

TC Document

I. Basic Information for TC

▪ Country/Region:	COLOMBIA
▪ TC Name:	Renewable Energy Integration - support to green hydrogen projects
▪ TC Number:	CO-T1731
▪ Team Leader/Members:	Planas Marti, Maria Alexandra (INE/ENE) Team Leader; Sandoval, Jose Manuel (CSD/CCS) Alternate Team Leader; Alvaro Mejia (INE/ENE); Catacoli Jimenez, Ruth (VPS/ESG); Hoffman, Nathalie Alexandra (SEC/TRD); Juan Tulande Lopez (INE/ENE); Juarez Olvera, Mariel (CSD/CCS); Liliana Chacon (CAN/CCO); Oscar Paramo (INE/ENE); Vila Saint Etienne, Sara (LEG/SGO) Oscar Páramo (INE/ENE); Alvaro Mejia (INE/ENE); Hoffman, Nathalie Alexandra (SEC/TRD); Juan Tulande Lopez (INE/ENE); Liliana Chacon (CAN/CCO); Alejandra Catacolí (VPS/ESG)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	N/A
▪ Date of TC Abstract authorization:	N/A
▪ Beneficiary:	Ministry of Energy and Mines through FENOGE
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	Strategic Climate Fund(SCX)
▪ IDB Funding Requested:	US\$2,000,000.00
▪ Local counterpart funding, if any:	US\$0
▪ Disbursement period (which includes Execution period):	24 months
▪ Required start date:	January 24
▪ Types of consultants:	Firm and Individual Consultants
▪ Prepared by Unit:	INE/ENE-Energy
▪ Unit of Disbursement Responsibility:	CAN/CCO-Country Office Colombia
▪ TC included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	No
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Gender equality; Productivity and innovation

II. Objectives and Justification of the TC

- II.1 The objective of this Technical Cooperation¹ (TC) is to provide technical assistance to accelerate the country's clean and inclusive energy transition, by supporting the development of green hydrogen projects that will contribute to the decarbonization of difficult-to-electrify sectors².
- II.2 This TC will have two specific objectives: the first one, Support the development of at least five pre-feasibility/feasibility studies for green hydrogen pilot projects and its value chain. The second specific objective is to build technical capabilities in the private, financial, and public sectors around the renewable energy and green hydrogen industry through the support of pilot projects and knowledge dissemination activities.

¹ The no-objection letter is being processed and is expected to arrive soon. Without this letter the cooperation cannot be carried out.

² [Hoja de Ruta del Hidrógeno en Colombia](#).

- II.3 As result of the Paris Agreement (COP 21), Colombia was committed to reduce its greenhouse gas emissions by 51% in 2030, compared to the business-as-usual case, and its carbon neutrality by 2050. These goals are confirmed by the country's current government, through its "National Development Plan 2022 – 2026: Colombia World Power of Life" (in its Spanish short, PND 2022 – 2026), which declares its purpose to accelerate the energy transition and decarbonization of the economy by promoting the power generation from non-conventional renewable sources (such as wind, solar, geothermal), the development of new energy sources like the green hydrogen and energy efficiency measures, among others³.
- II.4 The PND 2022 – 2026 states that Colombia will take steps to advance in the production of green hydrogen and other key synthetic fuels for the decarbonization of sectors where electrification is difficult to achieve and for non-energy uses such as the production of fertilizers. All of that, building on the policy efforts from recent years by the Ministry of Mines and Energy – MME, such as the Law 2099 of 2021⁴, MME's Decree 1476 of 2022⁵ and the Hydrogen Roadmap, as an effort to diversify the energy matrix and decarbonize of difficult-to-electrify sectors. It is estimated that the implementation of this roadmap would help to mobilize investments between \$2,500 and \$5,500 million dollars between 2020 and 2030, to create between 7 to 15 thousand direct and indirect jobs along the value chain, and to avoid between 2.5 and 3 MTons of GHG in the same period.
- II.5 The Colombia's Hydrogen Roadmap highlights that the country is well positioned to take advantage of its important renewable energy resources, particularly its wind and solar potential, to produce green hydrogen. However, this is a commercially young technology around the world and incipient in Colombia. For this reason, there is a need to create a critical mass of local projects validating the concept of decarbonization through GH₂ production and use, focusing on actions to incentivize and mitigate the risk of the first participants. In this way, one of the proposed actions is to support the development of feasibility studies for pilot projects, that if proven to be technically and financially feasible, would help the government, financial sector, and private investors to build capacities and be confident in the development of GH₂ assets at scale. The other benefit of feasibility studies is to make pilot projects ready to be presented and considered for concessional financing, helping them to close the competitiveness gap against the cost of conventional hydrogen projects while the technology advances reducing the cost of producing green hydrogen.
- II.6 On February 2nd the governing board of the Strategic Climate Fund (SCX) endorsed Colombia's Renewable Energy Integration (REI) Investment Plan, to help enable the penetration of renewable energy sources into its generation matrix. Under this investment plan, Colombia can access US\$70 million of concessional funds, including a US\$2 million grant for providing technical assistance to the Colombian government through the Non-Conventional Energies and Energy Efficiency Fund (known in Spanish as FENOGE), as the entity called in Colombia to promote the NCER, to support the implementation of Colombia's Hydrogen Roadmap, by promoting technical knowledge and supporting the preparation of pre-feasibility and feasibility studies of promising green hydrogen projects, resources that will be executed with this technical cooperation.

