_3) is gaining global attention for its role in decarbonization due to its widespread production and consumption, primarily as a fertilizer (80%) and various industrial uses. It is also considered an effective hydrogen (H_2) carrier, facilitating easier transport by converting H_2 into NH_3 , by combining nitrogen (N_2) from the air, through a process called Haber-Bosch. This process can be reverted to H_2 at destination, giving plenty of flexibility to end consumers of ammonia. With well-established production, transportation, and storage technologies, the use of NH_3 in a low carbon economy is promising as it does not emit CO_2 when burned, making it a potential zero-emission fuel for power generation, industrial furnaces, and heavy transport. According to IEA¹, demand for NH_3 is forecasted to grow from 190 million tons (2021) to almost 450 million tons (2035). In 2035, it is expected that 35% of NH_3 will be used as fuel for electricity generation, 20% for shipping and the remaining 45% is for chemicals, including fertilizers.
- 2.4 The Government of Japan (GOJ) formulated the world's first basic hydrogen strategy in 2017, positioning ammonia as a hydrogen carrier. In March 2020, Japan expanded ammonia's use for decarbonizing power generation, heavy industry, and transportation in its "New International Resource Strategy." The strategy also states that Japan will proactively import NH_3 along with other energy resources. NH_3 is also stipulated as one of 14 critical areas in the "2050 Green Growth Strategy for Carbon Neutrality of the GOJ." Moreover, the "Public-Private Council for the Introduction of Fuel Ammonia" was established in Japan where governmental institutions and private companies (both users and suppliers) participate. There have been a variety of active discussions and initiatives on public policies, regulations, subsidies and incentives, and the development of value chains, markets, and related technologies such as synthesis, fuel/raw material utilization, large-scale storage facility, suppression of nitrogen oxide (NO_x) emissions, and specific safety measures. If developed countries accelerate NH_3 use for decarbonization, LAC could adopt these strategies and benefit from exporting NH_3 to contribute to meeting the expected growing international demand and decarbonize LAC's hard-to-abate sectors.
- 2.5 As mentioned, supported by the IDB, LAC's CLCH projects and roadmaps, particularly in Colombia, Brazil, and Chile, highlights ammonia's potential, thus, it is of great significance to seek investment opportunities, starting with development of strategies and feasibility studies. During its process, the knowledge and lessons learned from other countries like Japan will be important.

¹ [Towards hydrogen definitions based on their emissions intensity.](#)

- 2.6 Colombia established an ambitious NDC with the objective of reducing GHG emissions by 51% in 2030 and aims to achieve carbon neutrality by 2050. The “National Development Plan 2022-2026: Colombia World Power of Life ” declares two related government commitments: (i) to accelerate the energy transition and decarbonization of the economy by promoting power generation from nonconventional renewable sources and the development of new energy sources like CLCH; and (ii) to decarbonize public transport systems and enhance the national industry for the technological rise in the transport sector, with different focus on low-carbon and zero emissions mobility, prioritizing electric and H₂ technologies. In this context, IDB financed the country to establish its Hydrogen Roadmap where stipulates a regulatory and planning framework for the development of CLCH projects. As for NH₃, local initiatives to produce clean ammonia are just starting to make progress, nevertheless, positioning the country as both a potential exporter and consumer in this evolving industry will require comprehensive studies and action plan for further development of the market. The Ministry of Mines and Energy in Colombia requested for the Bank’s support in this regard.
- 2.7 Regarding Brazil, its NDC has set forth the ambitious targets of reducing the nation’s emissions to 37% below 2005 levels by 2025 and 50% by 2030. To achieve this goal, one of the recent government actions is to develop the CLCH production chain. In 2020, the National Energy Plan 2050 identified CLCH as a disruptive technology and a significant element within the context of decarbonizing the energy matrix. Supported by IDB, its National Hydrogen Plan includes establishing low-carbon H₂ pilot plants across the country by 2025, positioning Brazil as the world’s leading low-carbon H₂ producer by 2030 and establishing low-carbon H₂ hubs across the nation by 2035. Therefore, it implies a great potential for development of clean NH₃ market as mentioned above. Besides, Brazil is a net importer fertilizer, which is something that the country wants to revert and become a net exporter of clean fertilizers in 2050. PETROBRAS in Brazil requested for the Bank’s support in this regard.
- 2.8 Chile’s NDC mitigation goals for 2030 are a milestone towards the country’s long-term goal of achieving carbon neutrality by 2050. To achieve Chile NDC’s goal, CLCH emerges as a potential solution, targeting sectors such as fertilizers, chemicals, steel, mining, and transportation. Chile’s recent Green Hydrogen Action Plan 2023-2030 outlines 81 action items to promote clean hydrogen production and its derivatives. Key measures include an Emission Trading System, tax incentives, streamlined permitting, a US\$1 billion financial facility and international certification. Furthermore, with the rise of CLCH projects, there’s growing interest in clean NH₃. As a derivative of CLCH, clean NH₃ can serve as an efficient energy carrier and has potential applications in sectors like agriculture, mining and shipping. This diversification into clean NH₃ could further strengthen Chile’s position in the global renewable energy leader. The Ministry of Energy in Chile (MINERGIA) requested for the Bank’s support in this regard.
- 2.9 The TC is consistent with IDB Group Institutional Strategy (IDBImpact+): Transforming for Scale and Impact (CA-631) and is aligned with the objective(s) of: (i) reduce poverty and inequality; and/or (ii) address climate change; and (iii) bolster sustainable regional growth by: contributing to a comprehensive NH₃ strategy in three pioneer countries and gap analysis to promote the clean ammonia development. The TC is also aligned with the operational focus area(s) of: (i) biodiversity, natural capital and climate action; and/or (ii) gender equality and inclusion of diverse population groups, particularly through training and knowledge dissemination in events; (iii) institutional capacity, rule

