

Funding Proposal

FP115: Espejo de Tarapacá

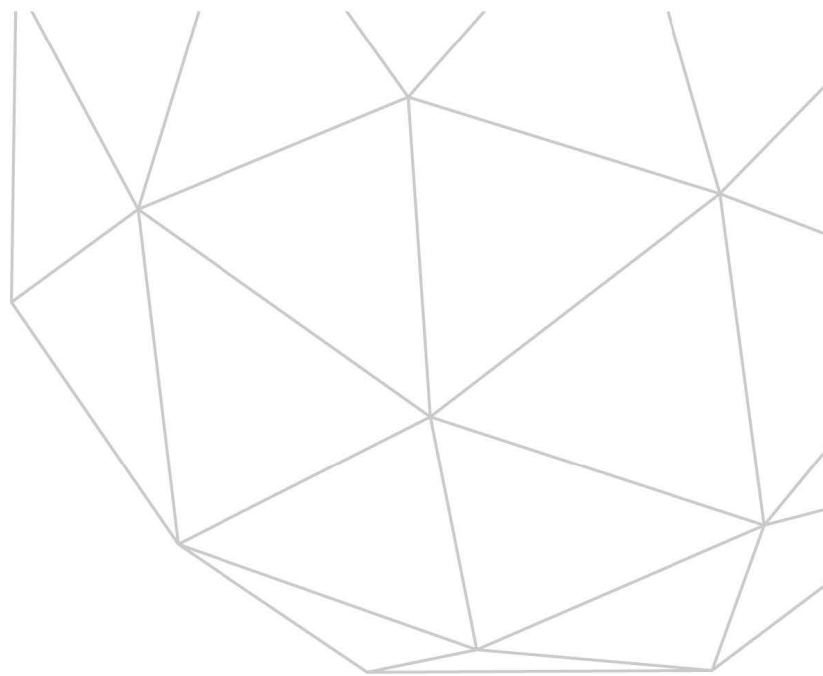
Chile | MUFG Bank, LTD | Decision B.23/23

23 July 2019





GREEN
CLIMATE
FUND



Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Espejo de Tarapacá

Country/Region: Chile

Accredited Entity: MUFG Bank, Ltd.

Date of Submission: (First Submission: November 22, 2018)

(Final Revision Submission: April 16, 2019)

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Note to accredited entities on the use of the funding proposal template

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

"[FP]-[Agency Short Name]-[Date]-[Serial Number]"

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title	Espejo de Tarapacá	
A.1.2. Project or programme	Project	
A.1.3. Country (ies) / region	Chile	
A.1.4. National designated authority (ies)	Ms. Trinidad Lecaros, Ministerio de Hacienda	
A.1.5. Accredited entity	MUFG Bank, Ltd. ("MUFG Bank")	
A.1.5.a. Access modality	☐ Direct ☒ International	
A.1.6. Executing entity / beneficiary	<u>Executing Entity:</u> Energía de Tarapacá SpA, [Tarapacá Fund], Energía Valhalla <u>Beneficiaries:</u> The inhabitants of the country of Chile, the Tarapacá Region in northern Chile and the communities of San Marcos and Rio Seco which are located close to the Project. The direct beneficiaries from the reduction in CO2 emissions and a cleaner, more resilient electricity system due to the Project include the entire population of Chile, equivalent to 17.6 million people. The Project will supply approximately 1,500 GWh per year of clean, economic and reliable renewable energy to Chile's national electric grid. The Project will also provide indirect benefits to Chile's population by catalysing the development of additional clean renewable energy projects The direct beneficiaries also include the vulnerable local communities located close to the Project with approximately 550 inhabitants, which will benefit directly from the Project's provision of stable water supply and funds to diversify the local economy, which is highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and climate change. The beneficiaries in the regional community from the Tarapacá Region include approximately 330,600 inhabitants which will directly benefit from the provision of clean, local renewable energy, reduction of CO2 emissions and increased resilience of the electric system. Additionally, the regional population will also indirectly benefit from the creation of new employment and related service opportunities during construction and operation of the Project.	
A.1.7. Project size category (Total investment, million USD)	☐ Micro (≤ 10) ☐ Medium ($50 < x \leq 250$)	☐ Small ($10 < x \leq 50$) ☒ Large (> 250)
A.1.8. Mitigation / adaptation focus	☐ Mitigation ☐ Adaptation ☒ Cross-cutting	
A.1.9. Date of submission	November 22 nd , 2018	

A.1.10. Project contact details	Contact person, position	Chika Fukuyama, Vice President, Social & Environmental Risk Assessment Office, Solution Products Division
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A.1.11. Results areas (mark all that apply)

Reduced emissions from:

- ☒ Energy access and power generation
(E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
- ☐ Low emission transport
(E.g. high-speed rail, rapid bus system, etc.)
- ☐ Buildings, cities and industries and appliances
(E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
- ☐ Forestry and land use
(E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)

Increased resilience of:

- ☒ Most vulnerable people and communities
(E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
- ☒ Health and well-being, and food and water security
(E.g. climate-resilient crops, efficient irrigation systems, etc.)
- ☐ Infrastructure and built environment
(E.g. sea walls, resilient road networks, etc.)
- ☐ Ecosystem and ecosystem services
(E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

Please provide a brief description of the proposed project/programme, including the objectives and primary measurable benefits (see [investment criteria in section E](#)). The detailed description can be elaborated in [section C](#).

Project Description & Objectives

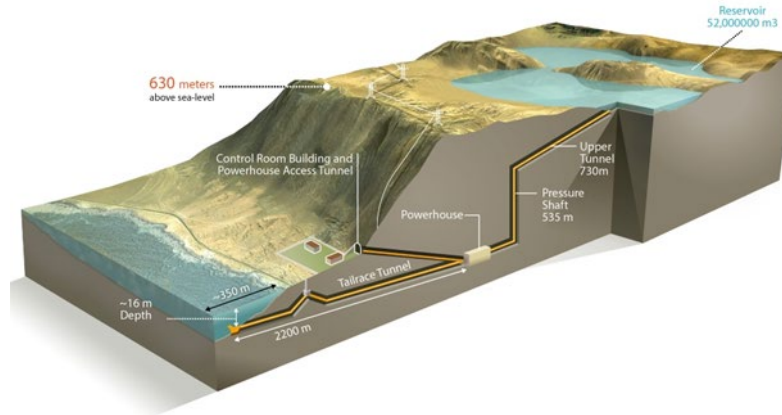
The Espejo de Tarapacá Project (“EdT” or “the Project”) is an innovative and unique large scale power project which combines Chile’s natural resources with proven generation technology in order to provide clean renewable energy supply 24 hours a day, seven days a week (“24/7”). The Project is comprised of two commercially integrated power plants: (i) a 300 MW pumped storage hydroelectric (“PSH”) plant using the Pacific Ocean as its lower reservoir and an existing natural concavity as its upper reservoir, and (ii) a 561 MW-AC photovoltaic solar (“PV”) plant with single axis tracking.

The Project will set a precedent by providing a renewable baseload solution at a price competitive with thermal technologies, within the context of an electricity grid heavily reliant on high emission electricity sources (~54% thermoelectric) and unpredictable hydropower (~30% hydroelectric). The Project is aligned to meet Chile’s target of 70% capacity from non-conventional renewable power generation by 2050 and future plans of grid decarbonisation by offering a viable replacement to thermal technology (decarbonizing the current national grid by up to 5%). In particular, the Project will stimulate a paradigm shift in the Chilean electric market, as the grid transitions from high polluting conventional energy

generation to zero emissions renewable energy, by providing dispatch flexibility, improving resiliency, and catalysing private investments in renewable energy.

Through implementation of the first renewable bulk energy storage facility in Latin America utilizing seawater, the Project's paradigm shift potential extends beyond Chile, as this ground-breaking and innovative bulk energy storage facility can be replicated in other suitable locations around the globe, enabling multiple markets to resolve the problem of intermittency by integrating seawater pumped storage hydro generation with other renewable technologies. The Project will establish an important precedent and track record which can be followed worldwide, particularly in Africa and Latin America, in order to help mitigate and adapt to climate change through the provision of 100% renewable 24/7 electricity supply.

Figure 1: EdT Pumped Storage Hydro Plant



Primary Measurable Benefits

The Project has cross-cutting impact potential as it provides both climate change mitigation and adaptation. The Project will help Chile comply with commitments in the Paris Agreement and is fully aligned with the 2030 Agenda of the United Nations Sustainable Development Goals (SDGs), supporting at least nine SDGs at national, regional and local levels. Through the production of 100% renewable energy, EdT will mitigate global greenhouse gas emissions, avoiding on average 1,001,187 tonnes of CO₂ per year, with 35 million tonnes of CO_{2e} avoided over the 35-year evaluation period. The supporting documentation can be found in Annexes 9 and 10 which include a descriptive procedure report and a calculation spreadsheet¹.

The Project will also contribute to climate change adaptation at the national, regional and local levels in Chile in three principal areas:

- 1) **Energy Sector Resilience:** The Project will help Chile build capacity to adapt to climate change by improving grid flexibility (renewable energy storage via natural reservoir in pumped storage, e.g. ramping up and down) and catalysing additional private investments in variable renewable energy and also by reducing the national grid's dependence on fossil fuels (decarbonisation) and hydrology affected by droughts (In 2017, Chile's power generation was comprised of 57% thermoelectric and 29% hydroelectric).
- 2) **Water Security:** The Project will provide stable water supply from its own desalination plant to the vulnerable local communities of around 550 inhabitants at cost. Currently, these communities located close to the Project do not have access to stable drinking water supply, which is currently sourced from groundwater and transported to the communities by truck on a bi-weekly basis.
- 3) **Improvement in Livelihood of Local Vulnerable Communities:** Under the long-term collaboration agreements executed with the vulnerable fishing communities close to the Project, EdT will provide funds and training for social

¹ See the Appendix Methodology Applicability & Emission Reduction Calculation Procedure included in Annex 9 which was prepared by the consulting firm ImplementaSur Climate Action.

and productive investments to help diversify the local economy, which is highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and higher water temperature due to climate change.

Support of Vulnerable Local Community

The Project plans to play a key role in the development of the vulnerable local community by providing funds and training to help diversify its economy and in particular, promoting empowerment of women and gender equality. The Project has pioneered a proactive community engagement model with the community, executing coordination agreements for maintaining a mutually beneficial relationship during development, construction and operation. The Project has followed a comprehensive stakeholders' and community engagement process with prior informed consent and meaningful participation.

Need for GCF Support & Proposal

The GCF's support is needed during the final development phase of the Project in which traditional private investors are not yet willing to enter due to final development risks (e.g. security bonds for energy contracts, final stage of permitting and associated guarantees, engineering and design tests, etc.). GCF support will de-risk the Project and help catalyse private investment, allowing it to overcome the significant financial and policy barriers to entry for large-scale, innovative and socially beneficial projects in the Chilean electricity market. GCF participation will also promote policy analysis by the local regulator to help determine appropriate regulations and remuneration for bulk renewable energy storage, considering the multiple electric system and social benefits provided by such facilities.

The GCF funding proposal is comprised of US\$ 60 million² in direct equity, equivalent to approximately 13% equity participation in the Project. The GCF's participation as an "anchor" equity investor in the Project will provide a "stamp of approval" and help attract additional private sector debt and equity investors which will fund the remaining investment of US\$ 1 billion.

A.3. Project/Programme Milestone	
Expected approval from accredited entity's Board (if applicable)	N/A
Expected financial close (if applicable)	2020
Estimated implementation start and end date	Start: 2020 (initiation of construction) End: 2025 (commercial operation date)
Project/programme lifespan	35 years, 0 months

² The amount and type of funding provided by GCF is subject to final confirmation.

B.1. Description of Financial Elements of the Project / Programme

Please provide:

- an integrated financial model in [Section I \(Annexes\)](#) that includes a projection covering the period from financial closing through final maturity of the proposed GCF financing with detailed assumptions and rationale; and a sensitivity analysis of critical elements of the project/programme
- a description of how the choice of financial instrument(s) will overcome barriers and achieve project objectives, and leverage public and/or private finance
- a breakdown of cost estimates for total project costs and GCF financing by sub-component in local and foreign currency and a currency hedging mechanism:
- a breakdown of cost/budget by expenditure type (project staff and consultants, travel, goods, works, services, etc.) and disbursement schedule in project/programme confirmation (term sheet) as included in section I, Annexes.

Barriers to Entry & Need for GCF Support

The Project initiated development in 2011 and has successfully completed key pre-construction milestones including engineering and design, permitting, community engagement and execution of construction contracts, among others. The initial equity for development of this start-up Project was provided by a group of individual Chilean investors who hold the vision that bulk energy storage is key for developing a 100% renewable electric system. However, these investors do not have the financial capacity to implement the Project—and for this reason, the Project requires incorporation of at least one strategic investor. The Project strongly believes that GCF's participation will facilitate entry of such investor(s).

Barrier 1: Energy policy and regulatory challenges

At present, Chilean electric regulations do not provide remuneration for the multiple electric system and social benefits which can be provided by bulk renewable energy storage. These benefits, in addition to the provision of energy and firm capacity, include enhanced system flexibility, increased system resilience, optimization of the transmission grid, reduction of CO₂ emissions, decarbonizing of the grid with the replacement of coal facilities, reduced reliance on variable hydro power, and catalysation of additional renewable investments, among others, among others. These benefits and services are in addition to the significant social benefits related to climate change mitigation and adaptation, which are detailed throughout this funding proposal.

