

# GEF-8 WORLD BANK PCN STAGE/GEF DATA SHEET

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## General Project Information

### Project Title

Chile Green Hydrogen Facility Project

### Region

Chile

### GEF Project ID

11065

### Country(ies)

Chile

### Type of Project

FSP

### GEF Agency(ies):

World Bank

### GEF Agency ID

P177533

### Executing Partner

Corporación de Fomento de la Producción (CORFO)

### Executing Partner Type

Government

### GEF Focal Area (s)

Climate Change

### Submission Date

2/28/2023

### Project Sector (CCM Only)

Renewable Energy

### Taxonomy

Focal Areas, Climate Change, United Nations Framework Convention on Climate Change, Nationally Determined Contribution, Paris Agreement, Climate Change Mitigation, Financing, Energy Efficiency, Technology Transfer, Sustainable Urban Systems and Transport, Renewable Energy, Influencing models, Transform policy and regulatory environments, Demonstrate innovative approaches, Deploy innovative financial instruments, Strengthen institutional capacity and decision-making, Stakeholders, Private Sector, Capital providers, Project Reflow, Financial intermediaries and market facilitators, Large corporations, Non-Grant Pilot, Civil Society, Type of Engagement, Partnership, Consultation, Communications, Gender Equality, Gender results areas, Capacity Development, Gender Mainstreaming, Sex-disaggregated indicators, Beneficiaries, Capacity, Knowledge and Research, Knowledge Exchange, Knowledge Generation, Innovation

### Type of Trust Fund

GET

### Project Duration (Months)

60

### GEF Project Grant: (a)

0.00

### GEF Project Non-Grant: (b)

13,761,468.00

### Agency Fee(s) Grant: (c)

0.00

### Agency Fee(s) Non-Grant (d)

1,238,532.00

### Total GEF Financing: (a+b+c+d)

15,000,000.00

### Total Co-financing

450,000,000.00

### PPG Amount: (e)

0.00

### PPG Agency Fee(s): (f)

0.00

PPG total amount: (e+f)

0.00

Total GEF Resources: (a+b+c+d+e+f)

15,000,000.00

Project Tags

CBIT: No NGI: Yes SGP: No Innovation: No

## Project Summary

Provide a brief summary description of the project, including: (i) what is the problem and issues to be addressed? (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? (iii), how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the project should be in section B “project description”. (max. 250 words, approximately 1/2 page)

Chile is strongly committed to decarbonization and to reaching carbon neutrality by 2050. Chile’s economy and the competitiveness of various of its productive sectors are vulnerable to risks associated with the increased intensity and frequency of extreme weather events (as experienced over the past decade). Among the country’s efforts to address these challenges, the Climate Change Framework Law (No. 21455) codifies its pledge to reach carbon neutrality by 2050. The law includes (i) the obligation for Chile to comply with its updated Nationally Determined Contribution<sup>[11]</sup> (NDC) (limit greenhouse gas [GHG] emissions to 95 million tons of carbon dioxide equivalent [MtCO<sub>2</sub>eq] by 2030<sup>[12]</sup>); and (ii) a Long-Term Climate Strategy (*Estrategia Climática de Largo Plazo*, ECLP, presented at COP26),<sup>[13]</sup> which outlines a road map to significantly increase renewable energy generation and green hydrogen production, and reduce emissions from industry and mining, in turn decarbonizing the economy. It specifically acknowledges green hydrogen’s potential role in reducing GHG emissions by 21 percent by 2050.<sup>[14]</sup>

In 2020, Chile launched an ambitious National Green Hydrogen Strategy (NGHS)<sup>[5]</sup> to become a global leader in green hydrogen production and leverage Chile’s abundant and low-cost renewable energy potential. The primary objectives of the NGHS include (i) having 5 GW of electrolysis capacity under construction by 2025, (ii) producing the lowest-cost hydrogen in the world by 2030, and (iii) being among the top three global hydrogen exporters by 2040. Chile has the potential to produce the world’s lowest-cost green hydrogen by leveraging its excellent solar and wind resources and the competitive cost of investments in the energy sector.<sup>[6]</sup>

Supporting green hydrogen can help Chile diversify its productivity through the creation of green value chains, allowing it to remain competitive while adapting to the challenges of low-carbon export markets. The development of green hydrogen and its derivatives can help in decarbonization and foster the creation of green value chains in key productive areas such as green copper, green steelmaking, green lithium, and other chemical production. Green fertilizers can also help create value chains in important export

agribusinesses such as fruits, vegetables, salmon, and/or wines. This will help the country to remain competitive, particularly in European Union (EU) markets, given the introduction of the Carbon Border Adjustment Mechanism (CBAM).<sup>[7]</sup> Moreover, using green hydrogen, Chile can produce new green ammonia or green hydrogen commodities that could be consumed locally or internationally. This can help Chile to further diversify its economy. While these are emerging commodity markets, they are expected to grow significantly in the coming decade.<sup>[8]</sup>

In line with the NGHS, Chile's Ministry of Energy (MoE) is leading regulatory work to standardize the country's green hydrogen industry, as reflected in the Regulatory Action Plan (*Plan de Acción Regulatorio*, PAR). The current regulatory framework already recognizes hydrogen and its derivatives as clean fuels, enabling them to be used as energy carriers.<sup>[9]</sup> Changing the status of green hydrogen and its derivatives from hazardous substances to clean-energy sources will facilitate granting of incentives, securing their access to infrastructure, and accelerating their use in innovative industries. In addition, the SEC approved a set of mandatory guidelines that outline the requirements for installing or refurbishing infrastructure to produce, store, transport, and use green hydrogen.<sup>[10]</sup> To incentivize the production of green hydrogen, the Law to Promote Energy Storage and Electromobility enables large self-generator renewable energy companies to sell excess supply to the power grid and buy electricity from the grid by paying only for energy (without paying for capacity). Moreover, the PAR defines the laws and regulations to be approved in the short-, medium-, and long-term to operationalize the NGHS. In the short term, the PAR includes the approval of two critical regulations by 2023: (i) a law on blending green hydrogen into natural gas pipelines, which will establish green hydrogen quotas to be injected in the gas network based on technical viability,<sup>[11]</sup> and (ii) a law to determine the safety requirements to produce, store, transport, and use green hydrogen.<sup>[12]</sup> In the medium- and long-term, norms and regulations focusing on the storage, handling, and use of green hydrogen for terrestrial and maritime transport will be developed in collaboration with the ministries of interior, transport, mining, and defense, and the National Commission of Energy. The GoCI is also receiving support from the European Commission and the German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ) for technical assistance, including (i) support for regional governments (especially in the Antofagasta and Magallanes regions) to be able to better identify environmental and social (E&S) issues, and (ii) capacity building, for which a study by the GoCI is underway to identify the reskilling and upskilling required for green hydrogen and its derivatives.

This operation seeks to catalyze the early deployment of green hydrogen projects in Chile by providing: (i) green hydrogen investment sub-loans and risk-mitigation instruments; and (ii) capacity building and project management. The Project will be instrumental to develop the risk mitigating instruments to help generate market and investors' confidence in this nascent industry. The GEF-NGI resources will provide the innovative risk sharing reserve accounts that will bring comfort to lenders that despite risks related to underperformance of a new technology that hydrogen sub-projects will pay their debts. This will enable commercial banks to issue debt at a lower cost and help scale up the nascent market. The use of GEF-NGI resources would enable to direct the IBRD resources towards financing of sub-projects and a more efficient use of resources.

The project is expected to support 8 to 10 green hydrogen sub-projects developed by private sponsors, leading to production of 15,000 tons of green hydrogen per year, and generating 2.87million tons of GHG emissions reductions (tCO<sub>2</sub>e) over a 20-year period.

[1] NDCs are at the heart of the Paris Agreement and the achievement of its long-term goals. By setting NDCs, each country commits to reducing national emissions and adapting to the impacts of climate change (United Nations—Climate Change).

[2] UNDP Global NDC Support Programme, “Chile,” United Nations Development Programme, <https://www.ndcs.undp.org/content/ndc-support-programme/en/home/our-work/geographic/latin-america-and-caribbean/Chile.html>.

[3] 2021 United Nations Climate Change Conference. See Government of Chile, *Estrategia Climática de Largo Plazo de Chile* (Santiago de Chile: Government of Chile, 2021), [https://unfccc.int/sites/default/files/resource/CHL\\_LTS\\_2021.pdf](https://unfccc.int/sites/default/files/resource/CHL_LTS_2021.pdf). The World Bank provided support for the development of the Long-Term Climate Strategy in the Framework of the COP21 Aide Memoire: Ana Bucher, Patricio Bofill, and Carolina Urmeneta, “Chilean Society Builds Its Long-Term Climate Strategy in a Participatory Way,” World Bank blogs, November 8, 2021, <https://blogs.worldbank.org/latinamerica/chilean-society-builds-its-long-term-climate-strategy-participatory-way>.

[4] COP25 (2019 United Nations Climate Change Conference), Chile, “Chile Delivers Long-Term Climate Strategy to the UN Executive Secretary of Climate Change,” November 3, 2021, <https://cop25.mma.gob.cl/en/chile-delivers-long-term-climate-strategy-to-the-executive-secretary-of-un-climate-change/>.

[5] MoE, *National Green Hydrogen Strategy* (Santiago de Chile: Ministry of Energy, Government of Chile, 2020), [https://energia.gob.cl/sites/default/files/national\\_green\\_hydrogen\\_strategy\\_-\\_chile.pdf](https://energia.gob.cl/sites/default/files/national_green_hydrogen_strategy_-_chile.pdf).

[6] IRENA (International Renewable Energy Agency), *Global Hydrogen Trade to Meet the 1.5°C Climate Goal: Part III—Green Hydrogen Cost and Potential* (Abu Dhabi: IRENA, 2022), p. 25, <https://www.irena.org/publications/2022/May/Global-hydrogen-trade-Cost>.

[7] The European Union (EU) introduced CBAM to prevent ‘carbon leakage’ by subjecting the import of certain groups of products from non-EU and non-EFTA countries to a carbon levy linked to the carbon price payable under the EU emission trading system (ETS) when the same goods are produced within the EU. In the first transition stage of CBAM, which will enter into force in October 2023, the following products will have to declare their carbon footprints: cement, aluminum, fertilizers, electric energy production, iron, and steel. However, by January 2026, all importers will need to declare the embedded GHG emissions for all goods imported into the European Union and surrender the corresponding number of CBAM certificates. The price of the goods will be calculated based on the weekly average auction price of EU Emissions Trading System (ETS) allowances. See European Council, “Council Agrees on the Carbon Border Adjustment Mechanism (CBAM),” March 15, 2022, <https://www.consilium.europa.eu/en/press/press-releases/2022/03/15/carbon-border-adjustment-mechanism-cbam-council-agrees-its-negotiating-mandate/>.

[8] Hydrogen Europe, “Hydrogen—A Carbon-Free Energy Carrier and Commodity,” November 2021, [https://hydrogeneurope.eu/wp-content/uploads/2021/11/2021.11\\_Hydrogen-as-a-carbon-free-energy-carrier-and-commodity\\_clean.pdf](https://hydrogeneurope.eu/wp-content/uploads/2021/11/2021.11_Hydrogen-as-a-carbon-free-energy-carrier-and-commodity_clean.pdf).

[9] Law 21.305 on Energy Efficiency defines green hydrogen and its derivatives as a fuel and grants fiscal incentives to net-zero cars powered by hydrogen fuel cells.