of law, and citizen security; (iv) social protection and human capital development; (v) productive development and innovation through the private sector; (vi) sustainable, resilient, and inclusive infrastructure; and (vii) regional integration, through regional certification schemes such as the Clean Hydrogen and derivatives (such as clean ammonia) Certification scheme for LAC, better known as CertHiLAC, implemented by the IDB.

- 2.10 The TC is also aligned with: (i) the IDB Country Strategy for Colombia 2019-2022 (GN-2972, extended until August 2024), as it will contribute to the objectives of (a) increasing economic productivity, and (b) climate change through cost reduction, competitiveness improvement of energy transition projects; (ii) the IDB Country Strategy for Brazil 2019-2022 (GN-2973), as it will contribute to the objective of improving the business climate and narrow gaps in sustainable infrastructure to enhance competitiveness, promoting better quality infrastructure, increasing share of renewables in the energy matrix, and enhanced energy efficiency; and (iii) the IDB Country Strategy with Chile 2022-2026 (GN-3140), as it will contribute to boost the economy's environmental and social sustainability by promoting the development of productive sectors that are more resilient to the impacts of climate change and contributing to the decarbonization of the economy.
- 2.11 The TC is consistent with the Energy Sector Framework Document (GN-2830-8), specifically with the priority areas of: (i) promotion of energy efficiency, renewable energy (RE), and cleaner fuels for sustainable energy through promoting the adoption of new technologies and concepts; and with the Climate Change Sector Framework Document. (GN-2835-13), specifically with the goal of innovation for climate -resilient and low-carbon development for the promotion of technologies and new business models to advance RE integration. It is also aligned with the G20 Principles for Quality Infrastructure Investment as it will promote: (i) positive impact to achieve sustainable growth and development, (ii) economic efficiency in view of life-cycle cost; and (iii) environmental considerations.
- 2.12 Finally, since the clean hydrogen industry in LAC is still in its early stages, data on gender and diversity representation within the sector is limited. Traditional gender roles, lack of representation and educational disparities, which are prevalent in the energy industry, should be analyzed and addressed as part of the actions involved in this TC. Supporting the industry at this early stage presents an opportunity to develop a diverse and inclusive sector.