It should be noted that the Chilean regulator proclaims “technological neutrality” with no direct subsidies, tax credits or other incentives provided to any technologies or energy sources, although in fact, the regulator's failure to incorporate the social costs and benefits (such as the cost of CO₂ emissions) in the cost of production effectively provides indirect subsidies to certain technologies. Additionally, the Project's innovative proposal to provide base-load energy 24/7 from local and renewable sources has faced opposition from incumbent generators, since the bulk energy storage component would improve system efficiency and as a result, eliminate any excess profit received by existing thermal assets from sub-optimal system operation (i.e. inflexibility to quickly respond to energy ramps and transmission congestion during certain hours as a result of significant injections of variable renewable energy, both challenges that bulk energy storage would help resolve).

Barrier 2: Securing long-term energy agreement

The principal financial and market entry barrier for the Project is the absence of a stable source of revenue and cash flow which would adequately compensate the Project for the economic and social benefits it can provide and which in turn, would allow it to attract strategic equity and debt investors. As a result, the remaining critical development milestone is execution of long-term energy agreement³ to ensure stable future cash flows and enable the Project to secure equity and debt funding. Given that the Chilean electricity market is driven strictly by economic competition without regard to potential

³ The Project considers the following two long term sales agreements to be viable alternatives: 1) a power purchase agreement (PPA) under which the Project would sell 24/7 energy to one or more creditworthy off-takers; and 2) a transmission toll agreement under which the pumped storage hydro plant would be incorporated as part of the national transmission system and would receive a toll payment for pumping and generating as required by the independent system operator. Although the regulator has considered incorporation of storage in the transmission system, given that such proposal has not yet been implemented, the Project continues to focus on the energy PPA alternative. It is important to note that both of these long term agreements would be awarded in competitive auction processes and the Project's competitive position in both cases would benefit from GCF support.

social benefits, in order for large scale, unique and ground-breaking investment ideas, such as the Project, to secure a power purchase agreement (PPA) with a creditworthy offtaker, it must compete with all alternative sources, which in the case of generation includes thermoelectric and other renewable technologies.

The Chilean market is also highly competitive—with participation in the most recent public and private PPA tender processes from large incumbent power generators, attempting to maintain market share, and independent power producers, attempting to break into the market. The Project applied for GCF support in its “Pitch for the Planet” initiative, which called for bold investment ideas to unlock private sector financing and crowd-in capital for low-emission and climate resilient projects, in order to overcome barriers to entry into the highly competitive and capital-intensive Chilean electric market. The GCF’s support of the Project as a strategic equity investor will help level the playing field by allowing the Project to compete in PPA (and eventually transmission) bid processes with established players with solid financial capacity.

Barrier 3: Market distrust and risk-aversion of investing in innovative start-up project

The Project innovatively integrates two well-known and proven technologies, pumped storage hydro and photovoltaic solar, to provide 24/7 renewable energy supply. Its original project development formula combines seawater pumped storage hydro with PV solar generation, capitalizing on Chile’s superior irradiation and existing geography for large-scale energy storage. However, the Project faces significant financial and market entry barriers which include solid financial capacity, established experience and track record, and creditworthy strategic partners, among others. In the particular case of EdT, these barriers have prevented the Project from obtaining a solid PPA and in turn, prohibited incorporation of strategic equity investors, who as a rule, are not willing to invest without the guarantee of stable future cash flows. These barriers represent the principal reason for the absence of sustainable innovation and start-up companies in the development of large-scale energy projects; and is the foundation of EdT’s application for support from the GCF.

Need for GCF Support

The Project is requesting GCF’s support to overcome the following barriers:

1. Energy policy and regulatory challenges

2. Securing long-term energy agreement

3. Market distrust and risk-aversion of investing in innovative start-up project

GCF’s equity participation in Project would improve the viability of the Project by allowing it to participate and compete in electricity auctions. The Project proposes that the GCF participate as an “anchor” equity investor in order to overcome barriers to entry by assisting with critical last stage development expenses and providing a “stamp of approval” which will help attract additional private sector investors. The Project’s proposal is for GCF to obtain approximately 13% participation in EdT equity, equivalent to approximately US\$ 60 million, which would be used principally to fund costs during the final stage of development. The GCF’s equity investment would effectively de-risk the Project, thereby stimulating final private investment and financing. The Project proposes that GCF’s equity participation be “pre-payable” such that if GCF would like to exit in order to recycle its funds once the Project has been fully funded, the private sector investor with controlling participation in the Project have the option to re-purchase or pre-pay for GCF’s 13% equity participation. Nonetheless, GCF would have the option to maintain its equity participation in the Project past start-up of commercial operation and beyond to ensure the Project complies with the mandatory ESS requirements.

Cost Structure

The total cost of the Project is approximately US\$ 1,094 million, comprised of the capital expenditures for the 300 MW pumped-storage hydroelectric plant, the 561 MW-AC photovoltaic solar plant with single axis tracking and project financing costs. The capital expenditure for the PSH plant accounts for 50%, the PV plant for 39% and financing costs for 11% of total project costs. It should be noted that the spot market sales received during construction, principally related to the solar plant which will be put into operation in phases, have been included in financing costs, thereby offsetting capital expenditures. For purposes of the Funding Proposal, the Project capital expenditure has been separated into three components: Project Development & Preparatory Work, Project Construction and Community Works as further detailed in Section C.3 below.

The PSH power plant budget totals US\$ 543.5 million. More than 80% of the PSH budget, not including contingencies, is based on executed contracts or firm contractor bids from tender processes, and the remaining budget items are based on internal estimates with information provided by consultants and third parties. In 2017, Leidos Engineering, LLC conducted an independent engineer's limited technical due diligence review to confirm the Project's engineering, construction, and cost estimates, as well as the cost and time contingency levels included in the budget and schedule. This independent technical due diligence report has been included in Annex 6.

The PV power plant budget totals US\$ 425.7 million. The Project plans to conduct a competitive tender in order to ensure the best available EPC terms in light of the increasingly competitive PV market. The PV plant budget is based on individual offers received for principal plant equipment including PV modules, inverters and O&M services, and internal estimates.

The cost of financing the Project's debt is based on indicative financing proposals received from project finance banks active in Chile. The estimated financing cost is approximately US\$ 125 million. As mentioned above, the spot market sales received during construction have been included in financing costs, assuming that they will be used to offset capital expenditures. The support of the GCF is also expected to lead to improved terms and conditions decreasing the projected financing cost.

Table 1 below shows the expected sources and uses for the total Project cost of US\$ 1,094.0 million. It should be noted that the integrated financial model included in Annex 6 includes the detailed assumptions for the cash flow projections from financial closing through final maturity of the proposed GCF financing, including a sensitivity analysis of the principal risks.

Table 1: Project Sources & Uses

Sources	US\$ million	% Total
Equity	446.7	41%
Debt	647.3	59%
Total	1,094.0	100%
Uses	US\$ million	% Total
PSH Plant	543.5	50%
PV Plant	425.7	39%
Financing & Other Costs	124.8	11%
Total	1,094.0	100%

GCF Proposal

The Project proposes that the GCF participates as follows:

1. As an "anchor" equity investor to overcome barriers to entry by assisting with critical last stage development expenses and providing a "stamp of approval" which will help attract additional private sector investors. The Project's proposal is for GCF to obtain approximately 13% participation in Project equity, equivalent to US\$ 60.0 million, which is principally required to complete the final stage of development. GCF's equity participation would be "pre-payable" such that if GCF would like to exit in order to recycle its funds once the Project has secured the required amount of financing from the private sector, the Project investor with controlling participation would have the option to re-purchase or pre-pay for GCF's 13% equity participation. Nonetheless, GCF would have the option to maintain its equity participation in the Project past start-up of commercial operation and beyond to ensure the Project complies with the mandatory ESS requirements.
2. As a provider of PPA and permit guarantees in order to de-risk and level the playing field. The final stage of development has been particularly challenging given existing cash restrictions and the financial requirements involved. The expenses to be incurred during the final stage of development include expenses related to permitting, engineering, community engagement, staff and administration, as well as cash funding for guarantees required to participate in PPA tender processes and secure granted permits. With regard to the

required guarantees, the Project would deposit certain funds provided by the GCF in order to obtain and support guarantees required during the final stage of development, including those needed to participate in PPA tender processes⁴ and secure granted permits. In the event that the PPA funding is not required due to unsuccessful auction bidding, the GCF funding will be fully returned to the AE and GCF. GCF will then determine if this funding may be reinvested in the Project.

3. As an international climate advisor to support the Chilean energy policy and regulatory framework towards the recognition of technologies that help decarbonize the grid with renewable 24/7 baseload energy solutions and the provision of appropriate incentives for technologies multi-service systemic benefits.

Table 2 below summarizes the principal cost components and the proposed GCF funding amount, totalling \$60.0 million, for each component. A more detailed cost breakdown can be found in the integrated financial model included in Annex 2. Under the Project's funding proposal, the majority of GCF's equity contribution would be used to fund last stage development costs prior to initiation of construction, in order to overcome barriers and catalyse final development.

Table 2: Total Project Costs & GCF Funding Proposal

Components	Sub-component (if applicable)	Amount (for entire project)	Currency	GCF funding amount	Currency of disbursement to recipient
1. Project Development & Preparatory Work	Pumped Storage Hydroelectric (PSH) Plant	43.144	<u>million USD (\$)</u>	7.866	USD
	Photovoltaic (PV) Plant	7.050	<u>million USD (\$)</u>	2.858	USD
2. Project Construction	Pumped Storage Hydroelectric (PSH) Plant	497.005	<u>million USD (\$)</u>	43.287	USD
	Photovoltaic (PV) Plant	417.655	<u>million USD (\$)</u>	0.109	USD
	Financing Cost	124.833	<u>million USD (\$)</u>	5.589	USD
3. Community works	Pumped Storage Hydroelectric (PSH) Plant	3.301	<u>million USD (\$)</u>	0.234	USD
	Photovoltaic (PV) Plant	1.015	<u>million USD (\$)</u>	0.057	USD
Total project financing		1,094,003	<u>million USD (\$)</u>	60.000	USD

Table 3 below details the final stage development costs which would be funded by GCF's initial equity contribution, totalling approximately US\$ 25.4 million. The additional equity remaining to complete GCF's 13% participation of US\$ 34.6 million, would not be required until after a PPA is executed and construction is initiated. Approximately US\$ 16.3 million of GCF's equity contribution would initially be used to provide cash funding of guarantees required to secure participation in PPA bid processes (approximately US\$ 13.0 million) and secure granted permits (approximately US\$ 3.3 million). In order to secure the required guarantees, funds provided by GCF will be deposited as collateral with a financial institution. In the event that these guarantees are not needed, or are replaced or returned, for instance upon entry of a controlling strategic investor or financial close, the GCF funds released would then be re-allocated to other Project development costs or capital expenditures, maintaining GCF's 13% participation upon completion of the Project⁵. In the

⁴ The bid bond guarantee required for participation in the PPA tender process would be funded by GCF through the deposit of cash collateral with the AE. In order to obtain the bid bond bank guarantee, the AE would deposit the cash collateral with a Chilean bank, who would in turn issue the guarantee which would be provided in the tender process. In the event that the Project is not awarded a PPA, the bid bond would be fully returned to the Project. The Project would then return the bond to the Chilean bank, who would in turn return the cash collateral to the AE.

⁵ The financial model assumes that the bid bond and permit guarantees funded initially by the GCF will be replaced at financial close, as they will be included in the syndicated debt financing agreement and that GCF will then re-allocate

worst case, assuming that the Project does not achieve financial close and is therefore cancelled, the funds corresponding to permit guarantees will be returned to GCF.

Table 3: Final Stage Development Expenses

Final Stage Development Expenses	%	US\$ million
Pumped Storage Hydro Plant	88.5%	22.470
PPA Bid Bond	51.2%	13.00
Permit Guarantees	5.4%	1.37
Environmental & Permitting	2.7%	0.68
Engineering & Contracts	10.0%	2.53
Social Community Program	0.9%	0.23
Project Team & Admin	8.0%	2.03
Finance, Market, Legal Advisory	6.9%	1.76
Other Incidentals	3.4%	0.87
PV Solar Power Plant	11.5%	2.92
Permit Guarantees	7.8%	1.97
Environmental & Permitting	0.6%	0.16
Engineering & Contracts	0.7%	0.17
Social Community Program	0.2%	0.06
Project Team & Admin	1.3%	0.34
Finance, Market, Legal Advisory	0.5%	0.12
Other Incidentals	0.4%	0.10
Total	100.0%	25.39

The Project proposes that GCF funding be provided in multiple disbursements as indicated in Table 4 below. The first disbursement will be used for Pre-PPA development costs in order to maintain the viability of the Project while preparing for the upcoming PPA auction (the Project costs at this stage include financial and engineering advisory services, staff and general administrative and permitting costs). The first disbursement will also include funds to secure two granted permits, which would be lost if the guarantees are not issued when requested by the authorities. The second disbursement will be used to obtain the bid bond for the PPA tender process and the third disbursement for Post-PPA development costs needed to maintain the viability of the Project while an equity sponsor and project financing agreements are being finalized, including a third permit guarantee. The fourth and fifth disbursements will be used principally for construction of PSH plant and initial financing costs. The conditions for each disbursement will be detailed in the term sheet. As GCF's equity contribution will be disbursed at multiple times, the remaining cash will not be released and will be kept in GCF trustee's account until the conditions are satisfied.

