IDB Inter-American Development Bank

REQUEST FOR EXPRESSIONS OF INTEREST
CONSULTING SERVICES

Selection #: CH-T1235-P002
Selection Method: Competitive
Country: ***Chile***
Sector: Energy
Funding – TC #: ATN/JF-18347-CH
Project #: CH-T1235
TC name: Promotion for the Development of a Green Hydrogen Market in Chile.
Description of Services: Technical and regulatory feasibility assessment for blending hydrogen into existing gas transport and distribution infrastructure

https://www.iadb.org/es/project/CH-T1235

The Inter-American Development Bank (IDB) is executing the above mentioned operation. For this operation, the IDB intends to contract consulting services described in this Request for Expressions of Interest. Expressions of interest must be delivered using the IDB Portal for Bank Executed Operations (http://beo-procurement.iadb.org/home) by: January 15th, 2021 5:00 P.M. (Washington D.C. Time).

The consulting services ("the Services") include *technical and regulatory feasibility assessment for blending hydrogen into existing gas transport and distribution infrastructure in Chile (first quarter of 2021)*

Eligible consulting firms will be selected in accordance with the procedures set out in the Inter-American Development Bank: *Policy for the Selection and Contracting of Consulting firms for Bank-executed Operational Work* - GN-2765-1. All eligible consulting firms, as defined in the Policy may express an interest. If the Consulting Firm is presented in a Consortium, it will designate one of them as a representative, and the latter will be responsible for the communications, the registration in the portal and for submitting the corresponding documents.

The IDB now invites eligible consulting firms to indicate their interest in providing the services described below in the draft summary of the intended Terms of Reference for the assignment. Interested consulting firms must provide information establishing that they are qualified to perform the Services (brochures, description of similar assignments, experience in similar conditions, availability of appropriate skills among staff, etc.). Eligible consulting firms may associate in a form of a Joint Venture or a sub-consultancy agreement to enhance their qualifications. Such association or Joint Venture shall appoint one of the firms as the representative.

Interested eligible consulting firms may obtain further information during office hours, 09:00 AM to 05:00 PM, (Washington D.C. Time) by sending an email to: *paolar@iadb.org*

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Draft Synopsis Terms of Reference for EOI

1. Background and Justification

1.1. Internationally recognized organizations, governments, NGOs, researchers, and companies have concluded that the use of low-carbon hydrogen (H2) as an energy carrier is key to a rapid, sustained, and cost-effective reduction of emissions of greenhouse gases throughout the economy and, in particular, in hard-to-abate sectors such as heavy transport or high-grade heat. This is required for an effective mitigation of the effects of man-induced climate change and provides a solution for jurisdictions to achieve their emissions reduction commitments in a timely and cost-effective manner. However, the production and use of H2 and, specially, green H2 –that which is produced through the renewable-electricity-powered electrolysis of water– as an energy carrier is a novel trend, so costs are relatively high when compared to existing fossil technologies and thus there is uncertainty regarding various techno-economic and operational aspects. In addition, there are no established markets -yet- for trading this clean fuel. However, some countries and states are strongly promoting these technologies in an effort to develop these markets and commercialize such technologies.

1.2. Chile is a country with a significant potential for competitive production of green H2 –due to its extensive, high-quality renewable resources and its suitable ecosystem for clean energy investment–, as well as a country with significant emissions reduction commitments. Regarding the former, a potential for green H2 production of over 160 million tons per year has been recognized in Chile[1], which correlates with over 1.75 TW of untapped renewable electricity generation potential mapped in the country[2]. Regarding the latter, a Climate Change Draft Bill of Law is currently in Congress, which states that Chile will become a carbon-neutral country by 2050[3]. The National Determined Contribution (NDC) for Chile for 2030 has been recently been updated with a more ambitious goal of reaching a peak of national Greenhouse Gas emissions by 2025 and a target of 95 MtonCO_{2eq} by 2030 –a reduction of approximately 30% in per GDP terms from 2016 emissions–[4].

1.3. One of the most promising markets in the long-term for green hydrogen is its use in gas pipelines and distribution networks as a fuel for boilers and other domestic, commercial, and industrial applications that are currently supplied natural gas. In this application, green hydrogen (H2) is found to be competitive against natural gas under certain conditions, while also being more competitive than other low carbon solutions[5]. In Chile, this current natural gas market could translate to a potential demand of more than 400 million tons per year of hydrogen. Additionally, infrastructure and installations could be reutilized, reducing costs, project development uncertainty, and reducing new physical interventions to natural habitats as well as cities.