[10] Guidance to grant authorization and approval to hydrogen projects in Chile, available at: MoE, “Guía de Apoyo: Para Solicitud de Autorización de Proyectos Especiales de Hidrógeno,” [https://energia.gob.cl/sites/default/files/guia\\_proyectos\\_especiales\\_hidrogeno\\_2021.pdf](https://energia.gob.cl/sites/default/files/guia_proyectos_especiales_hidrogeno_2021.pdf).

[11] The MoE took the best practices from the ISO norm/TS 20100 related to gaseous hydrogen to elaborate on the proposed regulation. This law is expected by the end of 2023.

[12] The MoE started to work on this regulation based on the international norm NFPA 2. It is expected by early 2024.

## Indicative Project Overview

### Project Objective

The Project's Development Objective is to support the development of the green hydrogen industry in Chile.

## Project Components

### Component 1: Green hydrogen sub-loans and risk-mitigation facility

Component Type	Trust Fund
Investment	GET
GEF Project Financing (\$)	Co-financing (\$)
13,761,468.00	441,790,000.00

Outcome:

Accelerate the development of green hydrogen production and mobilize commercial finance

Output:

At least 10 green hydrogen (renewable-energy-powered electrolysis) sub-projects with with electrolysis capacity ranging from 8 MW to 50 MW financed through sub-loans and risk mitigation reserve accounts

### Component 2: Capacity Building and Project management

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing (\$)	Co-financing (\$)
	5,625,000.00

Outcome:

Strengthened enabling environment for green hydrogen production

Output:

- (i) independent third-party consultancies to assess the risks and support the technical, financial, legal, and environmental and social evaluation of subprojects
- (ii) capacity training in technical, financial, and environmental and social assessment of green hydrogen sub-projects targeting women and providing a green hydrogen certification
- (iii) knowledge products, including assessments to help inform ways to foster demand for green hydrogen from state-owned enterprises (such as refineries, mining companies, railways, etc.) as well as the private sector; promoting the use and access of public infrastructure, particularly ports; and analyses of the expected hydrogen international commodities markets
- (iv) project management to strengthen CORFO and its role as a one-stop shop to facilitate sub-projects' access to new and existing financial instruments (e.g., R&D Law subsidies, investment sub-loans, reserve accounts, guarantees, and coverage)
- (v) Sharing of lessons on innovative risk-mitigating and financial instruments; actual technology costs and technical challenges faced by sub-projects; development impact of the green hydrogen industry; success of capacity building activities to address re-skilling challenges and create green jobs ; and/or impact of the technical assistance efforts to assess, address and support the crafting of appropriate regulatory frameworks.

### M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing (\$)	Co-financing (\$)
	1,000,000.00

Outcome:

## Effective monitoring and evaluation of the Project

### Output:

- fiduciary oversight, including procurement and financial management
- monitoring of environmental and social aspects of the sub-projects, including their resilience to climate change
- project monitoring and evaluation activities

## Component Balances

Project Components	GEF Project Financing (\$)	Co-financing (\$)
Component 1: Green hydrogen sub-loans and risk-mitigation facility	13,761,468.00	441,790,000.00
Component 2: Capacity Building and Project management		5,625,000.00
M&E		1,000,000.00
<b>Subtotal</b>	<b>13,761,468.00</b>	<b>448,415,000.00</b>
Project Management Cost		1,585,000.00
<b>Total Project Cost (\$)</b>	<b>13,761,468.00</b>	<b>450,000,000.00</b>

Please provide justification

## Coordination and Cooperation with Ongoing Initiatives and Project

Does the GEF Agency expect to play an execution role on this project?

If so, please describe that role here. Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing

**The Government of Chile has asked CORFO to develop a Green Hydrogen Facility as a public intervention to help accelerate the transition from a testing phase to a developmental stage to help scale-up the industry.** The GHF will be supported by various development banks, including the WB, the European Investment Bank (EIB), the German development bank Kreditanstalt für Wiederaufbau (KfW), and the Inter-American Development Bank (IDB). The WB Project would provide lending on a cost-covering basis to: (i) finance green hydrogen production (including electrolysis systems, compression and storage); (ii) use risk-sharing mechanisms to provide confidence on the technology and debt payment to private lenders and financiers; and (iii) support the enabling environment through capacity building and assessments, fostering local demand by state-owned enterprises and the private sector, and promoting third-party access to public infrastructure, particularly ports. Financing from the European institutions and IDB is likely to be used to provide credit lines, guarantees and other financial instruments to projects. However, additional financing will be separate and following different timelines and processes from the WB and GEF resources included in this Project paper. At this stage, further details about such contributions or resources is unknown as these proposals are still in preparation stage and Project results are independent from these initiatives. As such the financing from EIB, KfW or IDB would not be considered co-financing under the WB and GEF Project. All MDBs are coordinating preparatory



work, especially in terms of the technical assistance that would be provided and applicable environmental and social management systems (ESMSs).

This WB Project and GEF proposal are also aligned to and supported by the GEF-funded “Green Hydrogen Support in Developing Countries” Technical Assistance (TA) program. In particular, the TA program is supporting Chile to develop important aspects of the GHF. The GEF funds have become critical to both the IBRD loan and the proposed NGI instrument by:

- Helping develop the eligibility criteria and selection requirement for the GHF and sub-project selection;
- Initiate the process to secure the selection of an international firm that will support the design of a financial structure to operationalize the GHF, including: (a) map the financial risks faced by investors, debt providers, EPC contractors, and relevant participants in Chile’s green hydrogen economy and propose risk mitigation mechanisms; (b) develop an underwriting department within the GHF; (c) define the financial instruments that will be offered to green hydrogen projects through the second phase of the GHF; (d) design the governance of the GHF; and (e) design and plan a roadshow to showcase the GHF.
- Support the preparation of the GHF’s economic and financial assessment.

The GEF’s support to these key tasks has allowed CORFO and the IBRD to accelerate the preparation and design of the GEF. Furthermore, by allowing to both quantify the impacts and needs of private capital to be mobilized under the initiative, the GEF’s support has been vital in providing key evidence for policymakers to finish detailing and designing the GHF instruments and have overall proved the relevance and viability of the operation, allowing it to move towards approval. The GEF support has also helped build capacities within CORFO by providing necessary resources for the training of key staff.

## Core Indicators

### Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
<b>Expected metric tons of CO<sub>2</sub>e (direct)</b>	2871000	0	0	0
<b>Expected metric tons of CO<sub>2</sub>e (indirect)</b>	0	0	0	0

### Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
<b>Expected metric tons of CO<sub>2</sub>e (direct)</b>				
<b>Expected metric tons of CO<sub>2</sub>e (indirect)</b>				
<b>Anticipated start year of accounting</b>				
<b>Duration of accounting</b>				

### Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
<b>Expected metric tons of CO<sub>2</sub>e (direct)</b>	2,871,000			
<b>Expected metric tons of CO<sub>2</sub>e (indirect)</b>				
<b>Anticipated start year of accounting</b>	2024			
<b>Duration of accounting</b>	20			

### Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
<b>Target Energy Saved (MJ)</b>				

### Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
Energy Storage	244.00			

### Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
<b>Female</b>	1,275			
<b>Male</b>	7,225			
<b>Total</b>	<b>8,500</b>	<b>0</b>	<b>0</b>	<b>0</b>

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

The calculation of the “Core Indicator 6 – GHG Emissions Mitigated”, assumes that the production of “green” hydrogen (produced through electrolysis, powered exclusively by renewable energy sources) supported by this Project will directly replace “grey” hydrogen produced using fossil fuels (through steam methane reforming -SMR- processing of natural gas). Chile has a large potential replacing existing grey hydrogen used domestically with green hydrogen, thereby supporting its decarbonize agenda, develop local production, and reduce fossil fuel imports. For instance, currently Chile’s refineries alone consume an estimated 58,500 ton of hydrogen per year (currently served with grey hydrogen) and imported fossil-based ammonia requires 90,000 tons of hydrogen per year to be produced. In contrast, the Project is expected to support production of around 17,000 ton of green hydrogen per year, which would represent 30 percent of current demand for hydrogen in refineries, and 18 percent of hydrogen needed to replace fossil-fuel based ammonia that is currently imported (by producing ammonia domestically from green hydrogen). This shows there is a wide space for locally produced green hydrogen to replace existing fossil-based hydrogen uses in Chile in the short term, while exports infrastructure and markets are being developed.

To arrive at the above-mentioned value of emissions reductions (ER), the following assumptions and steps were followed:

- Key assumptions:
  - o Existing electrolyzer technology is utilized. CAPEX is estimated in 667 \$US/kW installed (exclusive of installation costs) and efficiency is estimated in 65%.
  - o Project support results in up to 244 MW of electrolyzer capacity installed.
  - o Electrolyzers have a 45 percent utilization factor in average.
  - o All electricity for electrolyzers and associated systems is sources from renewable electricity generation sources. The lifetime GHG emissions per MWh of electricity from those sources was estimated to be extremely low (1 tonCO<sub>2</sub>eq/MWh was assumed).

- o Lifetime emissions for hydrogen produced through Steam Methane Reforming (SMR) of natural gas (known as “grey hydrogen”) were estimated at 10.5 kgCO<sub>2</sub>eq/kgH<sub>2</sub>, considering not only emissions from burning natural gas, but also those from transporting natural gas to Chile by ship, in the form of LNG.
- o Since “green” hydrogen will replace “grey” hydrogen in existing processes, post-production carbon emissions of “green” and “grey” hydrogen are assumed to be the same, and thus cancel each other.
- o The Project is planned on an 20-year timeframe, based on the average lifetime of an electrolyzer stack (15 years) and the expected implementation timeline. This is a conservative estimation, given the fact that replacing the stacks would only cost a fraction of total project cost and would allow for a longer lifespan, but was assumed to simplify the analysis and avoid making hard assumptions regarding future electrolyzer stack costs.

The GHG emissions assessment boundary was defined around Chile, the baseline case was defined as grey hydrogen production in Chile, and the project case was defined as green hydrogen production in Chile, partially displacing existing grey hydrogen production. Overall, the GHG emissions assessment followed these steps: (i) production capacity (electrolyzers installed capacity) was estimated based on expected Project support to be provided and current CAPEX for electrolyzers; (ii) annual production (tons of “green” hydrogen produced) were estimated based on capacity, electrolyzer efficiency and electrolyzer use factors, resulting in 15,000 tons of hydrogen to be produced per year; (iii) the annual amount of “green” hydrogen produced was multiplied by the difference in GHG emissions between “green” and “grey” hydrogen replaced (9.5 kgCO<sub>2</sub>eq/kgH<sub>2</sub>), which resulted in 144,000 tons of CO<sub>2</sub>eq reduced per year (0.155 million tons CO<sub>2</sub>eq); (iv) the previous value was then multiplied by the expected project lifetime (20 years) to obtain the total direct emission reductions, resulting thus in the final estimate of 2,871,000 tons of CO<sub>2</sub>eq reduced (2.9 million tons CO<sub>2</sub>eq). Key details are further discussed below.

- Boundaries:

- o As discussed, the Project GHG estimates only considers the replacement of grey hydrogen produced and used in Chile with green hydrogen to be produced and used in Chile. As such, green hydrogen production supported by the Project is estimated to be equivalent to roughly 30 percent of current production and consumption in Chile (annual hydrogen production would amount to an estimated 15 thousand tons of hydrogen, while current production and consumption of hydrogen in Chile is around 61 thousand tons).

- o The land footprint of electrolyzers is expected to be low and concentrated in existing industrial areas, and the Project will include an exclusion lists to avoid land clearing emissions.

