

TÉRMINOS DE REFERENCIA

Programa de entrenamiento virtual sobre el hidrógeno verde y su potencial en América Latina y el Caribe para oficiales de gobierno y hacederos de política.

1. Antecedentes y Justificación

- 1.1 El hidrógeno como portador de energía ha ganado impulso recientemente. El hidrógeno puede transportar energía (y electricidad) en el espacio y el tiempo (sin red eléctrica). Incluso, si bien no es una tecnología completamente nueva, su importancia ha aumentado porque: (1) debido a la disminución dramática de los costos variables de energía (como la solar y la eólica) el valor económico del almacenamiento de energía ha aumentado (y el hidrógeno puede jugar un papel clave en el almacenamiento de energía); (2) los países donde la energía renovable puede producirse a bajo costo comienzan a analizar el potencial para exportar energía renovable a través de buques en forma de hidrógeno. Si esto se convierte en realidad, el hidrógeno podría cambiar el juego, de la misma manera que el GNL vincula los mercados regionales de gas natural previamente desconectados (AIE, 2018); (3) en el proceso de electrificación del sector del transporte el hidrógeno puede tener un papel destacado ya que el hidrógeno puede almacenar energía que puede ser transportada y utilizada (como una pila de combustible) fácilmente; (4) el uso de la infraestructura de gas natural existente para la industria del hidrógeno puede ser una forma de suavizar la transición económica, disminuyendo su costo.
- 1.2 Varios países comenzaron a desarrollar estrategias estructuradas para utilizar el hidrógeno en su transición energética. Japón desarrolló una estrategia de hidrógeno con el objetivo de promover el uso más amplio de esta tecnología, reducir los costos y promover una línea estable de suministro tecnológico. Estados Unidos se está centrando en el Programa de Pilas de Combustible, intentando superar obstáculos como la falta de infraestructura y las soluciones técnicas disponibles. La estrategia de hidrógeno de Francia incluye objetivos indicativos para promover el uso de hidrógeno verde en la industria. El gobierno ha establecido una meta para el 10% de hidrógeno descarbonizado en el sector industrial para 2023. A nivel de la Unión Europea, la Directiva de Energía Renovable II (2018/2001) proporciona garantías de origen que están actualmente vigentes para que la electricidad renovable se extienda a cubrir 'gas renovable'. Esto permitirá que el hidrógeno producido a partir de fuentes renovables con garantías de origen se cuente contra los objetivos de energías renovables para 2030. También requiere que los estados miembros evalúen la necesidad de extender la infraestructura de red de gas existente para facilitar la integración del gas de fuentes renovables. En China, los proyectos de hidrógeno se fortalecieron fuertemente, 14 gobiernos a nivel provincial y 30 municipales lanzaron planes de desarrollo de hidrógeno. El número de estaciones de servicio en funcionamiento para la movilidad eléctrica aumentó de 31 en 2018 a 31 en 2019. Y se espera que alcance las 100 para fines de 2020.
- 1.3 En ALC tenemos algunos pocos ejemplos, como el autobús de hidrógeno de Costa Rica, sin embargo, diferentes países han mostrado interés práctico en este tema, como Uruguay y Trinidad y Tobago. Hay un gran potencial en la región, pero todavía hay poco conocimiento sobre el tema, visto el carácter innovador de la incorporación del hidrogeno en el sector de energía.

2. Objetivos

- 2.1. El objetivo de la consultoría es actualizar el conocimiento sobre la economía del hidrógeno en Latino América y Caribe. Los principales puntos que serán incorporados son: (1) El hidrógeno como vector de energía renovable; (2); Aplicaciones en el sector industrial, transporte o como producto de exportación; (3) Modelos de negocio en torno al hidrógeno verde.*

3. Alcance de los Servicios

3.1 Los consultores deben preparar el material del curso, compartir previamente con los especialistas del banco para retroalimentación.

4. Actividades Clave

- 4.1.** Material de divulgación de conocimiento en formato de Power Point sobre los siguientes temas: (1) El hidrógeno como vector de energía renovable; (2); Aplicaciones en el sector industrial, transporte o como producto de exportación; (3) Modelos de negocio en torno al hidrógeno verde.
- 4.2.** Entrenamiento de tres módulos de 4 horas, cada módulo deberá abordar cada uno de los temas especificados en 4.1.

5. Resultados y Productos Esperados

- 5.1.** Borrador del material de aprendizaje, para retroalimentación.
- 5.2.** Versión final del material de aprendizaje que pueda ser compartido, en formato editable.
- 5.3.** Workshops interactivos con el BID a través de una plataforma online.