Table 4: GCF Equity Contribution Disbursements

Disbursement	Description	Amount (US\$)	GCF Proceeds (%)	Indicative indirect GCF equity (%) in EdT
Disbursement 1	Pre-PPA Development Costs	4.82	10.3%	19%
	Permit Guarantees (Hydraulic Works Permit, Maritime Concession)	1.37		
Disbursement 2	PPA Bid Bond Guarantee	13.00	21.7%	43%
Disbursement 3	Post-PPA Development Costs	4.22	10.3%	50%
	Permit Guarantees (Solar Land Concession)	1.97		
Disbursement 4 & 5	Project Construction	34.61	57.7%	TBD
Total		60.00	100.0%	

these funds to construction related capital expenditures, in order to maintain GCF's equity participation commitment of 13% upon completion of the Project.

Initially, in de-risking the Project, GCF equity will exceed the targeted 13% of total final equity until the Project is fully funded by all equity investors.

As summarized in Table 5 below, GCF would hold 13% equity participation in the Project and private sector investors would hold the remaining 87%, with Valhalla providing 6% and strategic private sector investors being brought in to fund the remaining controlling 81% equity interest.

Table 5: Proposed Equity Participation

Equity Participation	US\$ million	% Total
Valhalla	25.8	6%
Green Climate Fund	60.0	13%
Private Sector Investors	360.9	81%
Total	446.7	100%

Private Sector Funding

With the support of GCF as an anchor equity investor, the Project is expected to raise approximately US\$ 1.0 billion from the private sector, excluding Valhalla and GCF equity participation. Of the total private sector investment, approximately 59%, equivalent to US\$ 647.3 million is expected to be funded with debt from private commercial banks and the remaining US\$ 360.9 million, representing 81% of Project equity, will be funded by one or more strategic private investors.

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
(a) Total project financing	(a) = (b) + (c)	1,094.0	million USD (\$)million USD (\$)million USD (\$)		
(b) GCF financing to recipient	(i) Senior Loans		Options Options million USD (\$)million USD		
	(ii) Subordinated Loans		(\$)million USD		
	(iii) Equity	60.0	(\$)million USD (\$)		
	(iv) Guarantees		Options		
	(v) Reimbursable grants *		Options million USD (\$)million USD		
	(vi) Grants *		(\$)million USD (\$)		
	* Please provide economic and financial justification in section F.1 for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in section E .				
	Total requested (i+ii+iii+iv+v+vi)	60.0	million USD (\$)million USD		

				(\$)million USD (\$)			
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	<u>Equity</u>	25.8	million USD (\$)	Valhalla			<u>junior</u>
	<u>Equity</u>	360.9	million USD (\$)	Strategic Private Investor			<u>junior</u>
	<u>Senior Loans</u>	647.3	million USD (\$)	TBD			<u>senior</u>
	<u>Options</u>		Options				<u>Options</u>
Lead financing institution: TBD							
* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.							
(d) Financial terms between GCF and AE (if applicable)	<i>In cases where the accredited entity (AE) deploys the GCF financing directly to the recipient, (i.e. the GCF financing passes directly from the GCF to the recipient through the AE) or if the AE is the recipient itself, in the proposed financial instrument and terms as described in part (b), this subsection can be skipped.</i> <i>If there is a financial arrangement between the GCF and the AE, which entails a financial instrument and/or financial terms separate from the ones described in part (b), please fill out the table below to specify the proposed instrument and terms between the GCF and the AE.</i>						
	Financial instrument	Amount	Currency	Tenor	Pricing		
	Choose an item.		Options	() years	() %		
	<i>Please provide a justification for the difference in the financial instrument and/or terms between what is provided by the AE to the recipient and what is requested from the GCF to the AE.</i>						

B.3. Financial Markets Overview (if applicable)

How market price or expected commercial rate return was (non-concessional) determined?

Please provide an overview of the size of total banking assets, debt capital markets and equity capital markets which could be tapped to finance the proposed project/programme.

Please provide an overview of market rates (i.e. 1-year T-Bill, 5-year government bond, 5-year corporate bond (specify credit rating) and 5-year syndicate loan.

Provide examples or information on comparable transactions.

Chile is one of the most attractive and stable economies in Latin America and presents an optimal sovereign and market environment for development of the Project. Chile has the highest sovereign credit rating in South America (S&P AA-, Moody's Aa3), the highest GDP per capita in Latin America, sustainable pro-business policies, and developed and liquid

capital markets. Chile's investor-friendly market is recognized internationally; it was the first South American country to join the OECD and has free trade agreements in place with over 50 countries.

While Chilean capital markets and its electric regulatory framework are well-established, the local banking market lacks depth and availability of long-term capital for large scale electric infrastructure projects which require funding in U.S. dollars, such as electric generation projects⁶. Additionally, the scale of the Project, which requires investment capacity of close to US\$ 1 billion, including debt and equity, is extremely large for the relatively small Chilean market.

The debt and equity capital markets for infrastructure in Chile include significant participation from international corporations, investors and banks. At present, international incumbent energy companies, which include Enel, the AES Corporation and Engie, represent the largest investors in the electricity market, participating in the distribution, generation and transmission sectors. Additionally, multilateral development and international commercial banks have been responsible for the majority of long term project financing for electric generation projects over the past decade. However, given the significant amount of exposure to Chile related to recent projects, the development banks have slowed their lending activities, leaving a gap in available funding.

The Project has held meetings with numerous international and local banks and multilateral institutions, which have expressed interest in participating as lenders in a future financing transaction. The Project has also requested and received multiple indicative financing proposals from banks on which the financing terms and conditions in the financial model are based. The base case funding plan is to source debt from a group of international and local commercial banks, export credit agencies and multilateral development institutions, particularly those that have a strong track record with recent participation and/or leadership roles in Chilean power project financings of similar size.

Recent comparable financing transactions which were financed with a project finance structure with an international bank syndicate similar to that proposed by the Project include the transactions listed in Table 6 below:

Table 6: Recent Infrastructure Project Finance Transaction in Chile

Transaction	Type of Deal	Financing Amount (USD)	Financial Close Date
Minera Spence Desalination	Water desalination	\$518.2 million	June 2018
Cerro Dominador	Power- Renewable (Solar)	\$758.0 million	May 2018
Los Guindos Generación	Power- Conventional	\$135.0 million	March 2018
Generadora Metropolitana	Power- Conventional	\$175.0 million	December 2017
San Juan y el Totoral	Power- Renewable (Wind)	\$415.0 million	September 2017
Aela Generación	Power- Renewable (Wind)	\$435.4 million	August 2017
Transmisora Eléctrica del Norte	Transmission	\$460.4 million	December 2016
El Pelicano	Power- Renewable (Solar)	\$199.7 million	July 2016
Interchile S.A.	Transmission	\$770.6 million	February 2016

⁶ Electricity prices in the Chilean market, including PPA and spot energy, and capacity prices, are determined in U.S. dollars, although monthly payments are made in Chilean pesos at the effective exchange rate for the corresponding period.

C.1. Strategic Context

Please describe relevant national, sub-national, regional, global, political, and/or economic factors that help to contextualize the proposal, including existing national and sector policies and strategies

The climate challenges faced by Chile and the government's commitment to implement mitigation and adaptation measures, as demonstrated by its enactment of the Paris Agreement, provides optimal timing for paradigm-changing solutions in the electricity sector such as the Project. The Project will help Chile meet its goals at national, regional and local levels.

Contribution to Chile's International Agreements

In accordance with Chile's Third Communication – UNFCCC (2016) Report and the Chilean National Climate Change Plan 2017-2022, Chile has identified nine sectors that are vulnerable to climate change: 1) water resources, 2) biodiversity, 3) health, 4) infrastructure, 5) energy, 6) forestry, agriculture and livestock, 7) fishing and aquaculture, 8) cities and 9) tourism. The Project will help Chile achieve its mitigation commitments and will also accelerate the implementation of climate change adaptation actions at national, regional and local levels. EdT will directly contribute to the creation of adaptation actions and more resilient communities in three of these sectors that are currently experiencing the effects of climate change: 1) energy, 2) water resources and 3) fishing and aquaculture.

The most significant and direct mitigation and adaptation contribution by the Project is in the energy sector. The 2016 National Biennial Update Report prepared by the Chilean Ministry of Environment estimated that 35% of country's greenhouse gas emissions originate from the electricity and heat production sub-sectors. Moreover, this ratio is expected to increase as Chile continues developing (on a per capita basis, Chile consumes approximately 50% of electricity per capita as compared to other OECD nations) and other sectors move towards electrification, such as the transport sub-sector, that represents 22% of national emissions.

Prior to its participation in COP21, Chile submitted its climate action plan to the UN Framework Convention on Climate Change (UNFCCC) in September 2015. This "Intended Nationally Determined Contribution" ("INDC") includes the following commitments :

- 1) Reduction in CO₂ emissions per capita by 30% versus 2007 levels (i.e., down from 1.02 tCO₂e/million CLP\$ 2011 to 0.71 tCO₂e/million CLP\$ 2011)
- 2) Contingent upon receiving international grants, reduction in CO₂ emissions per capita by 35-45% versus 2007 levels (i.e., down from 1.02 tCO₂e/million CLP\$ 2011 to 0.56-0.66 tCO₂e/million CLP\$ 2011)
- 3) Sustainable management and recovery of 100,000 hectares of forest, representing captures and reduction of greenhouse gases estimated at 600,000 tCO₂e per annum beginning in 2030
- 4) Contingent on extension of Decree-Law 701 and the approval of a new forestry development act, reforestation of 100,000 hectares, representing captures of 900,000-1,200,000 tCO₂e per annum beginning 2030.

Chile has also reaffirmed its commitment to contribute to the 2030 Agenda of the SDGs. EdT, as described in Section A.2 above, is fully aligned with this agenda and will contribute directly or indirectly to at least in nine SDGs at national, regional and local levels (SDGs: 1, 3, 4, 5, 6, 7, 8, 9 and 13). It should be noted that Chile will be the host country for the future COP25 to be held in Santiago from December 2 to 13, 2019.

Contribution to Chile's Energy Objectives

The Chilean electric sector is driven strictly by prices with no subsidies. Although the regulator proclaims "technological neutrality" with no direct subsidies, tax credits or other incentives provided to any technologies or energy sources, in fact, the failure to include the social costs and benefits, such as CO₂ emissions⁷, in the cost of production effectively provides indirect subsidies to certain technologies. In 1982, Chile was the first country to deregulate and segment the electricity market in generation, transmission and distribution markets. In the previous decades, this segmentation was appropriate

⁷ Since 2017, Chile applies a carbon tax to thermoelectric plants equivalent to \$5 per tonne of carbon emitted. However, the Ministry of Social Development estimated in 2017 that the social cost of carbon emissions is equal to \$32.5 per tonne of carbon emitted.

for conventional technologies serving only one market, but is no longer adequate for projects which simultaneously serve different markets by providing multi-service system benefits, such as energy storage.

Although in a forward looking study published in January 2019 the country's independent grid operator recognizes the strategic role that storage can play in the process of decarbonisation of the energy matrix⁸ (considering the current context in which more than 50% of the energy generated in Chile in 2017 and 2018 was sourced from thermal units, mostly coal-fired plants), presently Chilean electric regulations do not recognize the social benefits and externalities related to the installation of multi-functional energy storage. These benefits include the provision of energy, capacity, enhanced flexibility, and increased resilience, in addition to reduction of CO₂ emissions, decarbonizing the grid with the replacement of coal facilities, reduced reliance on variable hydro power, and catalysation of additional renewable investments, among others.

Nonetheless, the Chilean government does promote the incorporation of renewable energy. A Renewable Portfolio Standard was approved in 2008 and reformed in 2013 which requires generation companies to supply executed contracts with 20% of Non-Conventional Renewable Energy (including small hydro) by 2025, or pay fines. In 2016, the authorities, with a wide consensus from a diverse number of stakeholders, agreed on the 2050 Energy Agenda which includes the following goals:

- 5) At least 70% of total energy generation sourced from renewable energy by 2050;
- 6) Increased reliability of the electric system, with downtimes that should not exceed 1 hour per year on a regional basis; and
- 7) Reduction in electricity prices in order to rank third among OECD countries with lowest energy prices.

Subsequent to the Paris Agreement, the government revised its objectives and in 2018 announced the 2018-2022 Energy Plan which includes a program to “decarbonise” the existing energy matrix. In accordance with this initiative the government has formalized a working group lead by the Ministry of Energy with participation from the energy sector, in particular the owners of existing coal-fired facilities, to analyse the current situation and design a timetable for the retirement of coal facilities which do not possess adequate systems for capture of CO₂, subject to maintaining required levels of grid reliability and resilience. In 2017, coal generation represented 39% of total national generation, which means that decarbonisation will need to be accompanied with investment in renewable generation alternatives and flexible technologies, such as energy storage, in order maintain security of supply. It should be noted that the 2018-2022 Energy Plan also contains other important objectives such as multiplying distributed renewable generation, increasing the circulation of electric vehicles, and implementing a regulatory framework for promoting energy efficiency and creating an “energy culture” in the country, among others.

Given Chile's unique geographic conditions, it has abundant natural resources for the production of variable renewable energy (VRE), with wind, solar and run-of-river hydroelectric power plants. The desert area in northern Chile where the Project is located possesses tremendous potential for the development of solar energy. However, at present more than 87% of the electricity generated in the area comes from thermoelectric sources. The area has some of the best solar irradiation levels in the world (average capacity factors in excess of 35%) and is also relatively flat and sparsely populated. According a 2014 report by the GIZ GmbH and the Chilean Ministry of Energy⁹, the PV solar potential in the area exceeds 1.4 million MW of installed capacity. The existing installed solar capacity of around 633 MW in this area represents less than 0.1% of the total potential.