- Baseline:

- o The emissions baseline was based on the GHG emissions from “grey” hydrogen. The sources consulted estimated “grey” hydrogen production emissions at between 9.5 and 11 tonCO<sub>2</sub>eq/tonH<sub>2</sub>, with the larger number corresponding to cases when the natural gas for the SMR process had to be sourced through long distances.

- o Embedded emissions from SMR were estimated at 9.5 kgCO<sub>2</sub>eq/kgH<sub>2</sub>, considering that natural gas does not only release CO<sub>2</sub> during the SMR process but is also used as an energy source for the SMR process.

- Project scenario:

- o Conservative assumptions regarding the Project emissions were made, as the operation will rely exclusively on green hydrogen produced with renewable energy. Hydrogen production supported by the project will source electricity 100 percent from renewable generation sources.

- o Electrolyzers will have a 40 percent utilization factor on average. This is quite low, but it is a conservative assumption to allow the electrolyzer system to be sized to fully using renewable energy and not rely on a generation mix sourced from the grid (except in emergencies). Thus, there is no need to demonstrate substantiality of emission reductions as the Project supports hydrogen produced through electrolysis using exclusively (100 percent) low-carbon sources

- o GHG emissions from electricity production, per MWh of electricity from those sources was estimated to be negligible (0 tonCO<sub>2</sub>eq/tonH<sub>2</sub>).

- o Given the fact that “green” hydrogen would be replacing “grey” hydrogen in existing processes, post-production carbon emissions of “green” and “grey” hydrogen are assumed to be the same, and thus cancel each other.

The GHG emissions estimations will be further developed and presented in an excel sheet for CEO endorsement. Emissions will be tracked and sub-projects benefitting from the operation will report key data to accurately estimate emission reductions.

Core indicator 11: The estimated 8,500 direct Project beneficiaries includes only new direct jobs expected to be created, staff and stakeholders to be trained, consultants and others to be engaged. The percentage of women beneficiaries is expected to be 35% for training, capacity building and certification activities under component 2 and 10% for job creation, arriving at a total estimate of 15% women beneficiaries.

## NGI (only): Justification of Financial Structure

Please describe the financial structure and include a graphic representation. This description will include the financial instrument requested from the GEF and terms and conditions of the financing passed onto the Beneficiaries.

The proposed Project will support the early deployment of green hydrogen supply investments in Chile through the creation of a GHF. The Project will consist of an Investment Project Financing (IPF) loan for US\$150 million to the GoCI to be implemented through CORFO over a five-year period plus US\$15 million from the GEF's NGI program. The Project will comprise two components aimed at reducing the cost of producing a kilogram of green hydrogen: (i) green hydrogen investment sub-loans and risk-mitigation instruments; and (ii) capacity building and project management. Both components will support the establishment of the GHF, help develop the enabling environment and focus on achieving emissions reductions. The Project will provide the financial instruments, through which it is expected to mobilize about US\$ 300 million from private capital, including an estimated US\$ 130 million in private equity and about US\$ 175 million in commercial debt. Both components would support the establishment of the GHF and focus on achieving emissions reductions.

Under Component 1, the Project will include the development of financing and risk-mitigation instruments with financing to be provided from the IBRD loan (US\$ 141.79 million IBRD) and US\$ 13.76 million from the GEF's NGI. The WB operation would be processed as a stand-alone Project during FY23, while the GEF-NGI would be processed only after GEF approval and endorsement which is expected during FY24; thus, the GEF-NGI would be processed as an additional financing to the WB loan operation.

The financing from the WB and GEF-NGI to the financial instruments would be as follows:

- Sub-component 1a: Green Hydrogen Investment Sub-loans (estimated US\$135.00 million, IBRD). This sub-component would provide investment sub-loans to financial intermediaries (and, eventually, directly to green hydrogen sub-projects) for up to 40 percent of the investment costs (capital expenditures, CAPEX) for green hydrogen production (including electrolysis systems, compression, and storage). The IBRD loan resources will only finance investment costs associated with the production of green hydrogen (and not with the production of any derivative or any green energy generation source), including, *inter alia*, the capital cost of the electrolyzer, compressor, storage, and dispenser equipment, as well as related installation, engineering, transport, and civil works—items that can represent between 60 and 80 percent of the total costs of a green hydrogen production plant. The investment sub-loans would have a grace period until they generate sufficient income to service the debt (up to three years) and would generally be repaid over a 12– to 14–year period.

- Sub-component 1b: Risk-Mitigation Reserve Accounts (estimated US\$13.76 million GEF; US\$6.79 million, IBRD). This sub-component will finance reserve accounts, a typical instrument used in project finance, to mitigate the payment and operational risk associated to the green hydrogen production sub-projects. Sub-component 1b would complement the investment sub-loans, if the RFI requests so, and will make part of the debt service of the sub-projects. However, an RFI would not be able to request reserve accounts without an investment sub-loan. In its sub-project assessment, CORFO will determine the size of the reserve accounts. CORFO will monitor their use and replenishment and ensure overall compliance. Specific characteristics of the reserve accounts are described below:
  - *Debt service reserve account (DSRA)*: The DSRA will be created to mitigate the risks arising from the innovative nature of the technology and the uncertainty related to unexpected or untimely cash needs for private debt repayment related to the green hydrogen production (including electrolysis systems, compression and storage). The DSRA will be available to cover up to 12 months of private sector debt installment repayment of a sub-project, in turn reducing the risks related to potential payment default by sub-projects. The RFI's would call the DSRA in the event of a shortfall of cashflows that jeopardizes debt repayment to RFIs or other private sector debt lenders of the sub-projects based on the agreed debt service coverage ratio, for debt other than repayments of a sub-loan financed under Sub-component 1a. The sub-project will replenish the DSRA in up to 24 months if the DSRA is called. Activation of the DSRA, the steps, and the processes will be detailed in the POM.
  - *Liquidity reserve account (LRA)*: The LRA will be created to cover unexpected short-term technical underperformance in the green hydrogen generation plant that impact the expected production level of a green hydrogen sub-project and provide liquidity to the sub-project. This risk-mitigation instrument is intended to reduce the cost of EPC performance guarantees and will strengthen confidence among EPC firms, financiers, or lenders in the operational performance of the green hydrogen sub-project. Given the limited track record of green hydrogen technology, the LRA would be available for the initial five years of a green hydrogen sub-project to mitigate its potential technical underperformance. The LRA would be established based on a percentage (of up to 25 percent of a green hydrogen sub-project's revenue. It will be created to provide additional liquidity and facilitate the sub-project's continued operation. The LRA's triggering could be requested solely when sub-projects face nonstructural technical challenges (especially early on) that could arise due to the early development stage of the green hydrogen industry. Triggers will include, among others: (i) temporary deviations of operational Key Performance Indicators (KPIs) related to the production, compression, or storage of hydrogen (an operational KPI matrix will be submitted with the sub-project application); (ii) complications arising from the unavailability of component replacements; or (iii) excessive costs for repair and replacements due to component failure or due to unexpected performance degradation (beyond the scope of the performance-based maintenance contracting). The triggers will be further detailed in the POM based on these indicative concepts and others to be further defined with CORFO.

Funding under Component 1 would be provided at IBRD preferential terms (compared to commercial market rates) but covering CORFO's costs. By providing funding on a preferential but cost-covering basis and by establishing reserve accounts, CORFO will enhance the capacity of the RFIs as well as the financed sub-projects to manage the incremental risks of the Project's innovative green hydrogen approaches, which are expected to add significant environmental benefits. CORFO will pass on the cost of the IBRD funding, its administrative

costs, and the expected risk of default of the RFIs (when lending through these intermediaries) or the sub-projects (when eventually lending directly to them). RFIs receiving funding for on-lending would determine the rates of their sub-loans considering market conditions.<sup>[1]<sup>13</sup></sup>

**The proposed Project will be implemented by CORFO, which would assume overall responsibility for the Project and implement Components 1 and 2.** CORFO is a decentralized public service agency with its own legal person and its own assets<sup>[2]<sup>14</sup></sup> for fostering productive activities, innovation, entrepreneurship, investment and financing, and capacity building in the country. It carries out several financing programs, the most important being those that enable micro, small, and medium enterprises (MSMEs) to access finance by providing guarantees and funding that operate through RFIs. CORFO will receive budgetary approval from the Budget Law approved by Congress each year to use its resources for the implementation of the Project and from the Budget Office (*Dirección de Presupuesto*, DIPRES)<sup>[3]<sup>15</sup></sup> to be able to request the reimbursement of funds to the WB. Within CORFO, the Investment and Financing Management Unit (*Gerencia de Inversión y Financiamiento*, GIF) will be responsible for all Project activities under both Project components, specifically, through its Department of Studies and Management Control (*Subdirección de Estudios y Control de Gestión*) with extensive support from its Department of Risk Management and Financing and Educational Rights (*Subdirección de Gestión de Riesgos y de Financiamiento y Derecho Educacional*) and the Finance and Administrative Management Unit (*Gerencia Administración y Finanzas*, GAF). Some activities under Component 2 will be developed in coordination with the CORFO Green Hydrogen Committee.

For the implementation of Component 1, CORFO–GIF will be the wholesale financial intermediary managing the process to provide investment sub-loans and reserve accounts to other RFIs on a rolling basis and on a sub-project to sub-project basis. The financial risk assessment unit and the environmental and social risk assessment unit of the Department of Risk Management and Financing and Educational Rights of CORFO–GIF will assess the RFIs requests for credit lines that would provide investment sub-loans and reserve accounts for up to US\$40 million. It will do so with support from a pool of third-party independent consultant firms with technical, financial, legal, and socioenvironmental expertise. CORFO’s risk assessment units, with support from the third-party experts, will assess the sub-projects technical, financial, legal, and environmental and social risks, propose mitigation measures, and the provide recommendations on the sub-project’s allocation for investment sub-loans and reserve accounts in a draft Finance Agreement. The draft Finance Agreement would be presented to CORFO’s GHF Credit Committee for approval or rejection of the proposed investment sub-loans and reserve accounts. The GHF Credit Committee will include external technical experts with experience in infrastructure project finance and green hydrogen, as detailed in the POM.

Sub-projects will pay a fee to cover administrative costs for the management of all financial instruments by the RFI. Since the GH industry is at a nascent phase, and there is currently no market and very limited commercial finance available for these types of projects, the fees would need to be as low as possible to

induce the intended investments to be realized, but sufficient to cover administrative costs. This would also guarantee fulfilling the

#### A. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Describe how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how. (max. 500 words, approximately 1 page)

#### **Alignment with GEF**

The design and deployment of the GHF would allow the GEF resources to generate substantial benefits for Chile and its energy sector as well as the creation of green value chains in other economic segments, such as the steelmaking, mining, and agriculture industry that will benefit from the local production of fertilizer, which today is fully imported. Furthermore, the instrument will foster in private sector participants and create innovative risk mitigation solutions to help develop a nascent and promising industry that will be key to tackle climate change, especially in those hard-to-abate sectors of the economy.

The GHF is fully aligned with the GEF-8's Programming Directions to address major drivers of environmental degradation and to achieve systems change. The GHF would be directly supporting the GEF-8 Climate Change Focal Area Strategy, in particular objective 1.2, "Enable the transition to decarbonized power systems." The GHF would allow for new green hydrogen subprojects and applications, decarbonizing power generation and energy use in general, and enabling the overall transition to renewable energy-based power systems.

The GHF would also complement additional resources from other initiatives and donors and demonstrate the viability (and potential scalability and replicability) of the planned GHF, helping launch a first of its kind mechanism for green hydrogen financing. The GEF proposal would confirm the long-standing role of the GEF as a key partner and facility for crafting new mechanisms that help drive innovation, demonstration and leveraging of resources.