³ [Plan Nacional de Desarrollo 2022 – 2026](#). Colombia Potencia Mundial de la Vida, Chapter 4.C. [Law 2099 of 2021](#) which included the concepts of Green Hydrogen and Blue Hydrogen into the current legal framework for Non-conventional Sources of Energy. [Decree 1476 of 2022](#) which adopts some legal dispositions to promote the innovation and research related to the Hydrogen and its technologies of production, storage, distribution, and different uses.

- II.7 In terms of gender equality, unemployment rate has been higher for women than for men and the covid-19 pandemic widened these gaps. At the end of 2020, unemployment rate reached 18.7% for women and 10.2% for men. A major contributing factor for women's low participation in the labor market is the disproportionate responsibility they have for household tasks and care work. When women do participate in the workforce, their jobs tend to be of low quality and poorly paid. Female labor force participation in the mining, electricity, and oil and gas industries is much lower than in the case of men. A recent study (BID, 2021) shows that 73% of people employed in these sectors are men and only 27% are women. Additionally, women participation is lower in managerial positions (20.2%) than administrative and operational levels (41%). Unconscious and institutional biases exist in Colombia, especially in male dominated sectors, which affect women in accessing to leadership positions and sustain their work confidence and effectiveness.
- II.8 In this context, this technical cooperation seeks to support pre-investment studies (pre-feasibility or feasibility) of Green Hydrogen– pilot projects related to production, storage, conditioning, distribution, innovation, research and/or industrial uses, which will contribute to the decarbonization of difficult-to-electrify sectors. Through the knowledge built from these studies, the bank expects to create technical capacity building in the government, the local industry, the financial sector and to build public confidence in Green Hydrogen projects to increase future market demand for this product and its derivatives. This TC will also support knowledge sharing and dissemination activities that will include a gender perspective and build capacities to promote gender equality.
- II.9 **Strategic Alignment.** This TC is consistent with the Bank's Institutional Strategy 2020–2023 (AB3190-2) and is aligned with the development challenge of Productivity and Innovation, as it will support pre-investment studies of pilot projects for the development of the green hydrogen industry in the country, and the cross-cutting theme of: (i) climate change and environmental sustainability, by the promotion of NCRE in the Colombian electricity matrix aimed to reduce GHG emissions; and (ii) Institutional capacity and rule of law, by providing technical support through the development of studies that will help understand the technical, political, environmental and financial requirements for the development of hydrogen projects. This TC is also aligned with the cross-cutting theme of Climate Change and Environmental Sustainability, as well as with the document Proposal for the establishment of the Strategic Climate Fund in the Inter-American Development Bank (GN-2604-3).
- II.10 It will be funded by resources from the Renewables Integration Program of the Climate Investment Funds and will help to promote the development of new installed capacity of NCRE in the Colombian electricity matrix, contributing to the reduction of GHG emissions.
- II.11 The TC is also aligned with the development challenge of Gender equality because includes three activities that will promote gender equality. The first one is the implementation of a training program that will enforce women participation to develop capacities and knowledge on the economic, financial, technical, regulatory elements of projects across the green hydrogen value chain. This training program will also incorporate a module about the promotion of gender and diversity equality in the energy sector. The second activity will implement a dissemination strategy about green hydrogen and the relevance of integrating gender and diversity aspects in clean energy projects. And the third one is focused on strengthening the current Fenoge's gender and diversity policy.