Similarly, strong wind conditions in various parts of Chile also make wind generation feasible. Even though VRE still represents a small fraction of the installed generation mix (approximately 15% in May 2018), the installation of VRE is projected to rapidly expand in coming years, reaching approximately 30% and 40% of total installed capacity by 2025 and 2030, respectively. It should be noted that VRE represents 100% of the new generation projects awarded PPAs in public distribution auctions in the past 3 years.

⁸ See report prepared by Chilean independent grid operator (*Coordinador Electric Nacional*) in January 2019, “Study of Operation and Development Without Coal Plants”: [https://www.coordinador.cl/desarrollo/documentos/estudios-de-planificacion/estudio-de-operacion-y-desarrollo-del-sen-sin-centrales-a-carbon/](https://www.coordinador.cl/desarrollo/documentos/estudios-de-planificacion/estudio-de-operacion-y-desarrollo-del-sen-sin-centrales-a-carbon/informes-estudio-operacion-y-desarrollo-sen-sin-centrales-a-carbon/) https://www.coordinador.cl/wp-content/old-docs/2019/01/20190102-Estudio_OPyDES-Sin-carb%C3%B3n_Informe_Principal.pdf

⁹ Energías Renovables en Chile, El Potencial Eólico, Solar e Hidroeléctrico de Arica a Chiloé, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Chilean Ministry of Energy, Santiago de Chile, 2014.

Nonetheless, given that VRE output is driven by the weather and it therefore faces greater variability and uncertainty than that of conventional power plants, the energy sector now faces a significant challenge in order to incorporate and adequately manage VRE without sacrificing flexibility or reliability of the grid. Energy storage represents an opportunity for enhancing flexibility in order to integrate low carbon energy and improve resiliency. At present, Chile has very limited battery storage (52 MW with duration of approximately 20 minutes, in a system with 24,000 MW of installed capacity) and zero bulk energy storage. As declared by the International Energy Agency in its Policy Report for Chile (2018), bulk energy storage, such as the Project, will play a key role by providing flexibility and catalysing investment in renewable technologies, thereby transitioning the system from high polluting fossil fuel-based to zero emission technologies.

Although VRE still represents a small fraction of the generation mix, the country is already facing challenges related to its incorporation. At present, transmission constraints, principally associated with the injection of solar energy during daytime periods, result in inefficiencies and curtailment of VRE resources. The government has attempted to address this issue with enactment of a new regulation in 2016 to improve transmission planning and development. The growth of VRE also requires enhanced flexibility in order for the system to rapidly respond to upward or downward changes in the supply/demand balance. At present, there is no ancillary services market. The regulator has recognized the need to implement adequate remuneration for ancillary services and the grid coordinator is in the process of designing the applicable regulations. Nonetheless, an operating market and related compensation is still highly uncertain and not expected to be functioning prior to 2020.

Implementation of the Project as the first bulk energy storage facility in the Chilean electric market will stimulate the paradigm shift, as the grid transitions from high polluting conventional energy generation to zero emissions renewable energy, by providing flexibility, improving resiliency, and catalysing investments in VRE. The Project resolves the intermittency problem inherent to solar technology by effectively combining Chile's abundant sunlight and seawater resources to ensure electricity availability 24/7. As a result, the benefits provided by the Project to Chile's energy sector go far beyond those from other PV-only solar projects located in the same region.

Vulnerability of Chile's Energy Sector

In 2015, a publication on disaster risk reduction from the United Nations reported that, on average, between 1980 and 2011, Chile registered losses quantified as 1.2% of its GDP every year due to natural disasters, some of which are related to climate change. Moreover, a World Bank publication stated that 54% of the country's population and 12.9% of the land are exposed to three or more hazards. According to the 2017 Global Climate Risk Index (<https://germanwatch.org/en/12978>), Chile was the tenth most affected country by the impacts of weather-related loss events (storms, floods, heat waves etc.).

The past seven years in a row have been catalogued as part of the ten driest hydrological years of the past six decades. Additionally, ports more frequently have had to close for fossil fuel imports due to strong swells and cities have suffered blackouts due to landslides and extreme temperatures that have provoked extensive wild fires. In 2017, 57% of Chile's total energy generation was thermoelectric (provided by coal-fired or natural gas-fired plants which utilize imported fuel) and 29% was hydroelectric.

Chile is very vulnerable to hydrology. At present, 30% of the system's installed capacity, corresponding to dam and run-of-river hydro power plants, is dependent on hydrology. This is alarming, since climate change has resulted in a decrease of more than 20% in available hydroelectric energy, comparing the last 5 years to the last 56 years. This reduction of 20% represents more than 5,790 GWh of energy that has not been available each year during the last 5 years. Additionally, climate change has not only reduced the amount of available hydroelectric energy, but also increased the number and probability of natural disasters occurring on Chile, as presented in the 2017 Global Climate Risk Index.

Chile is also extremely dependent on energy imports from other countries. Data from the International Energy Agency confirms that during the last 10 years, energy imports represented on average more than 66% of the country's energy use. In the Chilean electricity market, 54% of the system's installed capacity utilizes imported fossil fuels. A concrete example of the dependency problem in Chile's recent history occurred in 2006 when Argentina curtailed 100% of its natural gas exports to Chile without warning, resulting in a system shock and leading to extremely high power prices and even shortages which lasted for years. One of the principal impacts of the Argentine gas crisis was the construction of more than 3,000 MW in coal capacity, since at the time, this fuel represented the lowest cost baseload alternative available to replace the natural gas-fired combined cycle plants.

Contribution to Chile's Adaptation to Climate Change

In accordance with Chile's Third Communication – UNFCCC (2016), Chile possesses seven of nine characteristics that the UNFCCC uses to define vulnerability and needs to focus on effective climate change adaptation strategies in these sectors: water resources, biodiversity, forestry & agriculture, fishing and aquaculture, energy, infrastructure, cities and coastal areas, health and tourism. EdT will contribute to climate change adaptation in three of the vulnerable sectors as detailed below:

The Project will have the following outcomes

- 1) **Electric Sector:** The Project will help Chile build capacity to adapt to climate change by improving grid flexibility and catalysing additional investments in variable renewable energy and also by reducing the national grid's dependence on fossil fuels and hydrology affected by droughts (In 2017, Chile's power generation was comprised of 57% thermoelectric generation and 29% hydroelectric).
- 2) **Most Vulnerable People and communities support:** Under the long-term collaboration agreements executed with the vulnerable fishing communities close to the Project, EdT will provide funds and training for social and productive investments which will help diversify the local economy, which is highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and higher water temperature due to climate change.
- 3) **Water Security:** EdT will benefit the vulnerable local communities by providing stable water supplies from the Project's desalination plant to the communities at cost. Currently, the local communities surrounding the Project do not have access to stable drinking water supply, which is currently sourced from groundwater and transported to the communities by truck.

National Designated Authority Support

On January 31, 2018, the National Designated Authority (NDA) of Chile, the Ministry of Finance, provided a "no-objection" letter to the GCF with regard to the Espejo de Tarapacá Project, confirming that EdT conforms to Chile's national priorities, strategies and plans and all relevant laws and regulations. On November 19, 2018, the Chilean NDA later provided an updated "no-objection" letter to the GCF recognizing the change in Accredited Entity and confirming its continued support for the Project. Both letters are included in Annex 1 to this Funding Proposal.

C.2. Project / Programme Objective against Baseline

Describe the baseline scenario (i.e. emissions baseline, climate vulnerability baseline, key barriers, challenges and/or policies) and the outcomes and the impact that the project/programme will aim to achieve in improving the baseline scenario.

Baseline Scenario

In terms of greenhouse gas emissions, in accordance with the Chile's Second Biennial Update Report on Climate Change prepared by the Ministry of Environment in 2016, Chile's total GHG emissions (excluding FOLU) amounted to 109.9 million tCO_{2e} in 2013, which represents an increase of 113.4% since 1990 and of 19.3% since 2010. The main GHG emitted by Chile was CO₂ (78.4%), followed by CH₄ (10.7%), N₂O (10.0%), and fluorinated gases (0.9%). The energy sector is the largest GHG emitter in Chile (77.4%), mainly due to the consumption of coal and diesel for electricity generation and consumption of diesel in road transport. Energy industries represent the main subcategory of GHG in the energy sector (45.3%) and the main source of emissions at the national level (35.0% excluding FOLU). As Chile continues developing and other sectors move towards electrification, GHG emissions are expected to continue to increase. On a per capita basis, Chile consumes approximately 50% of electricity per capita as compared to other OECD nations.

As described in Section C.1 above, Chile's electric sector is currently facing significant changes and challenges related to growth and curtailment of variable renewable energy, decarbonisation and climate change impacts, among others. At present, energy storage is virtually inexistent and no economic incentives are provided for investment in renewable energy or energy storage infrastructure. In addition, unique and ground-breaking investment ideas which provide important social benefits face market entry barriers. In the case of the Project, these barriers have prevented the Project from a long term energy supply contract in order to secure funding and move forward.

Finally, given that the Project combines the construction of the first bulk energy storage project in Chile with capacity of 300 MW with 600 MW of PV solar capacity, the integrated Project meets the "first-of-its-kind" approach for demonstrating additionality under the "Tool for the demonstration and assessment of additionality."

Project Objectives

The Project seeks to achieve multiple objectives by stimulating the paradigm shift in the Chilean electric sector which is transitioning from conventional energy generation to renewable energy:

- 1) Implementation of the first bulk energy storage project in the Chilean electric system which will provide multi-service system benefits including grid flexibility, improved resiliency and catalysation of additional investments in variable renewable energy, reducing dependence on fossil fuel and hydroelectric generation;
- 2) Reduction in GHG emissions. The Project will avoid a total amount of 35 million tonnes of CO_{2e}, resulting in a cost per ton of CO₂ avoided of 31.26 USD/tCO_{2e} for the total financing, and 1.71 USD/tCO_{2e} for the GCF financing;
- 3) Adaptation to climate change in the three sectors where Chile must build resilience; 1) Energy by increasing reliable generation not dependent on hydrology; 2) Water resources, by using the Project's desalination plant to provide potable water access to communities that do not have stable water supply. Indirectly, this will also contribute to creating healthier and more resilient local coastal communities; 3) Fishing and Aquaculture by designating a portion of funds provided in the social-productive agreements executed with organizations to help the coastal communities diversify their local economies, which are highly dependent on natural extraction of sea resources. The social-productive funds will be aligned with the national adaptation plan for climate change at national, regional and local levels;
- 4) Social, technical and financial recognition of pumped storage and other energy storage technologies to stimulate and facilitate investment and replicability;
- 5) Improvement in gender equality, well-being and economic opportunities for low income households in the fishing communities located close to the Project. The collaboration agreements executed by the Project and local community organizations includes the provision of funds to be invested in social and productive areas of the communities. One of the priority areas will be the gender equality and the empowerment of women. The Project will apply the 2030 Agenda of SDGs as a framework for the development of the local communities.

Table 7 below summarizes the existing baseline scenario and expected outcomes and impacts for each of the abovementioned objectives.

Table 7: Project Objectives, Baseline and Expected Outcome

Objective	Baseline Scenario	Expected Outcome
Implementation of the 1st bulk energy storage project in Chile to provide grid flexibility, improve resiliency and catalyse additional VRE investments	Inexistence of bulk energy storage and minimal energy storage (currently only 52 MW, approximately 20 minutes, of battery storage); need for enhanced system flexibility for incorporation of VRE in Chilean grid	Construction of Project's 300 MW PSH plant; construction of additional VRE generation in Chilean grid
		Reduced dependence on fossil fuel-based generation and hydroelectric generation affected by climate variability and droughts
Reduction in GHG emissions	System annual emissions of 35.5 million tCO_{2e} from the electric generation sector	Annual reduction of 1,001,187 tCO_{2e} in emissions from the generation of electricity with zero emissions
Adaptation to climate change	Adaptation to climate change in three sectors where Chile must build resilience: 1) Energy: 21,081 GWh/year of energy from hydroelectric plants at risk of reduction due to climate change, climate variability or droughts, 2) Water Resources: providing stable water access to the communities from the Project's desalination plant, which	Net generation of 1,500 GWh/year of clean energy with 0 risk associated to climate change, climate variability or droughts. Availability of drinking water supply from the Project's desalination plant for the San Marcos and Rio Seco coastal communities for at least 25 years from the date of EdT construction.

	helps create healthier and more resilient local coastal communities, and 3) Fishing and Aquaculture: the provision of social-productive funds to help diversify the local economy of the coastal communities.	Local community agreements (7 agreements with local organizations) which will help diversify the coastal economies for entire life of the Project. The focus of these agreements is enhancing the productivity of the communities through aquaculture projects, improving overall wellbeing and supporting gender equality and the empowerment of women.
Social, technical and financial recognition of pumped storage and other energy storage	Inexistence of large scale energy storage; inexistence of pumped storage infrastructure in Chile; significant financial and market barriers to entry for unique new projects	Benchmark and track record for future energy storage projects allowing for improved policies and sharing of economic benefits
Improvement in, gender equality, wellbeing and economic opportunities for low income households in Project community	Social and productive investment agreements were executed by the Project and organizations of San Marcos and Rio Seco, the communities located close to the Project. The project will also prioritize the empowerment of women in the fishing villages. The local economies of these communities are dependent almost exclusively on sea-related activities dominated by men; the community is vulnerable to the economic impact of climate change as detailed in the Gender Assessment.	Implementation of educational and skill training programs, creation of new economic activities and development of recreational activities, for adults; prioritizing the empowerment of women. For more detail, see the Gender Action Plan included in Annex 5.