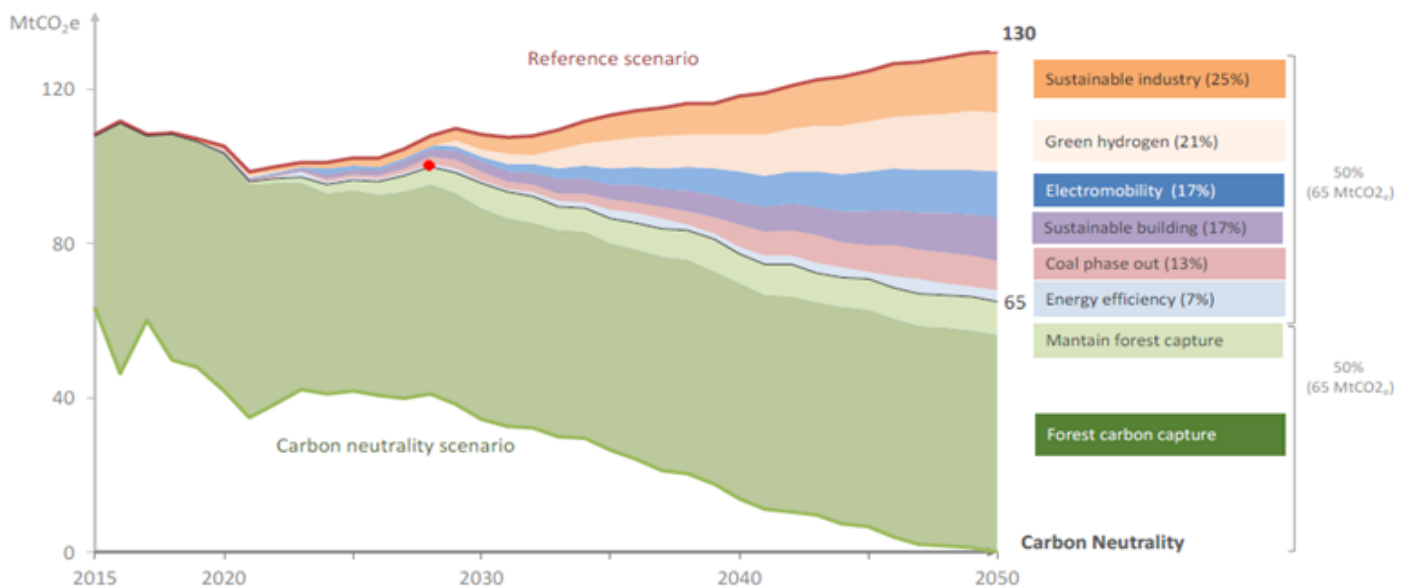
#### **Alignment with Country/Regional Priorities**

The Government of Chile's (GoCI's) *Programa de Gobierno Apruebo Dignidad 2022–26* aims to foster inclusive and sustainable economic growth. The Boric administration has set an ambitious reform agenda centered on tax and pension reform; maintaining fiscal discipline; equitable access to quality education and health services for the vulnerable; gender parity; and economic growth through digital transformation and more sustainable, innovative, and environmentally friendly practices. As part of this vision, Chile is reformulating environmental and energy policies to put local populations at the center, with a special focus on reducing regional inequalities across the country and supporting the transition to a net-zero economy.

Chile is strongly committed to decarbonization and to reaching carbon neutrality by 2050. Chile's economy and the competitiveness of various of its productive sectors are vulnerable to risks associated with the increased intensity and frequency of extreme weather events (as experienced over the past decade). Among

the country’s efforts to address these challenges, the Climate Change Framework Law (No. 21455) codifies its pledge to reach carbon neutrality by 2050. The law includes (i) the obligation for Chile to comply with its updated Nationally Determined Contribution<sup>[1]16</sup> (NDC) (limit greenhouse gas [GHG] emissions to 95 million tons of carbon dioxide equivalent [MtCO<sub>2</sub>eq] by 2030<sup>[2]17</sup>); and (ii) a Long-Term Climate Strategy (*Estrategia Climática de Largo Plazo*, ECLP, presented at COP26),<sup>[3]18</sup> which outlines a road map to significantly increase renewable energy generation and green hydrogen production, and reduce emissions from industry and mining, in turn decarbonizing the economy. It specifically acknowledges green hydrogen’s potential role in reducing GHG emissions by 21 percent by 2050, as shown in figure 1.<sup>[4]19</sup>

Figure 1: Pathway to carbon neutrality by 2050



Source: MoE (Ministry of Energy), *Carbono Neutralidad en el Sector Energía: Proyección de Consumo Energético Nacional 2020* (Santiago de Chile: Ministry of Energy, Government of Chile, 2019), [https://energia.gob.cl/sites/default/files/pagina-basica/informe\\_resumen\\_cn\\_2019\\_v07.pdf](https://energia.gob.cl/sites/default/files/pagina-basica/informe_resumen_cn_2019_v07.pdf).

In 2020, Chile launched an ambitious National Green Hydrogen Strategy (NGHS)<sup>[5]20</sup> to become a global leader in green hydrogen production and leverage Chile’s abundant and low-cost renewable energy potential. The primary objectives of the NGHS include (i) having 5 GW of electrolysis capacity under construction by 2025, (ii) producing the lowest-cost hydrogen in the world by 2030, and (iii) being among the top three global hydrogen exporters by 2040. Key domestic offtaker sectors identified by the NGHS include oil refineries and chemical industries (including ammonia and methanol), mining haul trucks (*camión de extracción*, CAEX),



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heavy-duty transport, and long-range buses. According to the NGHS, developing a green hydrogen industry could unlock US\$330 billion in private investment opportunities and exports of about US\$30 billion, representing 10 percent of GDP by 2050.<sup>[6]<sup>21</sup></sup>

The IBRD and GEF-NGI resources to support the development of the green hydrogen industry can help Chile achieve a just transition, since it has the potential to generate new skilled green jobs and absorb jobs related to fossil fuels, particularly in the decentralized regions of the country—that is, Antofagasta, Magallanes, and Bio-Bio.<sup>[7]<sup>22</sup></sup>

Many of the green hydrogen projects would be located in regions with the highest renewable energy capacity factors primarily in the northern region of Antofagasta, and the southern regions of Magallanes and Bio-Bio. These hydrogen hubs or hydrogen valleys can help stimulate the economy by capitalizing on economies of scale to develop local demand and capacity (in terms of new green local employment opportunities), especially in the regions with more vulnerable and marginalized people. Chile also has the opportunity to use green hydrogen as a strategic industry to foster a just transition in the context of transitioning fossil fuel-related jobs, such as those lost due to the planned closure of 5 GW of coal-fired thermal plants by 2040.<sup>[8]<sup>23</sup></sup>

For instance, AES Andes is developing a project to produce hydrogen in its former thermal plant of Angamos (which will close operations in 2025), and is reskilling workers to operate the plant and continue using the existing power and water infrastructure to feed the electrolyzer.<sup>[9]<sup>24</sup></sup>

Analytical work has shown that the development of green hydrogen can lead to the generation of an estimated 22,000 new green employment opportunities by 2030, 87,000 by 2040, and 94,000 by 2050 in Chile.<sup>[10]<sup>25</sup></sup>

However, there is currently limited local knowledge on the technical and operational aspects of hydrogen production and its associated risks, and potential lenders also lack the appropriate expertise and tools to assess the economic and financial viability of green hydrogen projects. To fill the local capacity gap, necessary training and knowledge are required to upskill or reskill professionals from existing industries to satisfy the labor market demands and support the hydrogen ecosystem.

A Green Hydrogen Facility (GHF) is a strategic public intervention that fosters green hydrogen development as it crowds in private capital, mitigates risks, and reduces the costs mentioned above. Devoting targeted amounts of public resources to mitigate perceived risks and finance key capital goods for green hydrogen production can create a multiplying effect on private investments. Scaling up green hydrogen projects from a pilot phase to a commercial scale would reduce the costs of producing a kilogram of green hydrogen, thereby increasing the technology's competitiveness.<sup>[11]<sup>26</sup></sup>

Leveraging Chile's comparative advantages and tailored public interventions could accelerate the transition to industrial-scale green hydrogen projects by: (i) providing the catalytic capital to attract private financing; (ii) acting as an anchor investor to attract interest; (iii) supporting the construction of an initial portfolio of attractive green hydrogen projects; thus spearheading

industry development; and (iv) fostering the country's enabling environment by supporting capacity building and local demand.

The overall Project is also aligned to and supportive of the Chile's regulatory efforts. The Government of Chile has already defined a regulatory action plan to implement laws and regulations that will support the deployment of green hydrogen projects, which the World Bank is also supporting. The main topics covered by the regulatory action plan include those related to (i) fostering local demand and market creation; (ii) safety in operation of green hydrogen and its end uses; and (iii) environmental and social management. The Ministry of Energy is leading the efforts to implement the plan, and has the support of the ministries of Transport, Mining, Health, Environment, Mining, Superintendency of Energy and Fuel, and National Energy Commission. Furthermore, the Project is being critically informed by the GEF-funded "Green Hydrogen Support in Developing Countries" TA program, whose support to address environmental and social aspects – among others – will be key to help create an enabling environment.

The Project is aligned with the upcoming CPF for FY24–27, which is expected to be discussed by the WB's Board of Directors jointly with this operation. Given that the proposed operation will support the development of the nascent green hydrogen industry (which will promote the strengthening and modernizing of the energy sector, help reduce emissions to help the country reach its climate change goals, and support local economic development and export diversification), , The Project will contribute to the CPF's proposed high-level objective to "Foster decarbonized and resilient development" and its Objective 3 to "Promote the development low-carbon development in the energy, transport, and industrial sector."

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[1] NDCs are at the heart of the Paris Agreement and the achievement of its long-term goals. By setting NDCs, each country commits to reducing national emissions and adapting to the impacts of climate change (United Nations—Climate Change).

[2] UNDP Global NDC Support Programme, "Chile," United Nations Development Programme, <https://www.ndcs.undp.org/content/ndc-support-programme/en/home/our-work/geographic/latin-america-and-caribbean/Chile.html>.

[3] 2021 United Nations Climate Change Conference. See Government of Chile, *Estrategia Climática de Largo Plazo de Chile* (Santiago de Chile: Government of Chile, 2021), [https://unfccc.int/sites/default/files/resource/CHL\\_LTS\\_2021.pdf](https://unfccc.int/sites/default/files/resource/CHL_LTS_2021.pdf). The World Bank provided support for the development of the Long-Term Climate Strategy in the Framework of the COP21 Aide Memoire: Ana Bucher, Patricio Bofill, and Carolina Urmeneta, "Chilean Society Builds Its Long-Term Climate Strategy in a Participatory Way," World Bank blogs, November 8, 2021, <https://blogs.worldbank.org/latinamerica/chilean-society-builds-its-long-term-climate-strategy-participatory-way>.

[4] COP25 (2019 United Nations Climate Change Conference), Chile, "Chile Delivers Long-Term Climate Strategy to the UN Executive Secretary of Climate Change," November 3, 2021, <https://cop25.mma.gob.cl/en/chile-delivers-long-term-climate-strategy-to-the-executive-secretary-of-un-climate-change/>.

[5] MoE, *National Green Hydrogen Strategy* (Santiago de Chile: Ministry of Energy, Government of Chile, 2020), [https://energia.gob.cl/sites/default/files/national\\_green\\_hydrogen\\_strategy\\_-\\_chile.pdf](https://energia.gob.cl/sites/default/files/national_green_hydrogen_strategy_-_chile.pdf).

