

## TC Document

### I. Basic Information for TC

▪ Country/Region:	REGIONAL
▪ TC Name:	Promotion of the Green Hydrogen Market in LAC Countries
▪ TC Number:	RG-T3777
▪ Team Leader/Members:	Gischler Blanco, Christiaan (INE/INE) Team Leader; Aiello, Roberto Gabriel (INE/ENE) Alternate Team Leader; Sucre Pantin, Carlos Gustavo (INE/INE) Alternate Team Leader; Bonifaz Urquizu, Jeanette (INE/INE); Brusatin Cadavid, Nicola (INE/INE); Carvajal Blanco, Paola (INE/INE); Correa Poseiro, Cecilia (INE/ENE); Gaviano, Andrea (VPS/ESG); Jimenez De Arechaga, Maria Del Pilar (LEG/SGO); Siroit, Gaston (INE/INE); Sologuren Blanco, Jaime (INE/ENE) Poseiro, Cecilia (INE/ENE); Gaviano, Andrea (VPS/ESG); Jimenez De Arechaga, Maria Del Pilar (LEG/SGO); Siroit, Gaston (INE/INE); Sologuren Blanco, Jaime (INE/ENE) Poseiro, Cecilia (INE/ENE); Gaviano, Andrea (VPS/ESG); Jimenez De Arechaga, Maria Del Pilar (LEG/SGO); Siroit, Gaston (INE/INE); Sologuren Blanco, Jaime (INE/ENE) Blanco, Christiaan (INE/INE) Team Leader; Aiello, Roberto Gabriel (INE/ENE) Alternate Team Leader; Sucre Pantin, Carlos Gustavo (INE/INE) Alternate Team Leader; Bonifaz Urquizu, Jeanette (INE/INE); Brusatin Cadavid, Nicola (INE/INE); Carvajal Blanco, Paola (INE/INE); Correa Poseiro, Cecilia (INE/ENE); Gaviano, Andrea (VPS/ESG); Jimenez De Arechaga, Maria Del Pilar (LEG/SGO); Siroit, Gaston (INE/INE); Sologuren Blanco, Jaime (INE/ENE)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	N/A
▪ Date of TC Abstract authorization:	11 Aug 2020.
▪ Beneficiary:	Government of Uruguay and Trinidad and Tobago
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	OC Strategic Development Program for Infrastructure(INF)
▪ IDB Funding Requested:	US\$363,817.00
▪ Local counterpart funding, if any:	US\$0
▪ Disbursement period (which includes Execution period):	48 months
▪ Required start date:	November 1, 2020
▪ Types of consultants:	Individuals consultants and consulting firms
▪ Prepared by Unit:	INE-Infrastructure and Energy Sector
▪ Unit of Disbursement Responsibility:	INE-Infrastructure and Energy Sector
▪ 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:	Productivity and innovation