C.3. Project / Programme Description

Describe the main activities and the planned measures of the project/programme according to each of its components.

Provide information on how the activities are linked to objectives, outputs and outcomes that the project/programme intends to achieve. The objectives, outputs and outcomes should be consistent with the information reported in the logic framework in section H.

Project Description and Objectives: The Project is a large scale power project located in the Tarapaca Region in northern Chile, which aims to make use of Chile's natural resources and proven generation technology in order to provide clean renewable energy supply 24 hours a day, seven days a week. The Project comprises the final development and construction of two commercially integrated power plants: (1) a 300 MW pumped storage hydroelectric ("PSH") plant using the Pacific Ocean as its lower reservoir and an existing natural concavity as its upper reservoir, and (2) a 561 MW-AC photovoltaic solar ("PV") plant (together the "Plants"). The Project also includes implementation and funding of community works including gender empowerment and climate change adaptation measures for the fishing communities located close to the Project.

The GCF Proceeds will be channelled to the Project through an equity investment in a limited liability vehicle established for the purposes of the Funded Activity. The initial GCF Proceeds will be used to cover expenses to be incurred during the final stage of development which include expenses related to permitting, engineering, financial and market advisory services, community engagement, staff and administration, as well as cash funding of guarantees required to secure

participation in PPA bid processes and secure granted permits. Through the use of the GCF Proceeds for the final stage of development of the Plants, the Project aims to: (i) de-risk the underlying renewable energy generation and storage project; and (ii) obtain a power purchase agreement (“PPA”) for the underlying renewable energy generation and storage project.

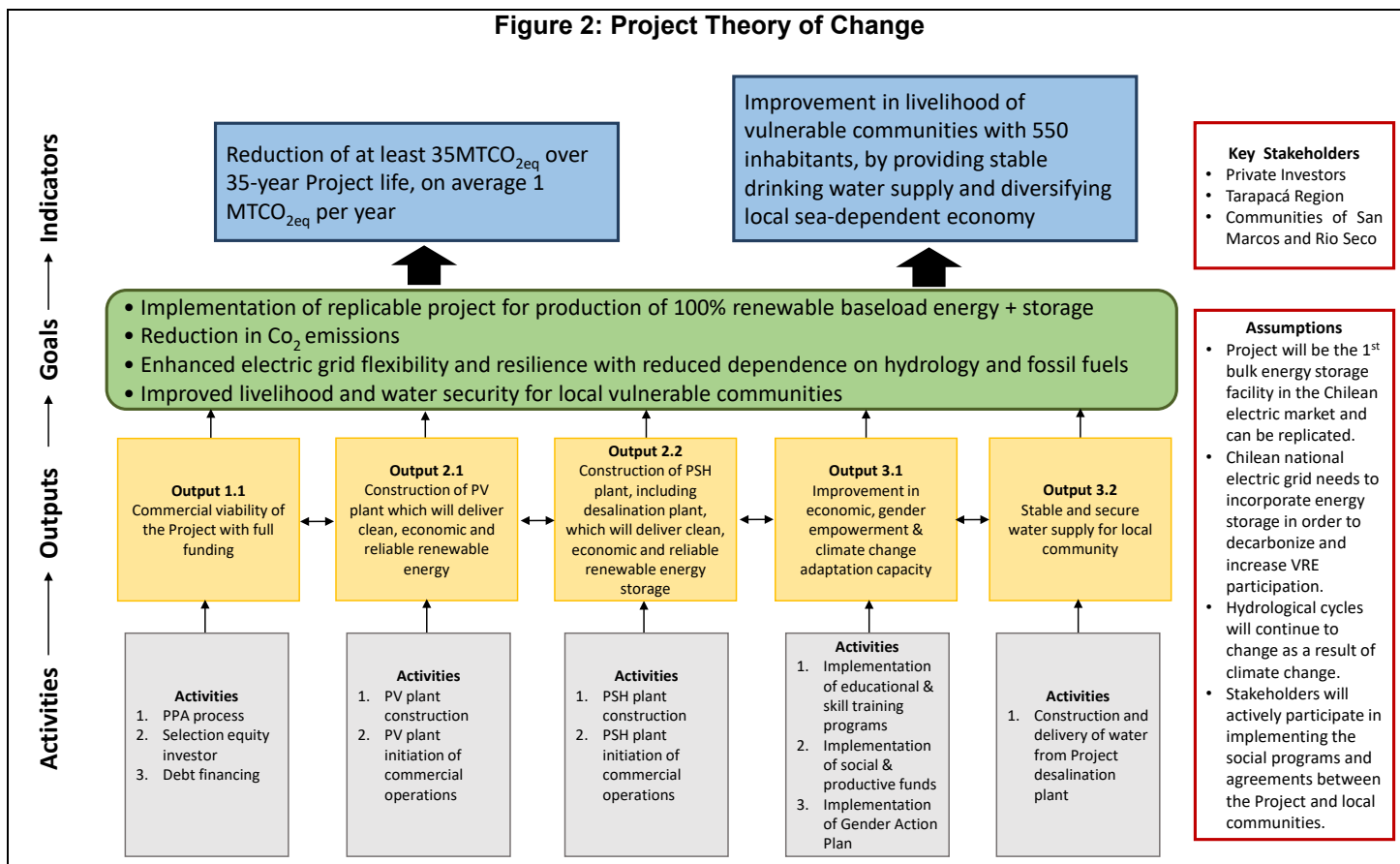
The commercial viability of the Project requires execution of a long term PPA (or transmission or other acceptable service contract) with a creditworthy customer in order to guarantee stable cash flows for recovery of the investment to be provided by equity and debt holders. GCF Proceeds will be used to assist the Project in securing a PPA (or transmission or other acceptable service contract) by funding the bid bonds needed to participate in the tender processes to guarantee the binding offers presented. It is estimated that the bid bond for the Project’s participation in such tender processes would be up to thirteen million US Dollars (13,000,000). In the event that the bid is not awarded, the bid bonds will be returned. In the event that the bid is selected, the bid bond will remain in place until financial close of Project debt financing, at which time it would be replaced with a guarantee issued under the syndicated debt financing agreement.

Project Components: The Project’s objectives will be achieved through the following three components (each, a “Component”):

- i) **Component 1 – Project Development & Preparatory Work:** This component encompasses work related to the final development phase of the Project until financial close of the debt financing and subsequent initiation of construction. This component includes Pre-PPA development costs in order to maintain the viability of the Project while preparing to participate in PPA auctions (the Project costs at this stage include financial and engineering advisory services, staff and general administrative and permitting costs). The Pre-PPA development costs also include funds for obtaining bid bonds for the PPA auctions and securing granted permits, which would be lost if the guarantees are not issued when requested by the authorities. Component 1 also includes Post-PPA development costs, which will be needed after award of a PPA to maintain the viability of the Project while an equity sponsor and project financing agreements are being finalized.
- ii) **Component 2 – Project Construction:** This component entails the entire construction process of the two Plants until reaching start-up of commercial operation (including construction and commissioning). Given that the Project plans to enter into a project finance syndicated credit facility which will be disbursed in accordance with construction cash flow requirements, financing related costs are also included in Component 2. For the avoidance of doubt, the implementation period does not include the period for operation and maintenance of the plants.
- iii) **Component 3 – Community Works:** This component encompasses the community engagement works to be implemented by the Project during all phases, including development, construction and operation. This component is particularly focused on gender empowerment and climate change adaptation measures for the vulnerable fishing communities located close to the PSH plant. The engagement works will include capacity building activities through the implementation of educational and skill training programs, provision of competitive funds for social and productive investments for the creation of new economic activities in order to diversify the local economy and development of recreational activities. In addition, this component includes the provision of stable and secure water supply for the local community from Project’s desalination plant (which will be constructed for operation of the PSH plant).

As detailed in the Logic Framework in Section H.1 below, a theory of change diagram summarizing the outputs and activities needed to achieve the identified goals is provided in Figure 2 below:

Figure 2: Project Theory of Change



Output 1.1 – Commercial viability of the Project with full funding: The Project is expected to overcome market barriers to entry and raise approximately US\$ 1.0 billion from the private sector including equity investors and commercial banks. The Project has been funded to date by a group of individual private investors, principally Chilean, who were attracted by the Project's unique vision and committed early but limited financial development support. It also received support from Start-Up Chile (an early stage venture capital fund from the Government of Chile) and Fundación Chile (a public-private NGO which aims to foster innovation in order to promote new industries in Chile).

However, the Project faces significant financial and market entry barriers including solid financial capacity, established experience and track record and creditworthy strategic partners, among others. These barriers prevent large scale, unique and ground-breaking investment ideas, such as the Project, from moving forward. In the particular case of EdT, these barriers have prevented the Project from obtaining a solid PPA and in turn, prohibited incorporation of strategic equity investors, who as a rule, are not willing to invest without the guarantee of stable future cash flows. These barriers to market entry represent the principal reason for the absence of innovation and start-up companies in the development of large-scale energy projects; and is the foundation of EdT's application for support from the GCF.

The objective of GCF's support is to help fund last stage development expenses, including cash funding of guarantees necessary to participate in PPA tender processes and secure granted permits. In addition, GCF's participation as an "anchor" equity investor in the Project will provide a "stamp of approval" and help attract additional private sector investors. Without the GCF support, the Project's short to medium-term capital needs will likely be unfunded, risking discontinuation and termination of the Project. GCF funding would be value-add during the early years of the Project, with the possibility to "crowd-in" once the Project proves it has overcome market risks.

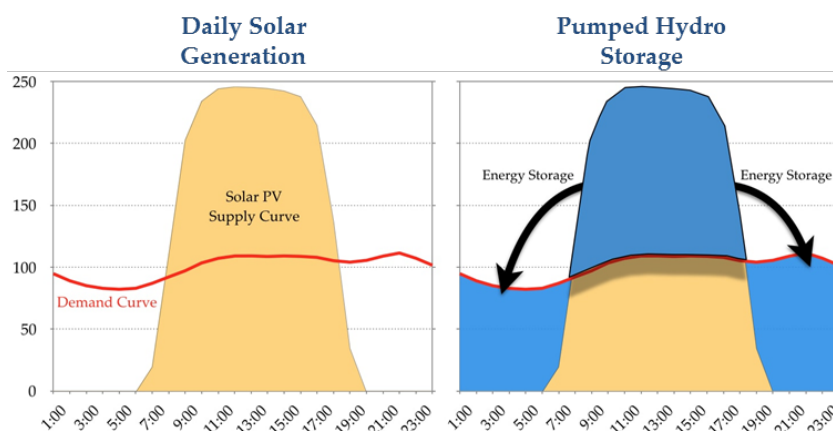
Output 2.1 – Construction of PV plant which will deliver clean, economic and reliable renewable energy: The Project includes the construction and initiation operation of a 561 MW-AC PV solar park which will be constructed in phases.

Output 2.2 – Construction of PSH plant, including desalination plant, which will deliver clean, economic and reliable renewable energy storage: The Project includes the construction and initiation operation of a 300 MW PSH plant using the Pacific Ocean as its lower reservoir and an existing natural concavity as its upper reservoir. The PSH plant will include construction of a desalination plant which will be used for operation of the PSH plant and to provide stable water supplies to the local communities.

EdT is an innovative and unique large scale power project which combines Chile's natural resources with proven power generation technology in order to provide a renewable 'solar plus storage' baseload solution for the Chilean market. The objective of the Project is to commercially integrate solar generation with pumped storage hydroelectric generation in order to provide renewable 24/7 energy supply. The Project will help Chile build capacity to adapt to climate change by improving grid flexibility and catalysing additional investments in variable renewable energy and also by reducing the national grid's dependence on fossil fuels and hydrology affected by droughts (In 2017, Chile's power generation was comprised of 57% thermoelectric generation and 29% hydroelectric).

The Project's innovative design resolves the intermittency problem inherent to solar technology by effectively combining Chile's abundant sunlight and seawater resources to ensure electricity availability 24/7. The Project design fundamentals are based upon the availability of solar capacity to provide electricity during daylight hours and hydroelectric pumped storage capacity to provide coverage during night-time hours. As a result, the benefits from the Project which include cross-cutting mitigation and adaptation impact potential are significantly higher those produced by smaller scale PV-only solar projects located in the same region. As depicted Figure 3 below, the Project's pumped-storage hydro plant is effectively bulk energy storage—storing solar energy in the form of water which is pumped into the reservoir, until it is required by the system.

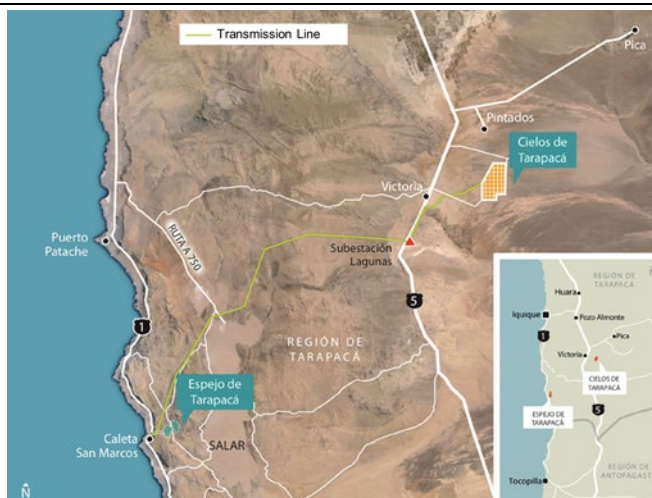
Figure 3: Integration of Solar with Pumped Storage Hydro



As shown in Figure 4 below, the Project will be located in the desert in northern Chile where currently, despite being among the most privileged places on earth for the development of solar energy, more than 87% of the electricity generated comes from thermoelectric sources¹⁰. In fact, this area possesses some of the best solar irradiation levels in the world (average capacity factors in excess of ~35%), and is also relatively flat and sparsely populated. According a 2014 report by GIZ GmbH and the Chilean Ministry of Energy, the PV solar potential in this area exceeds 1.4 million MW of installed capacity. The existing installed solar capacity of around 633 MW in this area represents less than 0.1% of the total potential.