[6] MoE, *National Green Hydrogen Strategy*.

[7] A hydrogen valley is a defined geographical area where hydrogen serves more than one end sector or application in mobility, industry, and energy. This typically covers all the necessary steps in the hydrogen value chain, from production (and often even dedicated renewable electricity production) to subsequent storage and its transport and distribution to various offtakers.

[8] MoE, "Estrategia de Transición Justa en Energía," <https://energia.gob.cl/mini-sitio/estrategia-de-transicion-justa-en-energia>.

[9] AES Andes, "AES Andes Launches the First Green Hydrogen Open Season in Chile with Its Adelaida Project," October 26, 2022, <https://www.aesandes.com/en/aes-andes-launches-first-green-hydrogen-open-season-chile-its-adelaida-project>.

[10] 4e (Programa de Energías Renovables y Eficiencia Energética en Chile), *Cuantificación del encadenamiento industrial y laboral para el desarrollo del hidrógeno en Chile* (Santiago de Chile: Ministry of Energy, 2020), <https://www.4echile.cl/publicaciones/cuantificacion-del-encadenamiento-industrial-y-laboral-para-el-desarrollo-del-hidrogeno-en-chile/>.

[11] Hydrogen Council, *Path to Hydrogen Competitiveness: A Cost Perspective* (Belgium: Hydrogen Council, 2020), <https://hydrogencouncil.com/wp-content/uploads/2020/01/Path-to-Hydrogen-Competitiveness-Full-Study-1.pdf>.

[1] NDCs are at the heart of the Paris Agreement and the achievement of its long-term goals. By setting NDCs, each country commits to reducing national emissions and adapting to the impacts of climate change (United Nations—Climate Change).

[2] UNDP Global NDC Support Programme, “Chile,” <https://www.ndcs.undp.org/content/ndc-support-programme/en/home/our-work/geographic/latin-america-and-caribbean/Chile.html>.

[3] Government of Chile, *Estrategia Climática de Largo Plazo de Chile*, (Santiago de Chile: Government of Chile, 2021), [https://unfccc.int/sites/default/files/resource/CHL\\_LTS\\_2021.pdf](https://unfccc.int/sites/default/files/resource/CHL_LTS_2021.pdf). The World Bank provided support to the development of the Long-Term Climate Strategy in the Framework of the COP21 Aide Memoire; Ana Bucher, Patricio Bofill, and Carolina Urmeneta, “Chilean Society Builds Its Long-Term Climate Strategy in a Participatory Way,” World Bank blogs, November 8, 2021, <https://blogs.worldbank.org/latinamerica/chilean-society-builds-its-long-term-climate-strategy-participatory-way>.

[4] COP25, Chile, “Chile Delivers Long-Term Climate Strategy to the UN Executive Secretary of Climate Change,” November 3, 2021, <https://cop25.mma.gob.cl/en/chile-delivers-long-term-climate-strategy-to-the-executive-secretary-of-un-climate-change/>.

[5] Ministry of Energy, *National Green Hydrogen Strategy* (Santiago de Chile: Ministry of Energy, Government of Chile, 2020), [https://energia.gob.cl/sites/default/files/national\\_green\\_hydrogen\\_strategy\\_-\\_chile.pdf](https://energia.gob.cl/sites/default/files/national_green_hydrogen_strategy_-_chile.pdf).

[6] Uwe Weichenhain, Markus Kaufmann, Martin Hölscher, and Martin Scheiner, *Going Global: An Update on Hydrogen Valleys and Their Role in the New Hydrogen Economy* (Luxembourg: Publications Office of the European Union, 2022), <https://h2v.eu/media/9/download>.

[7] Ministry of Energy, *National Green Hydrogen Strategy*, 12.

[8] Ministry of Energy, “Antofagasta y Magallanes: Lugares estratégicos para el desarrollo de Hubs de hidrógeno verde,” April 1, 2022, <https://energia.gob.cl/noticias/nacional/antofagasta-y-magallanes-lugares-estrategicos-para-el-desarrollo-de-hubs-de-hidrogeno-verde>.

## B. POLICY REQUIREMENTS

### Gender Equality and Women’s Empowerment:

We confirm that gender dimensions relevant to the project have been addressed as per GEF Policy and are clearly articulated in the Project Description (Section B).

Yes

### Stakeholder Engagement

We confirm that key stakeholders were consulted during PIF development as required per GEF policy, their relevant roles to project outcomes and plan to develop a Stakeholder Engagement Plan before CEO endorsement has been clearly articulated in the Project Description (Section B).

Yes

### Were the following stakeholders consulted during project identification phase:

Indigenous Peoples and Local Communities: Yes

Civil Society Organizations: Yes

Private Sector: Yes

### **Provide a brief summary and list of names and dates of consultations**

Considering the nature of the proposed Project, the key stakeholders in its citizen engagement activities will be the local communities where green hydrogen sub-projects will be developed. CORFO carried out consultations with various stakeholders on March 30, 2023, including direct and indirect beneficiaries, local authorities, and representatives of civil society, unions, trade associations, and community organizations, including indigenous organizations. These consultations focused on the design, procedures, and systems related to the operation. Those attending the consultation event expressed gratitude for the opportunity to provide feedback, and while the bulk of the comments were concentrated around the structure of the Green Hydrogen Financial Program and issues such as the criteria for its acceptance of RFIs, questions were also raised regarding the practical implications of CORFO's operation of an ESMS, and the ground-level impacts of green hydro production plants, especially in Magallanes. For example, participants in the civil society break-out group registered their expectation that, beyond the proper mitigation and management of adverse impacts from GH subprojects, these should generate community-level benefits, such as employment. Consultations will continue throughout the lifespan of the Project, as specified in its SEP. CORFO will also establish and maintain a grievance redress system for addressing stakeholder complaints related to the activities supported by the Project.

CORFO will also establish and maintain a grievance redress system for addressing stakeholder complaints related to the activities supported by the Project.

The Results Framework includes an indicator to assess the satisfaction of stakeholders with the consultation and engagement process done by sub-projects. The indicator will be used to capture stakeholders' feedback during the consultations and engagement process the sub-projects follow as aligned with the Project's SEP.

### **Summary and list of names and dates of consultations**

The Project includes a wide range of partners, beneficiaries, and overall stakeholders. These include, but are not limited to, local communities, private sector developers, commercial banks, capital funds, technology developers, engineering companies, manufacturers, other multilateral and bilateral cooperation agencies, government ministries, amongst others. The WB has carried out extensive discussions and consultations with key stakeholders in the nascent green hydrogen sector, both nationally and internationally, since March 2020.

Overall, these discussions have allowed the WB to craft a tailored mechanism and shown there is strong institutional support from key government agencies to advance the green hydrogen industry and to help secure market conditions that enable private investments. Key sector entities are committed to advancing the green hydrogen industry as a key policy that will generate major economic, social and environmental impacts in the country, including among other, the ME, Ministry of Finance (MoH), Ministry of Foreign Affairs, Ministry of Environment, National Energy Commission (CNE), Superintendency of Electricity and Fuels (SEC), National Petroleum Company (ENAP), and the Economic Development Agency (CORFO).[1127](#)

Consultations and interviews already performed have included discussions with stakeholders such as:

Chilean institutions:

- o Desarrollo País
- o CORFO
- o Fundación Chile
- o Coordinador Eléctrico Nacional (CNE)
- o Universidad Santa Maria
- o Banco Estado
- o Ministerio de Energía
- o Ministerio de Transporte
- o ENAP

Other governments and potential donors:

- o EU Commission
- o Netherlands Government and Netherlands Enterprise Agency (RVO)
- o Germany's Ministry of Energy
- o UK-BEIS
- o South Africa's CSIR

Private sector:

- o Indura (AIR PRODUCTS Group)
- o ARUP
- o Infrata
- o AES Andes
- o HDF (Hydrogene de France)
- o Porsche

Financial institutions:

- o BNP Paribas
- o Société General
- o Hudson Bankers
- o Natixis
- o Infrared Capital Partners
- o Brookfield
- o Aberdeen
- o Sumitomo
- o MUFG
- o Santander
- o BCI

Other development-focused agencies:

- o GIZ
- o KfW
- o EIB
- o UN Industrial Development Organization (UNIDO)

Trade unions:

- o Hydrogen Council of Australia
- o California Hydrogen Business Council
- o New Zealand Green Hydrogen Association
- o Green Hydrogen Organisation

- o Engie
- o Geostock/Vinci group
- o Siemens

[1] In April 2021 (prior to the creation and deployment of the GHF), CORFO opened a tender available to national and foreign companies with the objective of financing the cost of electrolyzers to viable green hydrogen projects in Chile. CORFO awarded US\$50 million to support six sub-projects that install 10MW (or more) of green hydrogen production facilities provided that they initiate commercial operation by the end of 2025. Although CORFO provided funds between US\$2 to 11 million to the six selected projects, developers have expressed that the grants have a limited impact on the financial closure of the "projects (as these will only be provided if the sub-projects are operational by the end of 2025). Analyses have shown that innovative financial mechanisms that enhance access to finance conditions can allow the absorption of risks and ensure flexible loan conditions to help match the investment needs of the projects, including risk-sharing mechanisms and attractive credit lines, which are required to secure the bankability of the projects. As such, subprojects selected may apply for support for the GHF's instruments as well, as the grants received may not be sufficient to ensure subprojects' success.

(Please upload to the portal documents tab any stakeholder engagement plan or assessments that have been done during the PIF development phase.)

## Private Sector

Will there be private sector engagement in the project?

Yes

And if so, has its role been described and justified in the section B project description?

Yes

## Environmental and Social Safeguard (ESS) Risks

We confirm that we have provided indicative information regarding Environmental and Social risks associated with the proposed project or program and any measures to address such risks and impacts (this information should be presented in Annex D).

Yes

## Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
High or Substantial			

## C. OTHER REQUIREMENTS

### Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described in the Project Description (Section B)

Yes

## ANNEX A: FINANCING TABLES

### GEF Financing Table

#### Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	GEF Project Grant(\$)	Agency Fee(\$)	Total GEF Financing (\$)
World Bank	GET	Chile	Climate Change	NGI	Non-Grant	13,761,468.00	1,238,532.00	15,000,000.00
<b>Total GEF Resources (\$)</b>						<b>13,761,468.00</b>	<b>1,238,532.00</b>	<b>15,000,000.00</b>

### Project Preparation Grant (PPG)

Is Project Preparation Grant requested?

false

PPG Amount (\$)

PPG Agency Fee (\$)

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non- Grant	PPG(\$)	Agency Fee(\$)	Total PPG Funding(\$)
<b>Total PPG Amount</b>						<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Please provide justification

### Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total(\$)
<b>Total GEF Resources</b>					<b>0.00</b>

### Indicative Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing(\$)	Co-financing(\$)
CCM-1-2	GET	13,761,468.00	450000000

<b>Total Project Cost</b>		<b>13,761,468.00</b>	<b>450,000,000.00</b>
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## Indicative Co-financing

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
GEF Agency	World Bank	Loans	Investment mobilized	150000000
Private Sector	Retail financial institutions	Loans	Investment mobilized	170000000
Private Sector	Project sponsors	Equity	Investment mobilized	130000000
<b>Total Co-financing</b>				<b>450,000,000.00</b>

Describe how any "Investment Mobilized" was identified

Investment mobilized includes a \$150 million IBRD loan, an expected \$170 million in loans provided by retail financial institutions (commercial banks), and an expected \$130 million equity provided by private project sponsors. The sub-project selection criteria requires that project sponsors commit to financing at least 30 percent of equity of the total cost of the green hydrogen subproject (the higher the equity share, the better the selection scoring).