6. Calendario del Proyecto e Hitos

- 6.1.** Entrega del borrador del material de aprendizaje.
- 6.2.** Entrega final del material y workshops.

7. Requisitos de los Informes

- 7.1.** El material de aprendizaje deberá ser entregue en Power Point, en formato editable.
- 7.2.** El workshop será presentado en formato on-line en una plataforma que comporte hasta 40 participantes y que permita interacción de los participantes.

8. Criterios de aceptación

8.1. Los productos serán aceptados después de la revisión de los especialistas del BID.

9. Otros Requisitos

9.1. La empresa deberá tener más de 8 años de experiencia en la industria de Hidrogeno Internacional y/o América Latina.

10. Calendario de Pagos

10.1. Las condiciones de pago se basarán en los hitos o entregables del proyecto. El Banco no espera hacer pagos por adelantado en virtud de contratos de consultoría a menos que se requiera una cantidad significativa de viajes. El Banco desea recibir la propuesta de costos más competitiva para los servicios descritos en el presente documento.

10.2. La Tasa de Cambios Oficial del BID indicada en el SDP se aplicará para las conversiones necesarias de los pagos en moneda local.

Plan de Pagos	
<i>Entregables</i>	%
1. Borrador del material de aprendizaje	40%
2. Versión final del documento de aprendizaje y entrenamiento	60%
TOTAL	100%

Selection process # RG-

TERMS OF REFERENCE

Pre-feasibility study for green hydrogen production in Trinidad and Tobago

Country: Trinidad and Tobago

Selection #: RG-T3777-XXX

Financing source - TC #: RG-T3777

Project #: XXX

TC document link:

TC Name: *Promotion of the Green Hydrogen Market in LAC Countries*

1. Background and Justification

- 1.1. Green Hydrogen is a clean energy carrier that does not emit GHG during production or consumption processes. It could be used as a feedstock, a fuel, or an energy carrier and storage. With the help of Fuel Cell, green hydrogen combined with oxygen (from the air) can once produce water and liberate electricity, therefore also becoming a source of green power. Current demand for hydrogen –70 million tons– comes as an input to produce ammonia (31 million tons) and to refine crude oil (38 million tons).¹ Demand for hydrogen mixed with other gases comes 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.
- 1.2. The IDB is working both regionally and at a country level to support the GHG emission reduction initiatives and compliance with the National Determined Contribution NDCs of Latin American and Caribbean countries. In this regard, IDB has been active in promoting energy diversification, integration of renewable energy sources and decarbonization of the local economies, among other initiatives. The Energy and Infrastructure sector (INE) has identified the opportunity to promote the development of the green hydrogen market in the region as an option to decarbonize the industrial, power and transportation sector, as well as a potential new exporting business.
- 1.3. The World Economic Forum (WEF), International Renewable Energy Agency (IRENA), International Energy Agency (IEA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the governments of Japan (which has declared its intention to consume up to 300,000 tons per year by 2030), 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. The development of green hydrogen production at a large scale could support both, emission reduction in hard-to-electrify industries and the development of a new export product leveraging local advantages.

¹ <https://www.woodmac.com/news/editorial/the-future-for-green-hydrogen/>

- 1.4.** Various countries in the LAC region have expressed interest in producing green hydrogen and assess its feasibility to reduce emissions in the transportation, petrochemical and industrial sector. Trinidad and Tobago (T&T) is the top grey hydrogen² producer and exporter in the LAC region and it is interested in promoting the incorporation of green hydrogen production leveraging the country's infrastructure and know-how. T&T economy is primarily driven by the hydrocarbon sector and it is the largest grey hydrogen producer and exporter in the LAC region, with the energy sector accounting for approximately 40% of the country's GDP, and the petrochemicals sector contributing over 20% of total exports³. The Honourable Minister of Finance in the 2019/2020 National Budget Presentation indicated that the State was desirous of exploring different applications of green hydrogen within the local economy and of encouraging collaborations with the private sector, academia, and international organizations. Moreover, local public and private companies 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.
- 1.5.** The purpose of this study is to support the government of T&T to identify opportunities whereby renewables-based hydrogen could be used locally as a basis for the decarbonization of the existing petrochemical industry as well as hard to decarbonize sectors like the cement and metals industries. Beyond the industrial sector, hydrogen could also provide a possible avenue to transition towards clean mobility as the transportation sector shifts from gasoline and CNG towards electric driving, both with batteries and with fuel cells fueled by hydrogen.