## II. Objectives and Justification of the TC

- 2.1 The objective of this Technical Cooperation (TC) is to accelerate the decarbonization process in Latin America and Caribbean (LAC) through the support of the development of a green hydrogen market in the region as an innovative and competitive energy carrier.
- 2.2 In order to achieve the objectives set out in the Paris Agreement and limit the global temperature increase from pre-industrial levels to between 1.5 and 2 degrees Celsius, climate change experts have established that it will be necessary to reach zero net carbon dioxide emissions between 2050 and 2070. This will not be possible unless the energy and transport sectors are decarbonized. Green hydrogen (produced using renewable energy) is presented as an alternative for the decarbonization of these sectors. Several countries and regions such as Japan and the European Union have already started to develop strategies to use green hydrogen in their energy transition.
- 2.3 The production of hydrogen is often categorized into three types: grey, blue, and green hydrogen. The grey refers to H<sub>2</sub> produced from fossil fuels – mainly from natural gas – and it accounts for 75% of global supply. Blue hydrogen refers to a production process that uses fossil fuels but where all emissions are captured and sequestered, through carbon capture and storage methods. Green hydrogen is obtained using renewable energy as a source power and an electrolyzer to separate the water molecule into hydrogen (H<sub>2</sub>) and oxygen (O<sub>2</sub>) molecules.<sup>1</sup> On the other side of the equation, global demand for hydrogen –70 million tons– is split into two main activities: as an input to produce ammonia (31 million tons) and to refine crude oil (38 million tons).<sup>2</sup> Demand for hydrogen mixed with other gases stems from methanol production and heat generation. However, there is growing interest and investment in wider applications of hydrogen – and particularly green hydrogen – especially in transportation and energy storage applications.
- 2.4 The production or consumption of green hydrogen does not emit GHG. It can be used as a feedstock, a fuel, or to carry and store energy. Through its use in a fuel cell, green hydrogen is combined with oxygen to produce water and generate electricity, therefore serving as a source of green power. The World Economic Forum (WEF), International Renewable Energy Agency (IRENA), International Energy Agency (IEA), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Governments of Japan,<sup>3</sup> Australia and Germany have concluded that the use of hydrogen as an energy carrier is key to the rapid, sustained and cost-effective reduction of GHG emissions. Further, the development of green hydrogen production at a large scale could support emission reduction in hard-to-electrify industries (such as steel making, cement manufacturing, heavy transport, among others) and the development of a new export product leveraging existing local advantages and capabilities.
- 2.5 Various countries in the LAC region, such as Uruguay, Trinidad and Tobago, Chile, and Costa Rica, among others have expressed interest in producing green hydrogen and in assessing its feasibility to reduce emissions in the transportation, petrochemical and industrial sectors. This TC will support such efforts in Uruguay and Trinidad &

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<sup>1</sup> <https://www.iea.org/reports/the-future-of-hydrogen>

<sup>2</sup> <https://www.woodmac.com/news/editorial/the-future-for-green-hydrogen/>

<sup>3</sup> The Government of Japan has declared its intention to consume up to 300,000 tons per year by 2030

Tobago, which are countries that already have defined pilot projects to evaluate the performance and potential of green hydrogen production to decarbonize the local economies or export to international markets.

- 2.6 Uruguay is one of the leading countries with great potential for green hydrogen production due to its existing renewable energy production capacity and excess of clean power generation, stemming mainly from hydroelectric and wind, and in lesser degree solar PV facilities. Local energy companies are developing a pilot project (currently in conceptual phase) to produce green hydrogen using 97% of renewable energy and to power passenger buses or freight trucks. Moreover, the Government of Uruguay is cooperating with some European countries to evaluate the potential green hydrogen production and exports from Uruguay to European markets.
- 2.7 Another country with great potential in the region is Trinidad and Tobago (T&T). T&T's economy is primarily driven by the hydrocarbon sector and it is the largest hydrogen producer and exporter in the LAC region – all grey as it stems from the production of natural gas. Its energy sector accounts for approximately 40% of GDP and the petrochemicals sector represents over 20% of total exports. During the presentation of the 2019/2020 National Budget, the Government of Trinidad & Tobago expressed its interest in exploring different applications of green hydrogen within the local economy and in encouraging collaborations with the private sector, academia, and international organizations. Moreover, public, and private companies in the energy sector are promoting a pilot project to produce green and carbon-neutral hydrogen that could be used by the local industrial sector to reduce carbon emissions.
- 2.8 **Strategic Alignment.** The TC is consistent with the Update to the Institutional Strategy (AB-3190-2) and is aligned with the development challenges of Productivity and Innovation and with the cross-cutting themes of Climate Change and Environmental Sustainability by promoting the use of green hydrogen as an energy carrier that will contribute with the decarbonization process in the region. The TC is also aligned with the Energy Sector Framework (GN 2830-5), by prioritizing the diversification of energy portfolios through the use of renewable energies and other less polluting energies than fossil fuels; the Science and Technology Sector Framework (GN-2791-8); the Climate Change Sector Framework (GN-2835-8); and the Infrastructure Strategy (GN-2710-5), by fostering innovation, promoting the reduction of greenhouse gas emissions and enhancing the sustainable growth of the energy sector by promoting the use of cleaner technologies. Also, green hydrogen investments are aligned with the first objective of the Country Strategy with Trinidad and Tobago 2016-2020 (updated in 2019) that focuses on promoting private investment to diversify the economy. Similarly, a pillar of the Country Strategy with Uruguay 2016-2020 is to boost productivity and competitiveness by promoting innovation and supporting an integrated and coordinated policy for international positioning. Therefore, the production of green hydrogen as an innovative clean energy product could facilitate both economic diversification and innovation. Lastly, this TC is aligned with the Ordinary Capital Strategic Development Program for Infrastructure (GN-2819-1), as it will support the development of green hydrogen ecosystem in LAC and therefore enhance the sustainability of the infrastructure services and promote the origination of infrastructure projects and preparing member countries for their successful implementation.