## ANNEX B: ENDORSEMENTS

### GEF Agency(ies) Certification

GEF Agency Type	Name	Date	Project Contact Person	Phone	Email
GEF Agency Coordinator	Angela Armstrong	2/27/2023	Janina Franco		jfranco3@worldbank.org

### Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Name	Position	Ministry	Date (MM/DD/YYYY)
Miguel Stutzin	GEF Operational Focal Point, International Affairs Office,	Ministry of Environment	11/18/2022

**NGIs** do not require a Letter of Endorsement if beneficiaries are: i) exclusively private sector actors, or ii) public sector entities in more than one country. However, for NGI projects please confirm that the agency has informed the OFP of the project to be submitted for Council Approval

Yes

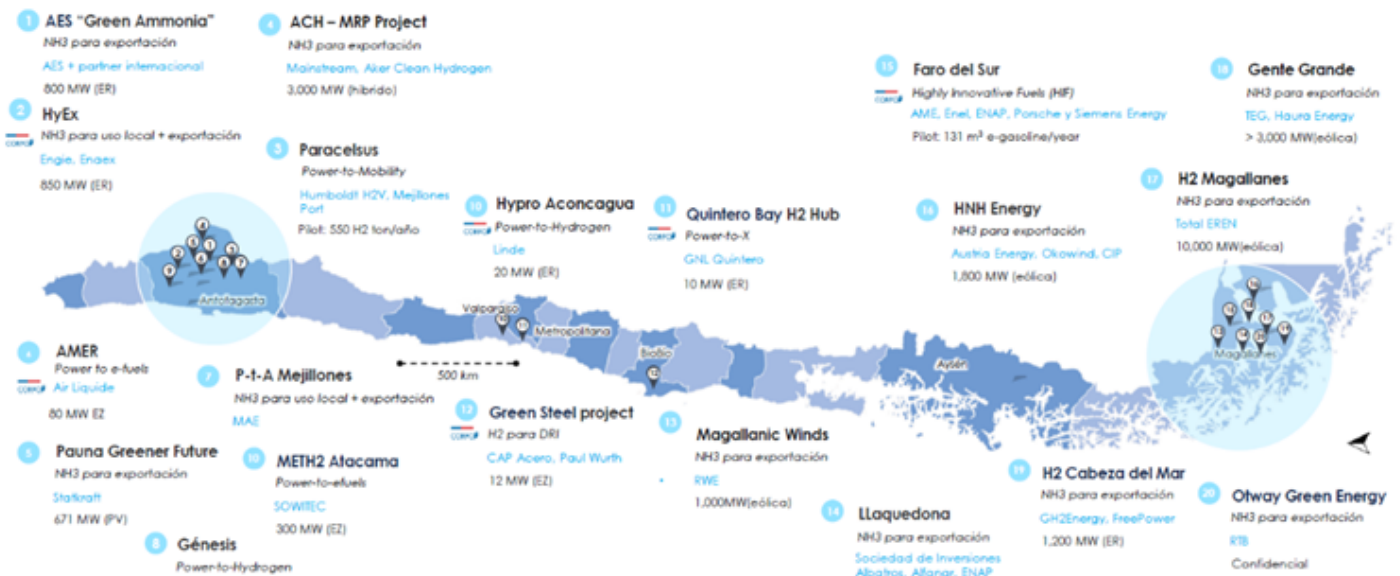
## ANNEX C: PROJECT LOCATION

Please provide geo-referenced information and map where the project interventions will take place

The Project will support a variety of sub-projects, to be selected as part of the initial implementation phase. The potential projects to be selected can be found in the Northern, central and southern regions of Chile, in



the country's main "hydrogen valleys". Of the more than 30 potential subprojects, those deemed with the highest potential are included below:



**ANNEX D: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING**

(PIF level) Attach agency safeguard screen form including rating of risk types and overall risk rating.

**ANNEX E: RIO MARKERS**

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
Principal Objective 2	No Contribution 0	No Contribution 0	No Contribution 0

**ANNEX F: TAXONOMY WORKSHEET**

Level 1	Level 2	Level 3
Influencing Models	<ul style="list-style-type: none"> <li>- Deploy Innovative Financial Instruments</li> <li>-Strengthen institutional capacity and decision-making</li> <li>-Convene multi-stakeholder alliances</li> <li>-Demonstrate innovative approaches.</li> <li>-Transform policy and regulatory environments</li> </ul>	
Stakeholders	-Private sector	- Capital providers

	<p>-Local Communities</p> <p>-Civil Society</p> <p>Type of engagement</p> <p>Communications</p>	<p>- Financial intermediaries and market facilitators</p> <p>- Large corporations</p> <p>-NGOs</p> <p>-Trade Unions</p> <p>Partnership</p> <p>Consultation</p> <p>Education</p>
Capacity, Knowledge and Research	<p>-Capacity development</p> <p>-Knowledge Generation and Exchange</p> <p>-Innovation</p> <p>Knowledge and Learning</p>	Capacity Development
Gender Equality	<p>-Gender mainstreaming</p> <p>Gender results areas</p>	<p>Beneficiaries</p> <p>Sex-disaggregated indicators</p> <p>Capacity Development</p>
Focal Area/Theme	Climate Change Mitigation	<p>Energy Efficiency</p> <p>Sustainable urban systems and transport</p> <p>Technology transfer</p> <p>Renewable energy</p> <p>Financing</p> <p>NDCs</p>

United Nations Framework on Climate Change

## ANNEX G: NGI RELEVANT ANNEXES

### Annex G.1: Template for Indicative Financial Termsheet

Instructions. This termsheet to be submitted with the PIF/PFD should include sufficient details to allow a financial expert to understand and judge the financial viability of the proposed investments. Indicative terms and conditions should be used when specific details are not yet available. An equivalent termsheet used for internal Agency purposes is acceptable but must include sections on Currency Risk, Co-financing Ratio and Financial Additionality.

#### ANNEX G: Indicative Financial Termsheet

<b>Project/Program Title</b>	Chile Green Hydrogen Facility Project
<b>Project/Program Number</b>	P177533 (IBRD Chile Green Hydrogen Facility to Support a Green, Resilient and Inclusive Economic Development)
<b>Agency presenting the Project</b>	The World Bank
<b>Project/Program Objective</b>	To support the development of the green hydrogen industry in Chile.
<b>Country</b>	Chile
<b>Project Financing</b>	<p>The GEF-NGI resources will provide the innovative risk sharing reserve accounts that will bring comfort to lenders that despite risks related to underperformance of a new technology that hydrogen sub-projects will pay their debts. This will enable commercial banks to issue debt at a lower cost and help scale up the nascent market. The use of GEF-NGI resources would enable to direct the IBRD resources towards financing of sub-projects and a more efficient use of resources.</p> <p>The overall Project will include two components. Under Component 1, it will provide green hydrogen investment sub-loans and risk-mitigation instruments. Component 2 will support capacity building and project management activities.</p> <p>Components will be financed by an IBRD loan for US\$150 million and complement by the proposed US\$15 million GEF NGI. With the use of the IBRD and GEF-NGI funds as IBRD cost recovery financing terms and risk sharing mechanism, the Project is expected to directly mobilize private sector financing for an estimated US\$300 million, including US\$ 130 million in private equity and US\$ 170 million in commercial loans, for a total project finance estimated at US\$450 million.</p>

	<p>IBRD and GEF financing would be allocated as follows:</p> <ul style="list-style-type: none"> <li>○ Component 1 (US\$141.79 million IBRD; US\$ 13.76 million GEF NGI) <ul style="list-style-type: none"> <li>– Green hydrogen sub-loans, to finance investments in CAPEX for electrolyzer systems (IBRD US\$135.00 million)</li> <li>– Risk-mitigation accounts (GEF NGI US\$ 13.76 million; IBRD US\$6.79 million) <ul style="list-style-type: none"> <li>○ Debt Service Reserve Account (DSRA), to cover untimely cash needs for debt repayment.</li> <li>○ Liquidity Reserve Account (LRA), to cover unexpected or untimely cash needs.</li> </ul> </li> </ul> </li> </ul> <p>Component 2: Capacity building and project management component (US\$6.625 million IBRD)</p>
<p><b>Investors</b></p>	<p>The Project will provide blended finance and risk sharing mechanisms to attract private investors by mitigating perceived risks and reduce market uncertainty. A conservative first assessment on potential for mobilizing private sector financing indicates that it could directly leverage about US\$300 million, including US\$130 million in private equity and US\$170 million in commercial financing.</p> <p>Chile has identified a pipeline of about 40 potential sub-projects, at various stages of development and covering different parts of the green hydrogen value chain; of these projects, 21 have feasibility studies and 16 are focused on providing green hydrogen for domestic consumption. A pipeline of 21 green hydrogen sub-projects are at advanced preparation stages (e.g. have prefeasibility and feasibility study); however, the majority of these projects are at early stages of development:<sup>1128</sup> one project (Haru Oni, with 1.2 MW of electrolysis capacity) has been constructed and is in the dry-run testing phase; four others are at an advanced preparation stage with operations aimed to begin by 2025, although financial closure is yet to be reached; and the rest are at feasibility stage.</p> <p>Sponsors are primarily international companies in the energy and ammonia field that have created consortia, many of them partnering with Chilean companies, to participate in the green hydrogen industry. Some of the main international players in the development of these pilot projects include, among others, Engie, Enel, AES Andes, Siemens, Hydrogene de France, Mitsui, Ballard, and Enaex. Local companies include ENAP, Grupo CAP, Antofagasta Minerals, Sociedad de Inversiones Albatros, and SQM.</p> <p>IFC has been in discussions with most of the players that are looking into developing green hydrogen projects in Chile and exploring potential support through the upstream (preinvestment) window or direct financing, as well as through the mobilization of concessional funding. Among these efforts, IFC provided letters of interest for several developers to submit their applications to the Chilean Economic Development Agency's</p>

(Corporación de Fomento de la Producción, CORFO) first call for green hydrogen grants, and most of the applicants that IFC supported were approved to receive the CORFO funds.<sup>[2]<sup>29</sup></sup> A common thread across these developers is their interest in incentives such as the proposed Green Hydrogen Facility (GHF) to encourage the development of green hydrogen pilots at this early stage of the technology. IFC is working in at least one large-scale green hydrogen related project that is considering a pilot to produce ammonia with green hydrogen

RFIs would apply for Project support on a rolling basis to foster the reception of sufficiently mature proposals. Sub-projects will need to be in an advanced stage of maturity and will be comprehensively assessed based on the following criteria: (i) equity and private debt leveraged; (ii) sponsors' experience; (iii) offtaker agreement in an advanced negotiation stage and its characteristics; (iv) sub-project's maturity, including technical characteristics and risks; (v) sub-project's technical and financial viability (having a technical report prepared by an independent engineering firm, and a business plan and a financial model); (vi) ability to assume financing commitments; (vii) environmental considerations (including GHG emission reductions); (viii) social and labor considerations (including local content in projects); (ix) advanced knowledge and capabilities of the developer and equipment suppliers; and (x) compliance with social and environmental permits and regulations. The POM will have further details as well as the eligibility and evaluation criteria, and the processes for the selection of the sub-projects to be supported.