2. Objective

- 2.1.** The principal objective of this consultancy is to conduct a technical, socioenvironmental, and commercial feasibility study for a green hydrogen pilot facility in Trinidad and Tobago and develop a promotion strategy to attract private and public investments.

3. Scope of the study

- 3.1.** Assess the potential production of green hydrogen from renewable energy sources in Trinidad and Tobago. The study will include at least an estimation of potential production volumes, infrastructure synergies, investments, and cost of production.
- 3.2.** Analyze and estimate the potential national and export markets for green hydrogen production in Trinidad and Tobago including at least an assessment of competitiveness, logistics and transport methods.
- 3.3.** Conceptualize a pilot project to assess the technical, socioenvironmental, and economic feasibility and suggest investment promotion strategies and business models considering the national regulatory and policy frameworks
- 3.4.** Define a roadmap for the promotion and development of the green hydrogen industry in Trinidad and Tobago.

4. Key Activities

² Grey Hydrogen is mainly produced industrially from natural gas and generates carbon emissions

³ XXX

4.1. Assess the potential production of green hydrogen from renewable energy sources in Trinidad and Tobago.

- Examine renewable energy availability throughout region and potential longer-term options for integration with hydrogen as an energy carrier
- Estimation of potential green hydrogen production volumes
- Analysis of infrastructure synergies with the ammonia and methanol industry and new requirements
- Analysis of the potential cost of production including the different segments of the value chain

4.2. Analyze and estimate the potential national and export markets for green hydrogen production in Trinidad and Tobago and the Caribbean.

- Assessment of importing markets and expected volume
- Analysis of logistics and export transport options from Trinidad and Tobago
- Assessment of green hydrogen competitiveness in international markets

4.3. Conceptualize a pilot project to assess the technical, socioenvironmental, and economic feasibility.

- Define a pilot project to assess the technical, socioenvironmental, and economic feasibility of green hydrogen production in Trinidad and Tobago.
- Develop the Analysis of Alternatives of the proposed development for the selection of the preferred option from socio-environmental and technical-financial perspectives, as well as identify the scope for future environment and social impact assessment studies
- Analyze and suggest business models to develop the pilot project considering the national regulatory and policy frameworks.
- Identify and suggest investment promotion strategies for the government of Trinidad and Tobago.

4.4. Define a roadmap for the promotion and development of the green hydrogen industry in Trinidad and Tobago.

- Suggest a roadmap with milestones and champions to promote the development of the green hydrogen industry.

5. Expected Deliverables

In close coordination with the IDB team, the consultancy firm shall prepare the following deliverables:

- 5.1.** Work plan which must include a detailed overview of key milestones as outlined in section 3.
- 5.2.** Workshop and report including the assessment of potential production of green hydrogen, synergies with local infrastructure and potential markets for Trinidad and Tobago (activity 3.1 and 3.2).
- 5.3.** Workshop and report with the pilot project and business model for investment promotion
- 5.4.** Workshop and report of the recommended strategy and roadmap to develop the green hydrogen industry in Trinidad and Tobago.

6. Supervision and Reporting

- 6.1.** *This consultancy will be under the supervision of Christiaan Gischler (CHRISTIAANG@iadb.org) Carlos Sucre (csucre@IADB.ORG) and Paola Carvajal (lilianca@iadb.org).*

7. Schedule of Payments

7.1. *Payment terms will be based on project milestones or deliverables. The Bank does not expect to make advance payments under The Bank wishes to receive the most competitive cost proposal for the services described herein. All product must be deliverable.*

Payment Schedule	
<i>Deliverable</i>	%
3. Work Plan	15%
4. Green Hydrogen Potential Report	30%
5. Pilot Project Report	30%
6. Strategy and Road Map Report	25%
TOTAL	100%

7.2. *All deliverables shall be submitted to the IDBG.*

7.3. *Every report must be submitted to the Bank in an electronic file. The report should include cover, main document, and all annexes. Zip files will not be accepted as final reports, due to Records Management Section regulations.*

Selection process # RG-

TERMS OF REFERENCE

Pre-feasibility study for green hydrogen production and exports from Uruguay

Country: Uruguay

Selection #: RG-T3777-XXX

Financing source - TC #: RG-T3777

Project #: XXX

TC document link:

TC Name: *Promotion of the Green Hydrogen Market in LAC Countries*

1. Background and Justification

- 1.1. Green Hydrogen is a clean energy carrier that does not emit GHG during production or consumption processes. It could be used as a feedstock, a fuel, or an energy carrier and storage. With the help of Fuel Cell, green hydrogen combined with oxygen (from the air) can once produce water and liberate electricity, therefore also becoming a source of green power. Current demand for hydrogen –70 million tons– comes as an input to produce ammonia (31 million tons) and to refine crude oil (38 million tons).⁴ Demand for hydrogen mixed with other gases comes 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.
- 1.2. The IDB is working both regionally and at a country level to support the GHG emission reduction initiatives and compliance with the National Determined Contribution NDCs of Latin American and Caribbean countries. In this regard, IDB has been active in promoting energy diversification, integration of renewable energy sources and decarbonization of the local economies, among other initiatives. The Energy and Infrastructure sector (INE) has identified the opportunity to promote the development of the green hydrogen market in the region as an option to decarbonize the industrial, power and transportation sector, as well as a potential new exporting business.
- 1.3. The World Economic Forum (WEF), International Renewable Energy Agency (IRENA), International Energy Agency (IEA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the governments of Japan (which has declared its intention to consume up to 300,000 tons per year by 2030), 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. The development of green hydrogen production at a large scale could support both, emission reduction in hard-to-electrify industries and the development of a new export product leveraging local advantages.

⁴ <https://www.woodmac.com/news/editorial/the-future-for-green-hydrogen/>

- 1.4. Various countries in the LAC region have expressed interest in producing green hydrogen and assess its feasibility to reduce emissions in the transportation, petrochemical and industrial sector. Uruguay has been identified as one of the leading countries with great potential for green hydrogen (GH₂) production due to its renewable energy production capacity and excess of clean power generation. Local energy companies (Ancap and UTE) are developing a pilot project (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 signed a Memorandum of Understanding (MoU) with the Rotterdam Port Authority to evaluate the potential green hydrogen production and exports from Uruguay to European countries.
- 1.5. The purpose of this study is to assess the potential of green hydrogen production and exports from Uruguay understanding the synergies with the local industry and define a plan to support the government in the promotion and development of the nascent industry. Multiple countries around the world are committed to the promotion of the green hydrogen production and trade, this study will identify the key competitive advantages of Uruguay to compete in the international markets and recommend a roadmap for development.

2. Objective

- 2.1. The principal objective of this consultancy is to conduct a technical, socioenvironmental, and commercial pre-feasibility study for green hydrogen exports from Uruguay to potential international markets leveraging current infrastructure and resources. The study will include the assessment of Uruguay's competitiveness to export green hydrogen, as well as the key levers to facilitate the development of the green hydrogen export industry.

3. Scope of the study

- 3.1. Assess the potential production of green hydrogen from renewable energy sources in Uruguay. The study will include at least an estimation of potential production volumes, infrastructure requirements, investments, and cost of production.
- 3.2. Analyze and estimate the potential national and export markets for green hydrogen production in Uruguay including at least an assessment of competitiveness, logistics and transport methods.
- 3.3. Conceptualize a pilot project to assess the technical, socioenvironmental, and economic feasibility and suggest investment promotion strategies and business models considering the national regulatory and policy frameworks
- 3.4. Define a roadmap for the promotion and development of the green hydrogen industry in Uruguay.

4. Key Activities

- 4.1. **Assess the potential production of green hydrogen from renewable energy sources in Uruguay.**
 - Estimation of potential green hydrogen production volumes
 - Analysis of infrastructure requirements
 - Estimation of investments in the short, medium, and long term
 - Analysis of the potential cost of production including the different segments of the value chain

4.2. Analyze and estimate the potential national and export markets for green hydrogen production in Uruguay.

- Assessment of importing markets and expected volume
- Analysis of logistics and export transport options from Uruguay
- Assessment of Uruguayan green hydrogen competitiveness in international markets

4.3. Conceptualize a pilot project to assess the technical, socioenvironmental, and economic feasibility.

- Define a pilot project to assess the technical, socioenvironmental, and economic feasibility of green hydrogen exports from Uruguay
- Develop the Analysis of Alternatives of the proposed development for the selection of the preferred option from socio-environmental and technical-financial perspectives, as well as identify the scope for future environment and social impact assessment studies
- Analyze and suggest business models to develop the pilot project considering the national regulatory and policy frameworks
- Identify and suggest investment promotion strategies for the government of Uruguay

4.4. Define a roadmap for the promotion and development of the green hydrogen industry in Uruguay.

- Suggest a roadmap with milestones and champions to promote the development of the green hydrogen industry.

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