Figure 4: PSH and PV Plant Locations

¹⁰ The Project is located in Chile's ex-Greater Northern Electric Grid, which includes the regions of Arica/Parinacota, Tarapacá and Antofagasta.



By combining the unique natural resources found in the Atacama Desert of northern Chile with recent reductions in the cost of photovoltaic solar generation, EdT is able to provide a competitive, reliable and sustainable alternative to traditional fossil fuel-fired baseload electric generation. These natural characteristics include: (i) the best solar irradiation in the world, (ii) a coastal site with a 600 m cliff and large surface concavity and (iii) proximity to the Pacific Ocean, which provides continuous water supply with no hydrological volatility. The Project efficiently utilizes existing geography and conditions (including Chile's superb natural solar and hydroelectric resources, proximity to the Pacific Ocean and the large natural concavity utilized for the reservoir) and has been designed to minimize environmental and social impacts during construction and operation. The Project does not require resettlement and will be constructed in barren and sparsely populated areas owned by the Chilean government. Nonetheless, it should be noted that the Project has applied the highest international standards in its community engagement.

By converting solar energy into a reliable and competitive 24/7 supply, the Project will revolutionize the Chilean electric sector and provide significant strategic benefits including: (i) acceleration of the growth and installation of competitive, reliable and sustainable renewable energy capacity, (ii) diversification of Chile's energy matrix away from contaminating imported fossil fuels and weather-dependent hydroelectric resources, toward domestic natural resources—promoting energy independence, (iii) enhancement of grid reliability and flexibility to manage load fluctuations that are exacerbated by intermittent renewable energy, and (iv) management of price volatility particularly during peak hours.

Output 3.1 – Improvement in economic, gender empowerment and climate change adaptation capacity in vulnerable local community: Under the long-term collaboration agreements executed with the vulnerable fishing communities close to the Project, EdT will provide funds and training for social and productive investments which will help diversify the local economy, which is highly dependent on sea products dominated by men that have been in steady decline in recent years due to over-exploitation and higher water temperature due to climate change.

Output 3.2 – Stable and secure water supply for vulnerable local community: The Project will provide stable drinking water supply from the Project's desalination plant to the local vulnerable communities located at cost. Currently, the local communities surrounding the Project do not have access to stable drinking water supply, which is currently sourced from groundwater and transported to the communities by truck.

In accordance with the cooperation agreements executed with the local communities, the Project will supply water from its desalination plant to the vulnerable local communities. Most of the water will be sold to the communities at cost. At present, potable water supplied from depleting groundwater sources is currently transported by truck from Iquique (approximately 100 km.) twice monthly.

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

Describe the quality of the management team, overall strategy and financial profile of the Sponsor (Executing Entity) and how it will support the project/programme in terms of equity investment, management, operations, production and marketing.

Energía de Tarapacá SpA (Executing Entity)

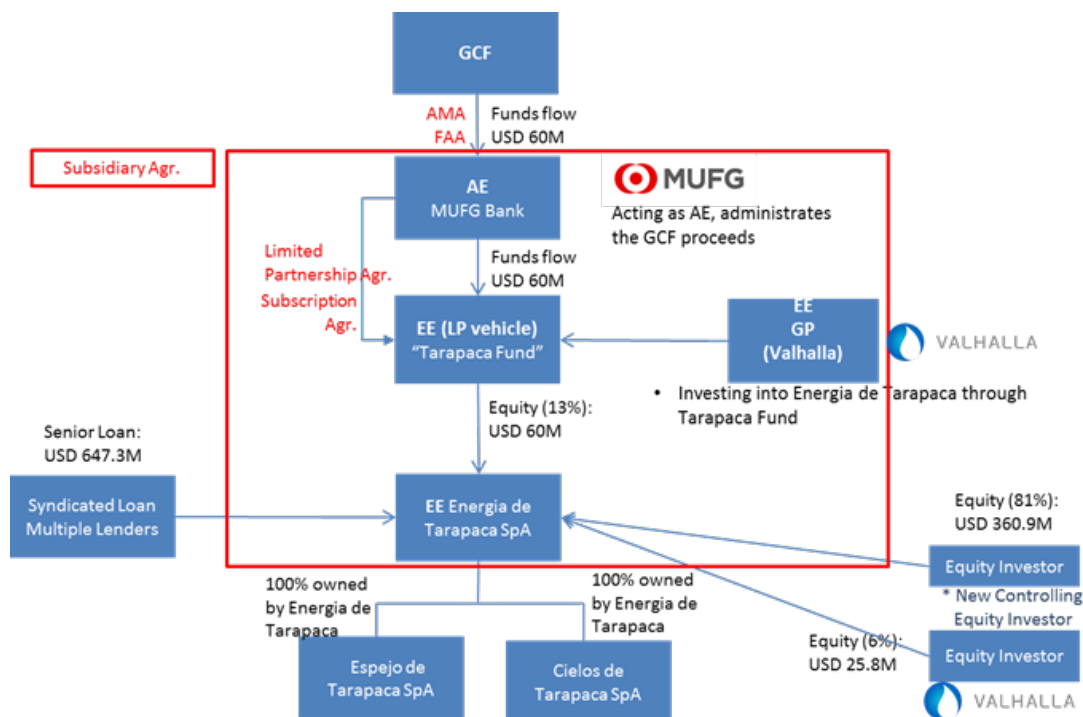
Energía de Tarapacá, the Executing Entity, is a wholly-owned subsidiary of Energía Valhalla ("Valhalla" or "the Company"), the Sponsor. Energía de Tarapacá SpA is fully formed and was incorporated in Chile on April 29, 2016. As shown in Figure 5 below, at present, Valhalla owns 100% of the Executing Entity, Energía de Tarapacá, which in turn owns 100% of the two project companies, Espejo de Tarapacá which is developing the PSH plant and Cielos de Tarapacá, which is developing the PV plant.

Figure 5: Current Project Ownership Structure



Valhalla is now seeking strategic investors to participate as partners in the ownership of the Project. Figure 6 below details the proposed funding structure presented to GCF, under which the shareholders of the Executing Entity, Energía de Tarapacá would include Valhalla (6%), GCF (13%) and Strategic Private Investor (81%). Additionally, as shown in the diagram below, the Project's future revenues will be sourced from a PPA expected to be executed by Energía de Tarapacá and a creditworthy offtaker.

Figure 6: Proposed Project Ownership Structure



Tarapaca Fund (the “Tarapaca Fund”) (Executing Entity)

Tarapaca Fund is a private limited partnership vehicle with limited liability to be incorporated in Canada and governed by the laws of Canada.

The Accredited Entity (on behalf of the GCF) will sign a subscription agreement with the General Partner (on behalf of the Tarapaca Fund) and a limited partnership agreement with the General Partner (for itself and on behalf of the Tarapaca Fund) for the Tarapaca Fund.

The Accredited Entity shall ensure that the General Partner, acting on behalf of the Tarapaca Fund, will carry out the Funded Activity in accordance with Funded Activity Agreement and AMA.

The Accredited Entity shall also enter into a multi-partite agreement with the Tarapaca Fund, the General Partner, and the Project Company.

Valhalla: Sponsor, Executing Entity, General Partner

Founded in 2011, Energía Valhalla (“Valhalla”) is a Chilean-owned independent start-up company focused on the development, construction and operation of renewable power projects—in order to strategically diversify the country’s energy matrix away from overdependence on imported fossil fuels. Valhalla’s original project development formula combines pumped storage hydro with photovoltaic solar generation, capitalizing on Chile’s superior irradiation and unique geography for large-scale energy storage.

At present, the Company’s ownership is comprised of approximately fifty shareholders, mostly well-known Chilean businessmen, who have funded development of the Project to date. As of March 31, 2019, development expenses incurred by the Project total approximately US\$ 26 million. The principal expenses relate to external advisors contracted to assist in preparation of the required engineering, environmental, community engagement, financial, commercial and legal studies, administration and staff expenses, and costs associated with securing land and permits.

Valhalla assembled a highly qualified multi-disciplinary team for development of the Project which effectively integrates expertise, innovation and extensive local and international experience in the development, financing, construction and operation of electric generation plants. Valhalla’s internal team includes professionals specializing in critical development areas such as commercial strategy and planning, logistics and permitting, sustainability and community engagement, and finance and administration. Additionally, Valhalla also engaged an extensive team of expert external advisors to assist in development activities, as well as specialized independent consultants to review and verify key Project issues.

Since inception, Valhalla has proactively communicated its vision among authorities, academics, communities and other stakeholders positioning the Company as a model for the future development of large scale energy infrastructure in Chile. The Company has been recognized with multiple awards, including energy innovation and community related awards, and has received extensive media coverage, locally and internationally. The Project has been recognized by well-known distinguished public and private figures such as ex-Chilean President and former Special Envoy on Climate Change for the United Nations Secretary-General Ban Ki-moon, Ricardo Lagos¹¹, ex-Chilean Minister of Energy Máximo Pacheco and American Nobel prize winning physicist Steven Chu.¹²

Valhalla will act as General Partner until new strategic investor(s) joins the Project.

¹¹ See letter of support for the Project addressed to the Green Climate Fund from Ricardo Lagos dated November 19, 2018 which is included in Annex 11.

¹² See video of conference presentation by Steven Chu: <https://vimeo.com/280816552>

C.5. Market Overview (if applicable)

Describe the market for the product(s) or services including the historical data and forecasts.

Describe the competitive environment including the list of competitors with market shares and customer base and key differentiating factors (if applicable).

Provide pricing structures, price controls, subsidies available and government involvement (if any).

Since the privatization of the electric sector market model in 1982, Chile has had one of the most stable and transparent regulatory frameworks in Latin America. The market model is based on free market principles, including marginal cost pricing and vertical unbundling of the generation, transmission and distribution segments, to promote private investment and competition. The regulatory fundamentals remain in place today and the limited adjustments over the last 30 years have been driven by encouragement of private investment and most recently, development of renewable energy. Recent developments in the Chilean power sector have targeted lowering electricity prices for consumers via public auctions for distribution companies and the greening of the power fuel source by promoting investment in renewables, although no economic incentives are provided.

The retail sale of electric power is split into two customer segments based on peak demand: regulated and unregulated customers. Regulated customers are those with demand less than 0.5 MW, while customers with demand ranging from 0.5 MW to 5.0 MW can opt into the unregulated retail market. Customers with a demand over 5 MW are strictly in the unregulated retail market. All large electricity consumers in Chile, including regulated distribution companies and unregulated mining and industrial customers, must enter into PPAs for the purchase of electricity. Under the existing regulatory framework in Chile, PPA pricing is market driven. Distribution companies with “regulated” customers, which make up approximately 70% of the market, award PPAs in public competitive auctions which are conducted by the National Energy Commission. Large “unregulated” customers, typically mining or industrial companies, bilaterally determine PPA prices and terms in private negotiations.

The Chilean electric power grid is organized into three independent systems. The largest grid, the National Interconnected System (“SEN”) extends for 3,100 km, encompassing most of the country from Arica in the north, to the island of Chiloe in the south. The SEN was formed in 2017 with inauguration of the transmission line interconnecting the northern and central grids. The SEN, where 98% of the country’s population resides, has installed capacity of approximately 24,000 MW. The Project is located in the northern part of the SEN, south of the city Iquique.

The SEN is dominated mainly by four electric generation companies, Enel, AES Gener, Engie and Colbun. Enel owns the largest stake of generation capacity with 29% of the total installed capacity, followed by AES Gener (17%), Colbun (14%), and Engie (9%). At present, the SEN is comprised primarily of thermal units which represent the 54% of total system installed capacity as of December 2017. Hydroelectric power plants represent 30% of the system, considering all the dam-based plants and the run-of-river plants over 20 MW. The remaining 18% of capacity is principally comprised of renewables plants, including solar, wind, biomass, and run-of-river plants of less than 20 MW.

Historically, coal has been a dominant source of power generation in Chile, and is expected to continue to hold a dominant share (currently 39% of total generation), considering that many of the coal facilities are relatively new, having been constructed in the 2000s¹³. However, the share of coal in the power mix is expected to decrease with the increasing competitiveness of other technologies (i.e., non-hydro renewables) and gradual decarbonisation of the matrix. It should be noted that the principal electricity incumbents, Engie, Enel and AES Gener, have all announced their commitment to discontinue new-build coal plants in Chile and in 2018, the Ministry of Energy initiated a working group to analyse and design a timeline for decarbonisation, subject to maintaining the level of reliability and resilience of the system, which will require the incorporation of flexible projects such as bulk energy storage. In fact, in January 2019, the report prepared by Chile’s national independent grid operator recognized the strategic role that storage can play in the process of decarbonisation of the energy matrix.

¹³ The newest coal plant in the system (375 MW) was commissioned in May 2019 by Engie.