Proposed Financing	Co-	Sources of	Co-financier	Type	Investment
		Co-financing			Mobilized
		GEF NGI	GEF Agency	NGI	US\$ 15 million
		IBRD IPF	IBRD	Loan	US\$ 150 million
		Private Sector	Financial Institutions and Companies	Debt and Equity	US\$ 300 million
		Total co-financing			US\$ 450 million
		Total financing			US\$ 465 million
<b>GEF Proposed Financing in the form of Non-grant instrument (NGI)</b>		US\$ 15 million, including US\$ 13.76 million – net of agency fees – for the risk mitigation instruments (reserve accounts for sub-projects – LRA and DSRA).			
<b>Agency Fees</b>		IBRD fee of US\$ 1.24 million			
<b>Total Portfolio under the Program</b>		The Program would include an estimate portfolio of US\$ 465 million, of which US\$165 million will be administered by the Agency (IBRD loan plus GEF resources), and US\$ 300 million corresponds to private sector financing (equity and debt).			

<p><b>Co-financing and Co-Financing Ratio</b></p>	<p>The GEF-NGI's support to the Reserve Accounts will be an integral part of the Project that will allow to mitigate risks of investments and leverage additional private resources, as each GEF-NGI US\$1 would mobilize US\$10 of financing from IBRD and is expected to mobilize US\$20 from private financing (including equity and debt).</p> <p>The indicative total co-financing ratio for the program, when including IBRD and private-sector resources is expected to be 1:30. Since this co-financing ratio includes an estimated private sector financing, the ratio may slightly change as the GHF becomes operational, but the Project structure would necessarily ensure it remains high.</p>
<p><b>Currency of the NGI</b></p>	<p>USD</p>
<p><b>Currency risk</b></p>	<p>The sub-projects will assume the currency risk. Even though CORFO will estimate the GHFs DSRA and LRA in US\$ dollars, these will need to be exchanged to Chilean pesos to be deposited in the accounts at the – most likely – RFIs, as they are not allowed to have any account in any other currency than Chilean pesos.</p>
<p><b>Structure and Governance</b></p>	<p>The Project will consist of an Investment Project Financing (IPF) loan for US\$150 million to the GoCl to be implemented through CORFO over a five-year period plus US\$15 million from the GEF's NGI program. The Project will comprise two components aimed at reducing the cost of producing a kilogram of green hydrogen: (i) green hydrogen investment sub-loans and risk-mitigation instruments; and (ii) capacity building and project management.</p> <p>CORFO is a decentralized public service agency with its own legal person and its own assets<sup>[3]<sup>30</sup></sup></p> for fostering productive activities, innovation, entrepreneurship, investment and financing, and capacity building in the country. It carries out several financing programs, the most important being those that enable micro, small, and medium enterprises (MSMEs) to access finance by providing guarantees and funding that operate through RFIs. CORFO will receive budgetary approval from the Budget Law approved by Congress each year to use its resources for the implementation of the Project and from the Budget Office ( <i>Dirección de Presupuesto, DIPRES</i> ) <sup>[4]<sup>31</sup> to be able to request the reimbursement of funds to the WB. Within CORFO, the Investment and Financing Management Unit (<i>Gerencia de Inversión y Financiamiento, GIF</i>) will be responsible for all Project activities under both Project components, specifically, through its Department of Studies and Management Control (<i>Subdirección de Estudios y Control de Gestión</i>) with extensive support from its Department of Risk Management and Financing and Educational Rights (<i>Subdirección de Gestión de Riesgos y de Financiamiento y Derecho Educacional</i>) and the Finance and Administrative Management Unit (<i>Gerencia Administracion y Finanzas, GAF</i>). Some activities under Component 2 will be developed in coordination with the CORFO Green Hydrogen Committee. <p>The GHF instruments under Component 1 will be deployed via lending through retail financial institutions (RFIs) and, eventually, through direct lending to sub-borrowers. At</p> </sup>

first, CORFO will rely on its considerable experience providing financing and risk-mitigation instruments through financial intermediaries. This will prevent delays and facilitate an effective and quick deployment of the GHF. However, once CORFO has the systems in place and to provide the lowest possible financial terms to help develop the green hydrogen industry, CORFO will be providing direct lending to sub-projects, for which it will need to build its capacity and establish a project finance unit. The WB will continue to provide project finance training to enable capacity strengthening and provide guidance on the establishment of the project finance unit. The lending modalities are further explained below:

*Providing financial instruments through RFIs.* Resources to be on-lent will be approved as one credit line including funds for sub-loans and reserve accounts.<sup>[5]<sup>32</sup></sup> Specific processes will be detailed in the Project Operational Manual (POM). RFIs will be responsible for opening, operating, maintaining, and supervising the reserve accounts which will be established in either the relevant RFI or in the agent leading the syndicated loan. RFIs will be responsible of ensuring all resources received from CORFO are used and managed appropriately, including ensuring that beneficiaries receiving resources use them exclusively for sub-project implementation.

*Granting financial instruments directly to sub-projects.* Engaging in this type of finance will require CORFO to build capacity in direct lending to green hydrogen sub-projects. This mechanism will be active only once CORFO has: (i) designed and prepared a business plan for a unit dedicated to provide direct financing to green hydrogen sub-projects (which can be later expanded to other green energy investments); (ii) established such a unit with adequate governance and the required technical, legal, and financial expertise to assess, design, approve, and monitor project finance arrangements; and (iii) developed the required policies, procedures, and systems in a manner satisfactory to the WB. Under this mechanism, resources will be approved by CORFO as one credit line.<sup>[6]<sup>33</sup></sup> IBRD resources for investment sub-loans will be disbursed by CORFO directly to the sub-project, while for reserve accounts, CORFO will be responsible for opening, operating, maintaining and supervising the accounts either at other financiers or at the agent of the syndicated loan. CORFO and beneficiaries receiving resources for sub-project implementation will be responsible of ensuring all resources received from CORFO are used and managed appropriately.

**Program Strategy**

Jumpstarting the industry will require making available financing at the lowest cost possible as well as risk mitigation instruments for developers and financiers. Creating a Green Hydrogen Facility (GHF) is a strategic public intervention that can foster green hydrogen development as it crowds in private capital, mitigates the risks, and reduces costs mentioned above. Devoting targeted amounts of public resources to finance initiatives in a nascent stage is needed to progress from the research and development to the deployment stage. Public intervention is further necessary and justified given

both the need to ensure public support for investments as well as to release the multiple social benefits associated to a sustainable economic development. In addition, developing targeted instruments such as those contemplated by the Facility can mitigate perceived risks and to finance key capital goods for green hydrogen production can create a multiplying effect on private investments. Leveraging Chile's comparative advantages and tailored public interventions could accelerate the transition to industrial-scale green hydrogen projects by: (i) providing the catalytic capital to attract private financing; (ii) acting as an anchor investor to attract interest; (iii) supporting the construction of an initial portfolio of attractive green hydrogen projects, thus spearheading industry development; and (iv) fostering the country's enabling environment by supporting capacity building and local demand. The GHF can also help develop a national green hydrogen industry underpinned by local stakeholders and directed towards the decarbonization of domestic industries (mining, agriculture, etc.). The use of competitive financing or lending at cost can create a local industry (as well as a new export product) and benefit Chile and the local population, including through the creation of new green jobs.

The proposed Project, when including GEF NGI financing, is expected to finance an estimated 244 MW electrolyzer capacity, kick-start the GH industry and help achieve a lower price of GH. The GHF will support sub-projects ranging from about 8MW to about 50MW for the production of green hydrogen towards uses such as producing green ammonia and green methanol or replacing fossil fuels in industrial processes or even electricity storage in isolated electricity systems. The Project would up to 40 percent of the investment costs (capital expenditures, CAPEX) for green hydrogen production (including electrolysis systems, compression, and storage). In addition, the development of a GH industry in Chile will generate institutional capacities, technical knowledge, a financing and operational mechanism that can be shared and replicated with other countries, in the LAC region and globally, thereby creating a valuable public good towards achieving carbon neutrality. The Project is highly relevant to unlock private sector financing in green hydrogen sub-projects and to develop a track record for the GH sub-projects, which is a critical element to enable the entrance of private financing and scale-up this nascent industry.

The GEF-NGI's funding would attract the participation of commercial lenders due to the presence of strong risk mitigation elements such as the DSRA and LRA. GEF-NGI resources will be key to leverage private financing and fostering participation of retail financial intermediaries, and thus mobilizing private sector capital. This is expected to result in an overall leverage ratio of 1:30 between GEF-NGI and private and IBRD financing.

The GEF-NGI's funding of the DSRA will create an essential risk mitigation instrument commonly used in project finance. As the DSRA will be triggered when the H2V Project has a cash shortfall that leaves the Project with insufficient funds to pay debt service to commercial banks, it will help attract commercial lenders that no longer will need to absorb such risks.



	<p>The GEF-NGI's support to create a LRA will be key to attract commercial debt to be able to scale up the green hydrogen industry. The LRA will be triggered when the green hydrogen sub-project is facing underperformance caused exclusively by a technical matter. This technological underperformance risk needs to be properly mitigated to attract equity and debt investors to be able to scale up the green hydrogen industry in Chile.</p>
<p><b>Environmental &amp; Social Safeguards</b></p>	<p>As a GEF Agency, the WB is aligned with the GEF's Environmental and Social Safeguards policies. The IBRD Project is preparing an ESMS, a SEP, and an ESCP, and the Project Operation Manual (a condition of Project effectiveness) will specify environmental and social (E&amp;S) procedures for sub-project evaluation and appraisal. Component 2 of the Project would also support closing gaps identified during Project preparation related to the strengthening of the implementing agency, including its technical capacities for preparation of project pipeline, project assessment and monitoring, and for environmental and social capacities to ensure compliance with WB policies and standards.</p> <p>The IBRD will share the ESRS with the GEF Secretariat in advance of CEO endorsement.</p>
<p><b>Reporting</b></p>	<p>Sub-projects will be required to provide quarterly reports to Retail Financial Intermediaries (RFIs). These will report to CORFO on a quarterly basis, which in turn will present the information to the WB every six months. This and other processes will be detailed in the Project's Operational Manual. Failure by sub-projects or RFIs to fulfill reporting obligations could result in exclusion from the GHF.</p> <p>Reports will include all standard variables usually controlled in Project Finance, plus operational indicators (i.e.: tons of green hydrogen produced, emissions avoided) and indicators specific to IBRD project supervision, as described in the IBRD Project Paper. IBRD will report to GEF-NGI on the performance of the Program through its customary annual monitoring and reporting channels.</p>
<p><b>Life of the Program and associated investment projects</b></p>	<p><b>GEF NGI Project Period</b></p> <p>The maximum amount time allowed for the agency, project implementing agency, and RFI to establish the reserve accounts will be 5 years. This will not necessarily mean all funds should be committed by year 5.</p> <p><b>IBRD Project period</b></p> <p>Will be five (5) years, with a debt term of fifteen (15) years for debt provided by the IBRD to CORFO. Concessional loans provided by financial intermediaries to sub-projects are expected to have a term of between 10 and 12 years, and private sector (Commercial) loans to sub-projects are expected to have a term (repayment period) of between 8 and 10 years.</p>