### III. Description of activities/components and budget

- 3.1 **Component I: Technical pre-feasibility studies for green hydrogen potential production and pilot projects (US\$187,817.)** The objective of this component is to

support the development of technical analysis for green hydrogen pilot projects in Trinidad and Tobago and Uruguay. This component will finance at least two technical pre-feasibility studies associated with green hydrogen production including the following aspects: (i) estimation of the potential production of green hydrogen based on the local renewable energy availability and resources; (ii) local infrastructure and human capabilities synergies assessment; (iii) technical studies for green hydrogen production and trade; and (iv) legal, environmental, and/or social analysis.

- 3.2 **Component II: Commercial / economic analysis for green hydrogen trade and exports (US\$150,000.)** The objective of this component is to identify the competitive advantage to produce and export green hydrogen from Uruguay and Trinidad and Tobago. This component will finance at least two commercial pre-feasibility studies associated with green hydrogen commercialization and trade including the following aspects: (i) national and international market assessment for green hydrogen; (ii) estimation of price competitiveness and potential target markets and (iii) business model analysis for the development of large-scale green hydrogen production or export projects
- 3.3 **Component III: Training and dissemination (US\$30,000)** This component will develop strategies to disseminate the work carried out and it will ensure knowledge sharing of the activities under Component I and II. The communication campaign will have two audiences: (i) Regional governments and policymakers will benefit from learning and sharing experiences about technical, financial, regulatory, and implementation issues of green hydrogen projects; and (ii) private and public companies could learn from the studies conducted under this TC to be aware of business opportunities in the region. In that sense, the component will finance the following activities: (i) development of a communication campaign to disseminate the main results of the projects including at least one event and one publication with the key learnings; and (ii) implementation of a virtual training program for government officials and policymakers of Trinidad and Tobago and Uruguay involved in green hydrogen topics that will facilitate the exchange of ideas and adoption of best practices. The expected output is to train at least 30 public servants using virtual tools.
- 3.4 The TC's total budget is US\$367,817 financed by the IDB Ordinary Capital Strategic Development Program for Infrastructure (INF).

#### Indicative Budget

Activity/Component	IDB	Total Funding
Component I: Technical pre-feasibility studies for green hydrogen potential production and pilot projects	187,817	187,817
Component II: Commercial / economic analysis for green hydrogen trade and exports	150,000	150,000
Component III: Training and dissemination	30,000	30,000
<b>Total</b>	<b>367,817</b>	<b>367,817</b>

- 3.5 **Results.** The expected result of this TC is to contribute to the implementation of pilot projects in Trinidad & Tobago and Uruguay for the production and commercialization

of green hydrogen by leveraging the existing local infrastructure, expertise and resources through the completion of at least four (4) relevant pre-feasibility studies – two per Component (I and II)-, one training to government officials, and one event and publication to disseminate the results.