C.6. Regulation, Taxation and Insurance (if applicable)

Provide details of government licenses or permits required for implementing and operating the project/programme, the issuing authority, and the date of issue or expected date of issue.

Describe applicable taxes and foreign exchange regulations.

Provide details on insurance policies related to project/programme.

Permits

Chile's General Environmental Law regulates the submission and evaluation of environmental impact studies ("EIAs") for electric generation and transmission and the Environmental Assessment Service (*Servicio de Evaluación Ambiental* or SEA) is the governmental authority responsible for managing, coordinating and consolidating the environmental evaluation process with participation from all relevant government agencies and local communities close to the projects. The Chilean environmental framework is recognized for its high standards and extensive monitoring throughout the life of approved projects. Upon approval of a project EIA, the SEA issues a permit resolution (*Resolución de Calificación Ambiental* or RCA), which serves as the primary environmental permit authorizing the construction and operation of the underlying power plant and associated infrastructure.

The Project submitted the EIA for the pumped storage hydro plant and the corresponding transmission line in August 2014 and approval was unanimously granted by authorities in December 2015. The Project also submitted the EIA for the PV plant and associated transmission line in January 2015 and was approved in January 2016.

A summary description and status of the principal Project permits is provided below. Table 8 describes the key Project permits which include the environmental, maritime concession and hydraulic works permits and Table 9 describes the principal land concessions which include the electric concessions and land-use concession.

Table 8: Key Project Permits

Permit	Status	Description / Comments
Environmental Permit (RCA) for PSH and Transmission / Interconnection to Lagunas Substation	EIA submitted in August 2014. EIA approved in December 2015.	The RCA, which is issued by the Ministry of Environment through the Environmental Assessment Service (<i>Servicio de Evaluación Ambiental</i>), constitutes environmental approval for the construction and operation of the PSH plant and its 65 km transmission line and interconnection to the Lagunas substation. The EIA was unanimously approved, without objections, on December 3, 2015.
PSH Maritime Concession	Maritime concession request submitted in April 2014. Approved in January 2017, pending submission of guarantee. Expected 2019.	The maritime concession, which is issued by the Ministry of Defence through the Subsecretary of the Armed Forces (<i>Subsecretaría para las Fuerzas Armadas</i>), grants approval for the construction and operation of the underground and offshore installations in the ocean from the intake point and along the first 80 m of coastline.

PSH Plant Hydraulic Works Permit	Hydraulic works permit request submitted in April 2015. Process completed, final approval pending submission of guarantee. Expected 2019.	The Hydraulic works permit, which is granted by the Ministry of Public Works through the National Water Authority (<i>Dirección General de Aguas</i>), is required for the construction waterways and reservoir of the pumped storage plant. This permit is required for the approval of the PSH electric concession.
PV Plant and Transmission Line Environmental Permit (RCA)	EIA submitted in January 2015. EIA approved in January 2016.	The RCA, which is issued by the Ministry of Environment through the Environmental Assessment Service (<i>Servicio de Evaluación Ambiental</i>), constitutes environmental approval for the construction and operation of the PV plant and its 18 km transmission line and interconnection to the Lagunas substation. The EIA was unanimously approved, without objections, on January 27, 2016.
Sectorial Permits	Sectorial permits have been and will continue to be obtained prior to and during construction, based on the applicable requirements.	Sectorial permits are lower tier permits associated with the RCAs which will be secured at the appropriate stages of Project development and construction. The Project has identified all required permits with estimated application and approval dates.
Construction Permits (PSH and PV Plants)	Construction permits have been and will continue be obtained prior to initiating construction of specific works based on the applicable requirements.	Construction permits provide approval to erect inhabitable structures such as project offices and housing. The Project has identified all required permits with estimated application and approval dates

Table 9: Land Concessions

Permit	Status	Description / Comments
PSH Plant Electric Concession	Electric concession request submitted in April 2015. Approval expected in 2019.	Hydroelectric power projects do not require electrical concessions, but they entitle the owner to impose perpetual easements upon landowners and provide the concessionaire with a permanent right to use the land for development, construction and operation. The electric concession is granted by the Ministry of Energy through the Superintendency of Electricity and Fuels (<i>Superintendencia de Electricidad y Combustibles</i>).

PSH Plant Transmission Line Electric Concession	Electric concession request submitted in August 2015. Approved in March 2017.	Transmission service does not require an electric concession, but companies may apply for a concession to facilitate access to third party properties for development of electric transmission facilities by means of easements. The electric concession was approved by the Superintendency of Electricity and Fuels on March 24, 2017.
Land Use Concession (CUO) for PV Site	Land use concession request submitted in July 2014. Approval expected in 2019.	The CUO constitutes the land use concession which allows for utilization of Project site for initial 30 year term, which may be renewed prior to expiration. The CUO is granted by the Ministry of Public Property (<i>Ministerio de Bienes Nacionales</i>).
PV Plant Transmission Line Electric Concession	Electric concession request submitted in December 2015. Approval expected in 2019.	Transmission service does not require an electric concession, but companies may apply for a concession to facilitate access to third party properties for development of electric transmission facilities by means of easements. The electric concession is granted by the Ministry of Energy through the Superintendency of Electricity and Fuels (<i>Superintendencia de Electricidad y Combustibles</i>).

Taxes

- Primary Value Added Taxes: applicable to be refunded after initiation of Project commercial operations
- Income taxes ~35% of pre-tax income

Foreign Exchange

- Electricity prices are indexed to US Dollars

Insurance

The Project will maintain standard all-risk insurance, including advanced loss of profit and business interruption, policies during construction and operation which include earthquake coverage.

MUFG's policy towards AML/CFT

MUFG Bank confirms that our Bank adequately controls transactions with Sanctioned Countries and Parties under the relevant regulations where applicable, such as UN resolutions, OFAC regulations, Foreign Exchange and Foreign Trade Act of Japan, etc.

MUFG Bank does not process any transaction under Sanction imposed by UN and US (OFAC)/Japanese authorities. MUFG Bank, as Accredited Entity monitors the Project to ensure that Executing Entity will comply with the policy toward AML/CFT.

C.7. Institutional / Implementation Arrangements

Please describe in detail the governance structure of the project/programme, including but not limited to the organization structure, roles and responsibilities of the project/programme management unit, steering committee, executing entities and so on, as well as the flow of funds structure. Also describe which of these structures are already in place and which are still pending. For the pending ones, please specify the requirements to establish them.

Describe construction and supervision methodology with key contractual agreements.

Describe operational arrangements with key contractual agreements following the completion of construction. If applicable, provide the credit analysis of key counterparties of key contractual agreements and/or structural mitigants to cover the counterparty risks.

Description of Implementation Agreements and Funds Flow Structure

MUFG Bank, as Accredited Entity will oversee the project administration, monitor the project implementation, and will insure project compliance with MUFG Bank's own relevant policies. MUFG Bank will execute an agreement with Executing Entity to make sure that Executing Entity will be responsible for the obligations which the Accredited Entity has under the Accredited Master Agreement.

MUFG Bank will review the execution of the projects, monitor the capability and performance of the Executing Entity, and assess any change in circumstances that may have a bearing on the plan in general and on the implementation and operation of the projects in particular.

More specifically, MUFG Bank will:

- conduct review missions,
- monitor the Executing Entity's compliance with equity effectiveness conditions,
- monitor the procurement of goods, works, and consulting services,
- monitor implementation and development performance,
- analyse progress reports,
- disburse GCF's equity proceeds, and monitoring project cash flows,
- review unaudited and audited project accounts and agency financial statements,
- monitor the Executing Entity's compliance with applicable MUFG Bank's policies as set out in relevant agreements,
- monitor the project compliance with environmental and social safeguards, social dimensions and gender development,
- monitor physical works progress, sector policy changes, sector restructuring, and tariff reform,
- monitor Executing Entity's compliance with covenants,
- strengthening the Executing Entity's financial management and developing their capacity,
- prepare project completion reports, and
- assess the achievement of the project outcome and outputs, and the contribution to achieving the development impact.

Description of Grievance Mechanism

Firstly, MUFG Bank has set means to receive claims by phone calls and emails which are set out in the webpages below.

<https://www.mufgamericas.com/contact-us>

<http://www.bk.mufg.jp/voice/index.html>

Also, Japanese Bankers Association ("JBA"), which MUFG Bank is a member of, provides alternative dispute resolution ("ADR"). Japanese Bankers Association concluded the agreement on "Strengthening its support for resolving complaints/disputes." This agreement was made in conjunction with the Mediation Committee, the support organization for dispute resolution. The aim is to strengthen support for resolving complaints/disputes and facilitate use of the support system for dispute resolution. The following is an outline of the agreement:

1. Strengthening financial alternative dispute resolution (ADR) is a means to enhance customer confidence in banks. The banking industry has taken the step to provide a fair and neutral dispute resolution vehicle that can provide

prompt and transparent dispute resolution, and has established measures to ensure its effectiveness for customers. Member banks are committed to endeavouring to listen earnestly to the voices of customers and to prevent troubles from occurring.

2. Member banks engaged in transactions of derivatives and specified deposits, etc. shall agree to becoming the “target business operators” of JBA as a certified investor protection organization, unless reasonable reasons for not doing so exist.
3. When the resolution of a complaint forwarded to each bank or consumer relations office appears difficult, the member bank shall refer the subject to the Mediation Committee with the consent of the customer, and endeavour to promptly resolve the complaints in accordance with the mediation proposals. When a customer wants to utilize the Mediation Committee, etc., priority should be given to using the support organization for the dispute resolution that the customer wants to make use of.
4. Member banks shall observe the “Rules for Facilitating Complaint Resolution and Mediation,” and sincerely handle the claims to resolve them smoothly.
5. JBA shall proactively conduct public relations by means of leaflets and posters concerning consumer relations offices and the Mediation Committee.

In addition to above, MUFG Bank intends to set out a dedicated page on MUFG Bank’s website to receive comments, feedbacks or complains for GCF-funded projects. The proposed grievance mechanism has been agreed by GCF Accreditation Panel and will be implemented on MUFG Bank’s webpage. As for any complain for MUFG Bank and/or Executing Entity, before pursuing legal action, MUFG Bank’s GCF Focal Point will receive dispute resolution requests by emails or regular mails. Please see MUFG Bank’s Procurement Guidelines draft for details.

Description of MUFG Bank’s Compliance Policy

MUFG Bank has clarified our group mission, long-term vision and shared values in the Corporate Vision and expressed our commitment to meeting the expectations of customers and society as a whole. Furthermore, we have established the Principles of Ethics and Conduct as the guidelines for how the group’s directors and employees act to realize the Corporate Vision. This expresses our commitment to complying with laws and regulations globally, to acting with honesty and integrity, and to behaving in a manner that supports and strengthens the trust and confidence of society.

In addition, as MUFG Bank expands our business globally, we are committed to keeping abreast with developments in the laws and regulations of the jurisdictions in which we operate, including those targeting money laundering and bribery, as well as competition laws, while paying attention to trends in financial crimes.

Compliance management divisions have been established at the holding company Mitsubishi UFJ Financial Group, and at MUFG Bank, Mitsubishi UFJ Trust and Banking, and Mitsubishi UFJ Securities Holdings. Each compliance management division formulates compliance programs and organizes training courses to promote compliance, and regularly reports to each company’s board of directors and Executive Committee on the status of compliance activities. The holding company has the Group Compliance Committee while the three companies have Compliance Committees which deliberate important matters related to compliance. Additionally, the holding company has the Group Chief Compliance Officer (CCO) Committee composed of the CCO of the holding company and CCOs of the three companies. This committee deliberates important matters related to compliance and compliance-related issues for which the Group should share a common understanding.