- II.12 The TC is also consistent with (i) the Energy Sector Framework document (GN28308) and the Climate Change Sector Framework (GN-2835-8) on sustainability and renewable energies. The TC is in line with the IDB Group Country Strategy with Colombia 2019- 2022 (GN-2972) in the strategic area such as: (i) increasing economic productivity; and (ii) climate change through cost reduction, competitiveness improvement of energy transition project.
- II.13 Finally, this TC is also aligned with the IDB Group Corporate Results Framework, 2020-2023 (GN-2727-12), because its content contributes to avoiding CO₂ emissions, increase the country's resilience to the effects of climate change, and promoting the integration of new installed capacity of electricity generation from renewable sources.

III. Description of activities/components and budget

- 3.1 **Component I. Pre-feasibility and feasibility studies for green hydrogen projects (US\$1.800.000).** This component will co-finance at least five pre-feasibility and/or feasibility studies for prioritized green hydrogen projects related to the production, storage, distribution, heavy industry, heavy transport, and/or other difficult-to-decarbonize sectors.
- 3.2 The studies could include the technical, environmental, economic, financial, and legal aspects that are required to determine the pre-feasibility and/or feasibility of green hydrogen production pilot projects and/or its potential uses, in the following sub-sectors:
- freight or mass public transportation systems,
 - production of green hydrogen derivatives such as green ammonia, urea, and fertilizers, in rural areas for communities
 - production of green hydrogen from sanitary filling gas to decarbonize garbage collection trucks,
 - industrial uses of GH₂ and other uses.
 - green hydrogen certification for local and regional requirements
 - Environmental and social studies, including strategic environmental and social assessments (SESAs) regarding the IDB's Environmental and Social Policy Framework, which includes an assessment of gender and diversity gaps, job opportunities and training needs.
- 3.3 Finally, this component will also co-finance two conceptual analyses on the production and use of GH₂. The first one, on the potential production of green hydrogen using the geothermal energy resources available in the country, which are another source of renewable energy; and the second one, on the potential for the producing Sustainable Aviation Fuels (SAF) from biomass and green hydrogen.
- 3.1. **Component II. Capacity building and knowledge dissemination (US\$200.000).** This component aims to provide technical assistance to enable effective knowledge sharing activities related to clean energy and green hydrogen, including: (i) training of government officials/advisors; (ii) knowledge sharing of case studies/projects and/or policies carried out by the government, the private sector, or international institutes; (iii) workshops to analyze and discuss potential production technologies and uses of green hydrogen; (iv) dissemination of study results.
- 3.2. In the development of training activities is important to secure an increased number of people (at least 50% of participants should be women and/or people with disabilities)

trained on clean energy, hydrogen production and conversion, hydrogen technologies, storage, sustainability, and financial market opportunities. These h training activities will also include a module about the inclusion of the gender and diversity approach in energy projects and workplaces.

- 3.3. Invitations will be sent by email to leaders from financial institutions, the private sector and government entities related to the hydrogen value chain, for them to select members of their teams who they consider key to strengthening their capabilities around renewable energies and hydrogen. In addition, they will be asked to prioritize the participation of women.
- 3.4. To promote gender and diversity inclusion and effective participation, the training methodology and logistics will consider elements like flexible schedules and hybrid options (in-person and virtual).
- 3.5. This component will also hire consultancy services to help Fenoge to strengthen its gender and diversity inclusion institutional policy by incorporating specific measures such as preventing sexual and workplace harassment, providing inclusive workspaces, closing recruitment gaps, promoting mentorship opportunities, and encouraging women's active involvement in decision-making processes, among others. A dissemination strategy about green hydrogen and the relevance of integrating gender and diversity (including people with disabilities, afro descendants, indigenous people and LGBTQ+) aspects in clean energy projects will also be developed. The effectiveness of the dissemination strategy in integrating gender and diversity aspects when submitting proposals to FENOGE will be monitored periodically.
- 3.6. Finally, this component will also finance individual consultants to provide technical support to FENOGE. The consultants will support the contracting activities and quality supervision of the studies, training programs and knowledge dissemination strategies that are part of this technical cooperation. It is anticipated that one specialist in renewable energy and hydrogen and one specialist in project management will be financed through this component.

3.7. **Expected Results**

The expected results from this technical cooperation are: (i) five pre-feasibility and/or feasibility studies for five green hydrogen pilot projects ; (ii) two conceptual analysis related with the production and use of green hydrogen; (iii) 60 people (at least 30 should be women and/or people with disabilities) trained on clean energy, hydrogen production and conversion, storage, sustainability, and financial market opportunities; (iii) one gender and diversity institutional policy strengthened; (iv) one dissemination strategy about green hydrogen and the relevance of integrating gender and diversity aspects when submitting proposals to FENOGE; (v) increased capacity in financial, governmental and private sector actors about the technical, social, environmental and economic feasibility of green hydrogen projects as an effective mean to tackle the goals GHG emissions and promote sustainable energy, particularly among difficult-to-electrify sectors.