III. Description of activities/components and budget

- 3.1 **Component I. Studies to promote and accelerate investments in clean ammonia development (US\$650,000).** This component supports policy formulation through conducting studies on (i) challenges, opportunities, and benefits of producing, consuming as a decarbonization vector for local hard-to-abate sectors, and exporting clean ammonia for decarbonization of heavy industries, heavy transportation, and power generation sectors in Colombia, Brazil, and Chile, and strategies for its development; and (ii) gap analysis of regulatory, financial, technical, and environmental and social aspects, including safety measures. The study also includes the collection of baseline data and recommendations to address gender disparities and promote inclusive practices in the clean ammonia sector.
- 3.2 **Component II. Capacity building and knowledge sharing (US\$150,000).** As part of the process to develop strategies and assess feasibility, this component supports capacity building and knowledge sharing activities for key stakeholders. It will include:

(i) disseminating workshops to raise awareness and exchange opinions among government entities and private stakeholders; and (ii) knowledge exchange event with the government of Japan and related entities to learn their lessons learned and experience such as: (a) effective clean ammonia policy measures; (b) the latest clean ammonia technologies for power generation, industrial use, and transport use; (c) case studies of projects and/or policies carried out by the government or the private sector in Japan, including their safety measures; and (d) create regulations and norms for designing and developing the fuel ammonia market. These events will be organized seizing the opportunity of related regional/global events such as H₂LAC. When organizing these events, gender equality and diversity of the participants will be considered. Additionally, technical notes will be developed to publish and share the insights gained from the TC activities.

- 3.3 **Indicative budget.** The total cost of this TC is US\$ 800,000 and will be funded by the Japan Enhanced Initiative for Quality Infrastructure, Resilience against Disaster and Health (JEI).

Table 1. Indicative Budget

Activity/Component	Description	JSF-JEI* US\$	Total Funding US\$
Component I	Studies for promoting and accelerating clean ammonia development	650,000	650,000
Component II	Capacity building and knowledge sharing	150,000	150,000
Total		800,000	800,000

**This TC will be funded by the Japan Enhanced Initiative for Quality Infrastructure, Resilience against Disaster and Health (JEI)*

IV. Executing agency and execution structure

- 4.1 At the request of the beneficiary countries the Bank through its Energy Division (INE/ENE) will execute this TC considering that, in accordance with the guidelines established in the Operational Guidelines for Technical Cooperation Products (GN-2629-1), this is a regional TC and there is an absence of a regional entity for its execution. The Bank will carry out the contracting of consultants' vis a vis the sustainability of the implementation of the project, will provide its experience and enable a successful implementation of the TC through the close relationship with the authorities of the countries.
- 4.2 The INE/ENE will be responsible for its execution, in coordination with the Climate Change and Sustainable Development Division (CSD/CCS) and the IDB Country Office in: Colombia (CSC/CCO), Brazil (CSC/CBR), and Chile (CSC/CCH). The Bank will contract individual consultants, consulting firms, and non-consulting services in accordance with the Bank's current procurement policies and procedures: (i) the individual consultants will be hired in accordance with the guidelines set out in the AM-650; (ii) contracting of services provided by consulting firms following the Institutional Procurement Policy (GN-2303-33 and its Guidelines)

- 4.3 In compliance with the Operational Guidelines for Technical Cooperation Products (GN-2629-1), this TC is classified as Client Support. The technical responsibility is in INE/ENE.
- 4.4 The focal point designated and sector specialist responsible for executing and supervising this TC will be the Lead Energy Specialist based in INE/ENE Team, with the support of the Bank Country Office in Colombia (CSC/CCO), Brazil (CSC/CBR), and Chile (CSC/CCH).

V. Major issues

- 5.1 No significant risks are expected during the execution of the TC, for the following reasons: (i) the team has already developed over fifteen clean hydrogen roadmaps and its derivatives, including ammonia, strategies and regulatory frameworks; which will facilitate the understanding of the regulatory framework; (ii) the team has established a Master Service Agreement with nine specialized firms covering the entire value chain of clean hydrogen and its derivatives, including ammonia, which will facilitate the procurement; and (iii) thanks to the dialogue for the Certification Scheme for the clean hydrogen and its derivatives including ammonia, CertHiLAC, communication with the countries is very fluid. However, because this is a new technology, there may be unforeseen necessities that arise during the execution of the program, which are not accounted for in the current procurement plan. These could lead to adjustments in the TORs or the execution timeline.

VI. Exceptions to Bank policy

- 6.1 No exceptions to the Bank's policies are requested.

VII. Environmental and Social Aspects

- 7.1 This TC will not finance feasibility or pre-feasibility studies of investment projects associated with environmental and social studies; therefore, it falls outside the scope of the Bank's Environmental and Social Policy Framework (ESPF).

Required Annexes:

[Request from the Client_52181.pdf](#)

[Results Matrix_79705.pdf](#)

[Terms of Reference_96642.pdf](#)

[Procurement Plan_92322.pdf](#)