1.4. Nonetheless, several challenges must be overcome in order for hydrogen to be used in gas pipelines and grids to supply a diversity of end uses, primarily boilers -residential, commercial and industrial-. The first challenge is a material one: pipes, pumps, valves, compressors, and other equipment and installations commonly part of a natural gas transport and distribution system, are designed, selected, and installed to work with a certain range of fluids. In the case of natural gas grids, these components are usually not adequate for complete use

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[1] IEA. (2019). *The Future of Hydrogen: Seizing today's opportunities*. Report prepared by the IEA for the G20, Japan. Available at: www.iea.org/reports/the-future-of-hydrogen

[2] Ministry of Energy of Chile & GIZ. (2014). *Energías Renovables en Chile – El Potencial eólico, solar e hidroeléctrico de Arica a Chiloé.* Available at: http://4echile.cl/4echile/wp-content/uploads/2017/03/Energias-Renovables-en-Chile-El-potencial-eolico-solar-e-hidroele%CC%81ctrico-de-Arica-a-Chiloe.pdf

[3] Boletín 13191-12 del Senado de Chile. Available at: https://www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=13191-12

[4] https://mma.gob.cl/primer-proceso-de-actualizacion-de-la-contribucion-determinada-a-nivel-nacional-ndc/

[5] Hydrogen Council. (2020). *The Path to Hydrogen Competitiveness*. Supported by McKinsey&Company.

of hydrogen[6], though several pilots under way in Europe have shown that some blending of the two gases is achievable up to 20% in volume of hydrogen[7] without significant modification of components.

1.5. The second challenge relates to the impacts at the end uses of blending of hydrogen gas in a natural gas grid or pipeline. Equipment such as boilers and stoves are designed and calibrated to work with a specific range of combustible gases, so changes in thermochemical properties of the gas provoked by the blending of a new combustible gas might modify the equipment's behavior or even render it useless -notwithstanding safety issues-. Even though these risks exist, as the cited HyDeploy project has shown, blending of a fraction of hydrogen into natural gas grids can be well tolerated by end applications is certain conditions or might require minimal adjustments in some end applications that can be carried out swiftly.

1.6. The third challenge is a regulatory one: there exists a plethora of technical standards and codes that define design, construction, and operational conditions, criteria, and requirements to transport and distribute hydrogen through pipelines and grids; however, it is often the case -such as in Chile- that laws, by-laws, and other higher-level regulation do not consider the figure of hydrogen blending with natural gas and, thus, do not refer to the aforementioned standards and codes and do not allow it. Hence, if hydrogen is to be utilized in pipelines and grids, a review of existing regulation must be carried out so that barriers might be identified and lowered.

1.7. Based on the above, a study is required to review the global state of the art in hydrogen blending into natural gas grids and pipelines, including the review of best practices. Additionally, the technical feasibility of blending hydrogen into the gas infrastructure existing in Chile is to be evaluated to determine a maximum potential injection. Finally, barriers to hydrogen blending in gas grids and pipelines are to be identified in the Chilean regulatory framework and modifications are to be proposed. This study's results will enable access to this large fuel market of this new clean energy carrier and, thus, accelerate the deployment of a green hydrogen market in the country.

2. Objectives

2.1. **General objective**: To determine the feasibility of blending hydrogen into existing natural gas infrastructure in Chile.

- 2.1.1. **Specific objective 1:** To investigate the operational and regulatory state of the art of hydrogen blending into natural gas pipelines and distribution grids in countries leading the deployment of hydrogen as a clean fuel.
- 2.1.2. **Specific objective 2:** To determine the technical feasibility of injecting hydrogen into existing natural gas transport and distribution infrastructure, such as pipelines and grids in Chile.
- 2.1.3. **Specific objective 3:** To propose regulatory modifications to the Chilean regulatory framework for natural gas transportation and distribution so as to enable the injection of hydrogen under technical feasibility and international standards, codes, and best practices.

3. Scope of Services

3.1. A consulting firm with experience in regulatory, technical, economic, and/or commercial studies in the natural gas transport and distribution sectors is required. Experience in supporting the development of regulatory and technical plans and roadmaps for private and public stakeholders in the hydrogen and oil & gas sectors is also required.

3.2. The team proposed to execute the study by the consulting firm shall be multidisciplinary and have experience per section 3.1 above. The team shall consolidate both quantitative skills, as well as the ability to effectively communicate findings and methodologies.

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[6] For a detailed explanation as to the physical phenomena that prevent the use of large fractions of hydrogen in certain natural gas grids, please refer to Melaina, M.W., Antonia, O. and Penev, M. (2013). *Blending Hydrogen into Natural Gas Pipeline Networks:A Review of Key Issues*. Technical report by NREL.

[7] The HyDeploy Project under way in the UK is a noteworthy example: https://hydeploy.co.uk/