	<p><b>GEF NGI Investment Period</b> (maximum term for GEF resources committed)</p> <p>The Blended finance program is expected to last up to the lifetime of the IBRD loan taken by the GoCl, which is expected to be fifteen (15) years, to allow access for sub-projects requesting risk-mitigation instruments later in the life of the program.</p> <p>Reserve accounts for each individual sub-project will have a limited term, of up to 5 and 10 years (for the LRA and DSRA accounts respectively), and their precise term will be defined in collaboration with CORFO (based on the term of commercial debts for sub-projects). Since a 10-year DSRA account might be requested on the fifth year of the GEF NGI project period, the maximum term for GEF NGI funds was estimated in 15 years. However, due to the reflow mechanism selected, most of GEF NGI funds are expected to be reflowed much earlier.</p> <p>The criteria for defining the term of LRA and DSRA accounts for each individual sub-project will be established beforehand in the Operations Manual.</p> <p><b>Recycling</b></p> <p>Recycling might happen if sub-projects find it convenient to refinance their debt or close their reserve accounts early, or after the term of a sub-project’s LRA has been reached (expected to be up to 5 years). In these cases, the RFI will be allowed to recycle the funds, increasing the private capital mobilized by GEF funding.</p> <p>If no reserve account is closed early, and due to the proposed length of the investment period, LRA funds might be recycled two times and DSRA funds would not be recycled.</p> <p>If the remaining extent of the investment period is not enough for a reserve account utilizing recycled funds to last for its original design life, the sub-project applying for such account will be given the option of obtaining the reserve account for a period up to the end life of the investment period.</p>
<p><b>Exposure Limits</b></p>	<p>The GEF’s funding will be capped at US\$15 million.</p>
<p><b>Fees</b></p>	<p>The risk-mitigation instruments’ accounts will be in the respective RFI’s or bank agents as described above. A one-time fee for the administration of all instruments will be set and further defined in the Project’s operations manual.</p> <p>Overall funding under component 1 would be provided at IBRD financing terms, but covering CORFO’s costs. CORFO will pass on the cost of the IBRD funding, its administrative costs, and the expected risk of default of the RFIs. RFIs receiving funding for on-lending would determine the</p>

	<p>rates of their sub-loans considering market conditions, but the subsidiary agreements to be signed between these and CORFO will seek to limit their pricing, especially as most risks should be covered by CORFO. CORFO was ample experience in calculating and implementing these limits, as part of its normal operation providing financing and risk mitigation instruments to financial institutions in Chile. Eventually, CORFO could also provide direct lending to sub-projects (provided it develops its project finance capacities) helping to further ensure a potential reduction in costs and increasing efficiency.</p> <p><b>Minimum Concessionality</b></p> <p>The accounts will charge sub-projects requesting the GHF instruments a one-time fee aimed at covering administrative costs for the management of the instruments, including the reserve accounts. This fee will only aim to cover the administrative costs of managing the reserve accounts, and will be set based on the methodology stated in the Project’s operations manual. This would guarantee fulfilling the “minimum concessionality” principle of Blended Finance (as the level of concessionality will not be greater than to induce the intended investments and reductions in perceived risks).</p> <p>Due to the fact that GH industry is a nascent industry, and there is currently a minimal amount of commercial finance available for these types of projects, there is still no market that can act as a reference for the fees to be charged. Thus, to induce the intended investments and reduce perceived risks the fees charged to the sub-projects will need to be as low as possible.</p> <p>The fee’s sole objective) will be to cover administration costs. This would not imperil the participation or crowding-out of private actors, but on the contrary: as the reserve accounts are precisely for addressing risks associated to the private debt of sub-projects. They will help crowd-in private actors, reduce costs and risks for private sponsors and help develop the industry.</p>
<p><b>Reflows</b></p>	<p>GEF funding will be directed towards the GHF from which they will be allocated to specific and individual risk mitigation (DSRA and LRA) accounts for each sub-project, for a limited amount of time.</p> <p>The individual sub-project reserve accounts (financed by GEF resources) will be provided by CORFO (through RFIs or eventually directly) and will flow to the sub-projects together with the IBRD loan to finance CAPEX , as part of a credit line which will be accounted as debt of each RFI (or sub-project, when provided directly by CORFO) to CORFO. This means that the reserve accounts will be constantly re-paid by sub-projects with an amortization schedule in line with that of the CAPEX sub-loans and to be set in the specific subsidiary agreements to be signed with CORFO. Given the fact that the reserve accounts will be sub-project debt to be repaid, and taking into account that projects will, over time have repaid CORFO for these funds, at the end of the amortization timeframe any resources left in the reserve accounts will belong to the sub-project.</p> <p>This means, that, as sub-projects pay back the credit lines, the repayments for the resources originally allocated to the reserve accounts will reflow back to CORFO, and then back to the GEF. In case of failure or default of a sub-project, such loss will be accrued by the GEF after CORFO has made efforts to recover the resources.</p>
<p><b>Unused GEF Funds</b></p>	<p>Unused funds will be reflowed back to the GEF Trustee at the end of the investment period. Reflows would follow a constant process to be further detailed in the POM.</p>

<b>Recovered Proceeds</b>	Any proceeds from recovery of defaulted assets will be returned to the GEF.
<b>Cash Waterfall (Recovered Proceeds) from Individual Investment</b>	<p>If funds from an individual sub-project DSRA or LRA account are partially or totally called, sub-projects will be granted a time limit (of up to 24 months, to be defined in collaboration with CORFO, and included in the Operations Manual) to replenish the used funds into their individual accounts.</p> <p>Once accounts are replenished, if the term of the individual reserve accounts have not been met yet, funds may be kept in the individual reserve accounts until the end of their original term.</p> <p>If the term of the individual account has been reached, funds will flow to the sub-projects. If, by the end of the IBRD project period, funds for the Reserve Accounts have not been fully recovered, the GEF would incur such a loss.</p>
<b>Use of Concessionality</b>	<p>Following the “minimum concessionality” principle of Blended Finance, the level of concessionality will not be greater than to induce the intended investments and reductions in perceived risks. In line with this principle, reserve accounts funding sourced from the GEF NGI will only charge sub-projects costs related to the administration of these accounts.</p> <p>The above is due to the fact that the green hydrogen market is a nascent one, and that there is currently a lack of commercial financing willing to enter the market, a high level of concessionality is needed for instruments providing funding for reserve accounts that will help mobilize private financing. The proposed reserve accounts funded by GEF-NGI will be a vital tool to overcome these market failures, mitigating risks and enabling the entrance of private sector financing at a rate that is affordable for the sub-projects.</p>
<b>Termination</b>	The GEF-NGI funding for reserve accounts will be terminated when the last outstanding commercial loan under the GHF has been repaid, or 5 years have passed since the approval of the last (GEF-NGI financed) LRA for an individual sub-project, whichever happens last.
<b>Terms and conditions for the financing instruments</b>	<p>All use of blended concessional co-investments will meet the DFI Enhanced Blended Concessional Finance Principles for Private Sector Projects.</p> <p><b>LRA (financed by GEF NGI)</b></p> <p>(a) Amount of the GEF instrument: 5 US\$ million GEF (and 4.79 US\$ million IBRD)</p> <p>(b) Term: 5 years</p> <p>(c) Fees: An administration fee (to be defined) will be charged to eligible sub-projects, based on the administration cost of the reserve accounts.</p> <p>(d) Interest payment dates: not applicable</p>

(e) Principal repayment: 5 years

(f) Replenishment period: up to 24 months

The Liquidity Reserve Account (LRA) will initially be financed with: IBRD US\$4.79 million, to which GEF NGI US\$ 5 million is expected to be added. The LRA will be created to cover unexpected short-term technical underperformance in the green hydrogen generation plant that impact the expected production level of a green hydrogen sub-project and provide liquidity to the sub-project. This risk-mitigation instrument is intended to reduce the cost of EPC performance guarantees and will strengthen confidence among EPC firms, financiers, or lenders in the operational performance of the green hydrogen sub-project. Given the limited track record of green hydrogen technology, the LRA would be available for the initial five years of a green hydrogen sub-project to mitigate its potential technical underperformance. The LRA would be established based on a percentage (of up to 25 percent of a green hydrogen sub-project's revenue). It will be created to provide additional liquidity and facilitate the sub-project's continued operation. The LRA's triggering could be requested solely when sub-projects face nonstructural technical challenges (especially early on) that could arise due to the early development stage of the green hydrogen industry. Triggers will include, among others: (i) temporary deviations of operational Key Performance Indicators (KPIs) related to the production, compression, or storage of hydrogen (an operational KPI matrix will be submitted with the sub-project application); (ii) complications arising from the unavailability of component replacements; or (iii) excessive costs for repair and replacements due to component failure or due to unexpected performance degradation (beyond the scope of the performance-based maintenance contracting). The triggers will be further detailed in the POM based on these indicative concepts and others to be further defined with CORFO

The LRAs for each individual sub-project will have a term of 5 years

#### **DSRA (financed by GEF NGI)**

(a) Amount of the GEF instrument: 8.76 US\$ million GEF (and 2 US\$ million IBRD)

(b) Term: 10 years

(c) Fees: An administration fee (to be defined) will be charged to eligible sub-projects, based on the administration cost of the reserve accounts.

(d) Interest payment dates: not applicable

(e) Principal repayment: 10 years

(f) Replenishment period: up to 24 months

	<p>The Debt Service Reserve Account (DSRA) will be initially financed with IBRD US\$ 2 million, to which GEF NGI US\$ 8.76 million is expected to be added. The DSRA will be created to mitigate the risks arising from the innovative nature of the technology and the uncertainty related to unexpected or untimely cash needs for private debt repayment related to the green hydrogen production (including electrolysis systems, compression and storage). The DSRA will be available to cover up to 12 months of private sector debt installment repayment of a sub-project, in turn reducing the risks related to potential payment default by sub-projects. The RFI's would call the DSRA in the event of a shortfall of cashflows that jeopardizes debt repayment to RFIs or other private sector debt lenders of the sub-projects based on the agreed debt service coverage ratio, for debt other than repayments of a sub-loan financed under Sub-component 1a. The sub-project will replenish the DSRA in up to 24 months if the DSRA is called. Activation of the DSRA, the steps, and the processes will be detailed in the POM</p> <p>The DSRA for each individual sub-project will have a term of 10 years.</p> <p>If the LRA and/or the DSRA are called, the sub-projects will be mandated to replenish these accounts in up to 24 months.</p>
<p><b>Knowledge Sharing</b></p>	<p>The Bank will seek to share knowledge learned with the GEF and other actors and:</p> <ul style="list-style-type: none"> <li>Continue involving stakeholders in the Project's preparation to learn from their experiences</li> <li>Provide visibility for the interventions and disseminate results</li> <li>Disseminate aggregate data on experiences</li> <li>Leverage the Bank's role as a global convener to bring together stakeholders to share experiences, lessons learned and continue supporting private capital mobilization</li> <li>Coordinate with relevant national, regional, and international trade union to showcase viable solutions to deploy green hydrogen</li> </ul> <p>Particular issues for which lessons learned would be expected to be developed include:</p> <ul style="list-style-type: none"> <li>Innovative risk-mitigating and financial instruments, including lessons and results from the efforts conducted simultaneously by other partners.</li> <li>Actual technology costs and technical challenges faced by sub-projects.</li> <li>Development impact of the green hydrogen industry and its contribution towards Chile's decentralization and just and clean energy transition agenda.</li> <li>Success of capacity building activities to address re-skilling challenges and create green jobs across the country.</li> <li>Impact of the technical assistance efforts and their ability to assess, address and support the crafting of appropriate regulatory frameworks.</li> </ul>



[1] Thirty-two projects are pilots, four projects aim to achieve commercial scale, and one is at a bankable stage.

[2] The CORFO grant is only provided if the green hydrogen sub-projects become operational before the end of 2025.

[3] CORFO is managed by a Board of Directors presided by the Minister of Economy, Development, and Tourism, and comprising the Minister of Finance; the Minister of Agriculture; the Minister of Foreign Affairs; the Minister of Social Development and Family; the Minister of Science, Technology, Knowledge, and Innovation; the Executive Vice President of CORFO; and two counselors appointed by the President of the Republic.

[4] CORFO (Chilean Economic Development Agency),