IV. **Budget**

- 3.8. The total cost of this TC will be **US\$2,000,000**, financed with resources from the Renewables Energy Integration program from the SCX, under the Investment Plan

approved for Colombia⁶ in February 2023 by the Global Climate Action Program (GCAP) Committee. No financial local counterpart is foreseen.

Indicative Budget		
Component	Description	SCX - REI
Component I	Pre-feasibility and/or feasibility studies to support Green Hydrogen production and/or use pilot projects	US\$1,600,000
	Conceptual analysis of Green Hydrogen production using Geothermal Energy	US\$100,000
	Conceptual analysis on the potential to produce Sustainable Aviation Fuels (SAF) from biomass and Green Hydrogen	US\$100,000
Component II	Training sessions on technical and leadership aspects of clean energy, green hydrogen and gender and diversity inclusion	US\$50,000
	Dissemination strategy about green hydrogen and the relevance of integrating gender and diversity aspects when submitting proposals to FENOGE	US\$30,000
	Strengthening FENOGE's gender and diversity institutional policy	US\$20,000
	Technical Support	US\$100,000
Total		US\$2,000,000

V. Executing agency and execution structure

- 4.1. The TC will be executed by the IDB, by request of the Ministry of Energy and Mines, implemented by the Energy Division (INE/ENE) of the IDB to facilitate the coordination of the multiple private and public sector actors that will be involved in its implementation of and to benefit from the expertise of the Bank in the execution of H₂V studies and projects. The Bank will be responsible for hiring the consulting firms and individual consultants that will perform the consulting services described in each of the components, following the guidelines set out in Appendix II (Procurement Criteria by the Bank) of the Operational Guidelines for TC Products (OP-619-4).
- 4.2. All activities to be executed under this TC have been included in the Procurement Plan (see Annex IV) and will be contracted in accordance with Bank policies as follows: (a) AM-650 for Individual consultants; (b) GN-2765-4 and Guidelines OP-1155-4 for Consulting Firms for services of an intellectual nature; and (c) GN-2303-28 for logistics and other related services.

⁶ [The governing board of the Climate Investment Funds \(CIF\)](#) endorsed a wide-ranging investment plan of US\$70 million to fast-track the transformation of Colombia's energy system and help enable its grid system to absorb and channel more clean power. The Investment Plan includes US\$2 million to finance feasibility studies for prospective green hydrogen projects.

- 4.3. The Energy Division (INE/ENE) and the Bank's Representation in Colombia (COF/CCO) will maintain constant dialogue with all relevant actors for the execution of this TC including the Ministry of Energy and Mines and FEBOGE. To guarantee a constant and effective dialogue, both the Energy Division (INE/ENE) and the Bank's Representation in Colombia (COF/CCO) will establish a working group with representatives of the relevant public entities to coordinate the execution of the components. Finally, this working group will be in charge of providing technical support to the Energy Division (INE/ENE) and the Bank's Representation in Colombia (COF/CCO) during the monitoring activities of the contracted consulting firms that are contracted with resources of this TC.
- 4.4. The focal point designated and sector specialist responsible for executing and supervising this TC will be the Lead Energy Specialist based in Bogota, Colombia, with the support of the Bank Country Office in Colombia (CAN/CCO) and the INE/ENE Team. INE/ENE will be the unit responsible for making the disbursements.

VI. Major issues

- 5.1. No significant risks are expected during the execution of the TC. One minor risk is identified, related to the availability of the information necessary for the studies. The execution of the INE / ENE, with the support of specialized consultants, continuous follow-up meetings with the government and indicating the information necessary for the study from the beginning will help mitigate these potential risks.
- 5.2. All knowledge products derived from this Technical Cooperation will be the Bank's intellectual property.

VII. Exceptions to Bank policy

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

VIII. Environmental and Social Aspects

- 7.1. This TC will finance feasibility (or pre-feasibility) studies of investment projects and associated environmental and social studies, whose terms of reference and products will be consistent with the applicable requirements of the Bank's Environmental and Social Policy Framework (ESPF) and related environmental and social technical guidelines.

Required Annexes:

- Request from the client.
- Results Matrix.
- Terms of Reference for activities/components to be procured.
- Procurement Plan.