#### **IV. Executing agency and execution structure**

- 4.1 As requested by the beneficiaries and according to the Operative Guidelines (GN-2629-1), The Bank, through the Infrastructure and Energy Sector (INE/INE) will act as the executing agency of this regional TC due to its ability to leverage its extensive network of internal and external subject-matter experts and well-established relationships with the stakeholders involved.
- 4.2 The IDB will lead implementation, programmatic oversight of the different activities and coordinate results reporting with other organizations operating at the national level. The Bank will monitor and administrate the consulting services and the beneficiaries, Ministry of Industry, Energy and Mining (MIEM) in Uruguay and National Energy Corporation in Trinidad and Tobago, will provide the technical input and information to the consultants.
- 4.3 Due to the novelty of this technology for the LAC region and beneficiary countries, there are multiple variables (regulatory, technical, and economic ones) that will require detailed analysis impacting the pace of the execution. Based on previous experience, given the required review and non-objection on the scope of work with the authorities in each country and the procurement process the expectation is that the studies will be completed in 18 to 24 months, which may entail some delays given the current travel restrictions. When the studies are completed, this TC will support the implementation of trainings to policymakers and local authorities of Trinidad and Tobago and Uruguay involved in green hydrogen topics. The initial scope includes a maximum of 30 government officials in topics related to production, distribution and trade, risks, business models, etc. The training scope will be agreed with local authorities and it is expected to be implemented in the following 6 to 12 months to boost the ownership and interest from policymakers. These dissemination efforts will provide enough time for relevant stakeholders to participate and share their feedback which will serve as inputs for the publication under Component III to present the TC results, disseminate the knowledge and promote further collaboration around green hydrogen market development in the region. The TC is expected to be fully executed in a maximum period of 48 months.
- 4.4 The execution of the activities under this technical cooperation has been included in the Procurement Plan (attached) and they will be executed in accordance with the Bank's current procurement policies and procedures as follows: (a) Recruitment of individual consultants guidelines according to procedures AM-650; (b) Contracting of consulting firms for services of an intellectual nature procedures GN-2765-4 and its operational guidelines OP-1155-4; and (c) Procurement of logistics services and purchase of goods different from consulting services, according to procedures GN-2303-28.

#### **V. Major issues**

- 5.1 The main risk for the implementation of this TC lies in limited local information for the execution of the studies due to the technical complexity and newness of the green

hydrogen technology in Trinidad & Tobago and Uruguay. The IDB team will draw from well-established and recognized international best practices, methodologies, and experienced consultants to help avoid this risk.

- 5.2 Another risk for the implementation of the technical cooperation is delays in the implementation of activities involving local authorities or site visits. The COVID-19 pandemic has impacted the speed of response from authorities and public companies to different projects because of the teleworking conditions. Similarly, travel restrictions could impact local data gathering for international consulting studies. To mitigate this, the project team will implement all activities in close coordination with IDB country offices and key country stakeholders, including representatives from government, industry, and civil society. In addition, consulting services will foresee the use of remote communication tools to ensure the scope of work completion. Training and dissemination activities will be conducted using virtual tools.
- 5.3 Coordination with multiple institutions and authorities to analyze and review the deliverables from the studies could delay the TC execution. To mitigate the risks the local team members based in Uruguay and Trinidad and Tobago will lead the dialogue with the local authorities with support and in coordination with the team leader of this TC. The TC team will conduct regular meetings with the designated focal point in each organization/Ministry established at the beginning of the implementation.

## **VI. Exceptions to Bank policy**

- 6.1 No exceptions to Bank policies are expected for the implementation of this technical cooperation.

## **VII. Environmental and Social Strategy**

- 7.1 This TC will not have negative environmental and/or social impacts because all the activities are related to the execution of technical studies, training, and events. As per the IDB Social and Environmental Safeguards Screening Tool, the project Classification is “C” with no associated potential negative environmental and/or social impacts during the implementation (see: [Safeguard Policy Filter Report](#) (SPF) and [Safeguard Screening Form](#) (SSF).)

## **Required Annexes:**

[Request from the Client - RG-T3777](#)

[Results Matrix - RG-T3777](#)

[Terms of Reference - RG-T3777](#)

[Procurement Plan - RG-T3777](#)