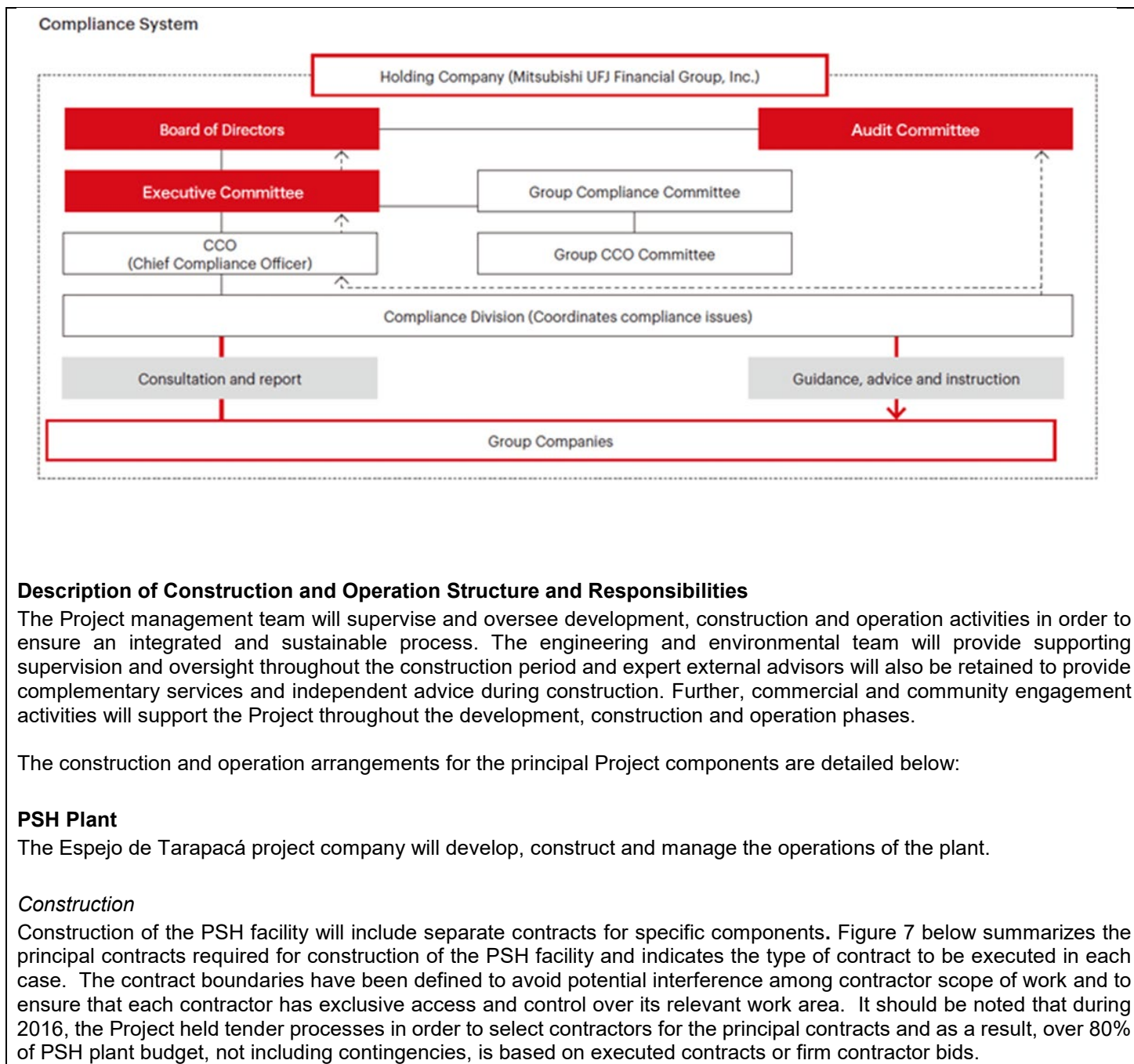
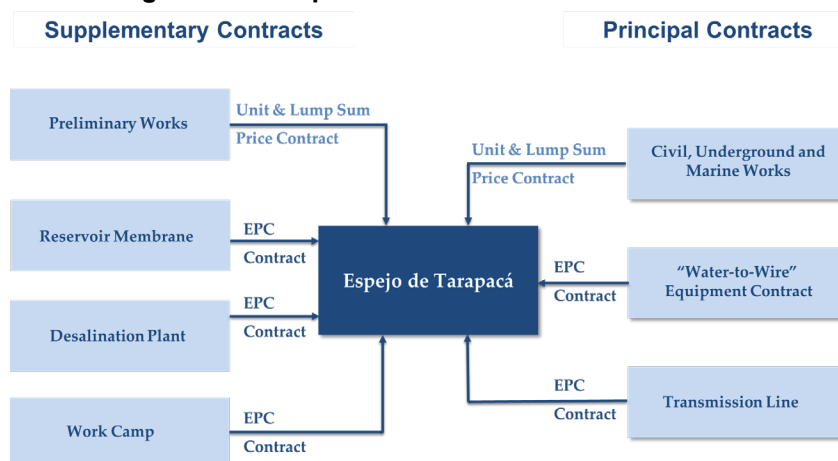


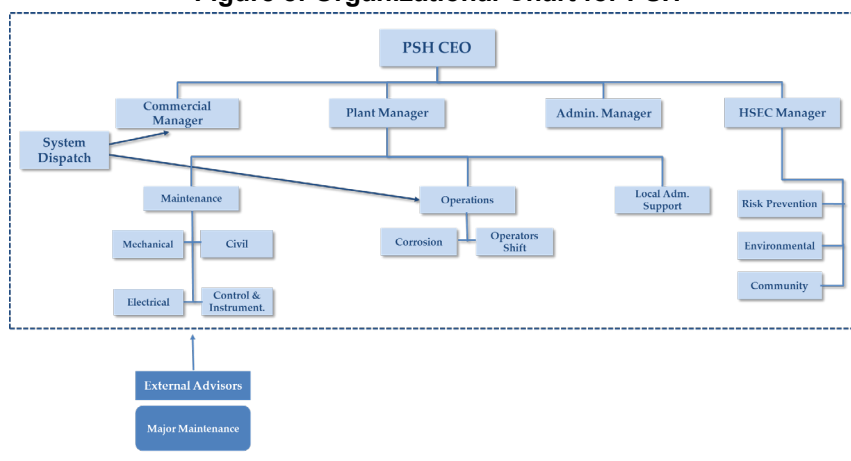
Figure 7: Principal Contracts for PSH Power Plant



Operations

The Project's PSH Operations team will supervise, control, operate and maintain the pumped storage plant and transmission facilities. However, major maintenance will be performed by third parties and temporary employees. Figure 8 below details the organizational chart for the PSH plant after start-up of commercial operations.

Figure 8: Organizational Chart for PSH



PV Plant

The Cielos de Tarapacá project company will develop and oversee the construction and operations of the plant.

Construction

The Cielos de Tarapacá project company will execute a turn-key EPC agreement with a qualified third-party for construction of the PV plant and related transmission facilities. Figure 9 below summarizes the principal contracts required for construction of the PV facility. The Project plans to conduct a competitive tender process in order to ensure best available EPC terms in light of the increasingly competitive PV market.

Figure 9: Principal Contracts for the PV Power Plant



Operations

The PV plant will be operated and maintained under an O&M agreement with a proven solar operator, at least for the first several years of operation until an internal team can be appropriately trained and qualified.

[illegible]

D.1. Value Added for GCF Involvement

Please specify why the GCF involvement is critical for the project/programme, in consideration of other alternatives.

Summary

GCF will support the Project, *Espejo de Tarapaca*, and the beneficiary country, *Chile*, by providing 1) early equity investment and 2) policy guidance as a leading climate institution for the Chilean energy regulatory agency to recognize and establish the appropriate economic incentives for the installation of technologies which provide multi-service system benefits.

1) Early Equity Investment

The Project has been funded to date by a group of individual private investors, principally Chilean, who were attracted by the Project's unique vision that bulk energy storage is key for developing a 100% renewable electric system and committed early but limited financial development support. It also received support from Start-Up Chile (an early stage venture capital fund from the Government of Chile) and Fundación Chile (a public-private NGO which aims to foster innovation in order to promote new industries in Chile). To date, the Project has achieved significant milestones spending approximately US\$ 26 million in development. However, given the significant capital expenditure of approximately US\$1.0 billion associated with this large-scale opportunity, the Project needs to incorporate one or more strategic private investors to finalize development and complete construction. To this end, the Project proposes to hire a financial advisor to confirm debt and equity terms and selection of strategic investors.

However, the Project faces significant financial and market entry barriers including solid financial capacity, established experience and track record, and creditworthy strategic partners, among others. These barriers prevent large scale, unique and ground-breaking investment ideas, such as the Project, from moving forward. The Chilean electricity market, which is based on private ownership and provides no subsidies or economic incentives for renewable power, is highly competitive and includes the participation of established power companies, making execution of a PPA increasingly challenging for a start-up renewable energy company without a strong balance sheet. In the particular case of EdT, these barriers have prevented the Project from obtaining a solid PPA and in turn, also prohibited incorporation of strategic equity investors, who as a rule, are not willing to invest without the guarantee of stable future cash flows. These barriers to market entry represent the principal reason for the absence of innovation and start-up companies in the development of large-scale energy projects; and is the foundation of EdT's application for support from the GCF.

Given the Project's solid economics, which make it possible to offer an energy price below the average variable cost of existing coal units in future PPA tender processes, we are confident that a PPA will be obtained along with the early stage equity investors and lenders. The objective of GCF's support is to help fund last stage development expenses, including cash funding for guarantees (security bond) which are required to participate in PPA tender processes and secure critical permits in 2019. The GCF funds will back the required guarantees for the PPA bidding. If the bidding process is not successful, the GCF funds will be reimbursed. In addition, GCF's participation as an "anchor" equity investor in the Project is expected to provide a "stamp of approval" and help attract additional private sector investors. Without the GCF support, the Project's short to medium-term capital needs will likely be unfunded, risking discontinuation and termination of the Project. GCF funding would be value-add during the early years of the Project, with the possibility to "crowd-in" once the Project proves it has overcome market risks.

2) Policy Guidance as a Leading Climate Institution

The GCF aims to support country ownership and align GCF investment in the Project by strengthening the institutional capacities of the Chilean National Designated Authority and energy regulations to enable installation of technologies which provide multiple system services by establishing the appropriate economic incentives for remuneration of the associated costs and benefits.

D.2. Exit Strategy

Please explain how the project/programme sustainability will be ensured in the long run, after the project/programme is implemented with support from the GCF and other sources, taking into consideration the long-term financial viability demonstrated in [E.6.3](#). This should include a description of strategies for longer term maintenance of physical assets (if applicable).

The Project's economic competitiveness, which allows it to generate energy below the average variable cost of existing coal units, will ensure its long term sustainability. The Project business model is based on stable cash flows generated under a long term PPA with a creditworthy customer, in addition to firm capacity payments from the system. These two principal revenue sources account for approximately 80% of total Project revenues and provide solid economic returns to both debt and equity investors. The Project's financial model also includes all operational and long term maintenance costs, including equipment overhaul and replacement in order to ensure the long term viability of the assets. The competitiveness of the Project is driven by the combination of excellent solar irradiation, the continuing reduction in PV solar technology costs and the ideal geographical characteristics of the pumped storage site. Together these conditions allow the Project to provide a 24/7 energy supply which is price competitive—without associated fuel or hydrological risk. In addition to its economic competitiveness, the renewable nature of the Project is also attractive to consumers, such as mining operations in northern Chile, seeking to secure long term energy supplies from sustainable and environmentally-friendly generators.

The GCF's support is initially needed in order to de-risk the project's financial structure and catalyse much needed private investment, and help overcome the significant market barriers in the Chilean electricity market for innovative start-up projects. The objective of GCF's support is to support the final stage of development and participate in the Project as an "anchor" equity investor in order to provide a "stamp of approval" and help attract additional private sector investors. Once private sector investors have been incorporated and the Project has established a track record, no additional support will be required and in fact, the Project will serve as an innovative model to be replicated in similar locations in Chile and worldwide in order to mitigate and adapt to climate change by providing 100% renewable 24/7 electricity supply.

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

Specify the mitigation and/or adaptation impact, taking into account the relevant and applicable sub-criteria and assessment factors in the Fund's [investment framework](#).

When applicable, specify the degree to which the project/programme avoids lock-in of long-lived, high emission or climate-vulnerable infrastructure.

Mitigation and Adaptation Impact

The Project will help Chile meet its goals by both mitigating global greenhouse gas emissions and helping the country build capacity to adapt to climate change. The Project seeks to implement the first bulk energy storage project and stimulate the paradigm shift in the Chilean electric sector which is transitioning from conventional energy generation to renewable energy. At present, Chile's electricity grid is highly dependent on thermoelectric plants fired with fossil fuels and hydroelectric plants which rely upon rain and snowfall, which together represent nearly 80% of the system's installed capacity. The Project will generate approximately 1,500 GWh (net) of clean energy per year, avoiding on average 1,001,187 tonnes of CO_{2e} every year and 35 million tonnes of CO_{2e} over the Project's 35-year evaluation period. The supporting documentation can be found in Annexes 9 and 10 which include descriptive procedure report and calculation spreadsheet.

The paradigm shift in the electric sector will require significant investment and installation of VRE capacity. Given that VRE output is driven by the weather and it therefore faces greater variability and uncertainty than that of conventional power plants, the energy sector will need to incorporate and adequately manage VRE without sacrificing flexibility or reliability of the grid. Energy storage is an important alternative for enhancing system flexibility in order to integrate low carbon energy in electricity networks. At present, Chile has very limited battery storage (52 MW, approximately 20 minutes, in a system with 24,000 MW of installed capacity) and zero large scale energy storage. As declared by the International Energy Agency in its Policy Report for Chile (2018), large scale or bulk energy storage, such as the Project, will play a key role by providing flexibility and catalysing investment in renewable technologies, thereby transitioning the system from high polluting fossil fuel-based to zero emission technologies and improving the resilience of the energy system to climate variability.

The PSH storage technology utilized by the Project will also allow the system to store solar or other renewable energies in the form of water which is pumped into the reservoir, until it is required by the system. By converting solar energy into a reliable and competitive 24/7 supply, the Project will revolutionize the Chilean electric sector and provide significant strategic benefits including: (i) acceleration of the growth and installation of competitive, reliable and sustainable renewable energy capacity, (ii) diversification of Chile's energy matrix away from contaminating imported fossil fuels and toward domestic natural resources—promoting energy independence, (iii) enhancement of grid reliability and flexibility to manage load fluctuations that are exacerbated by intermittent renewable energy, and (iv) management of price volatility particularly during peak hours. The diversification of the energy mix will improve the resilience of the energy system in Chile against climate variability.

In accordance with Chile's Third Communication – UNFCCC (2016) Report and the Chilean National Climate Change Plan 2017-2022, Chile has identified nine sectors that are vulnerable to climate change: 1) water resources, 2) biodiversity, 3) health, 4) infrastructure, 5) energy, 6) forestry, agriculture and livestock, 7) fishing and aquaculture, 8) cities and 9) tourism. The Project will help Chile achieve its mitigation commitments and will also accelerate the implementation of climate change adaptation actions at national, regional and local levels.

EdT will directly contribute to the creation of adaptation actions and more resilient communities in three of these sectors that are currently experiencing the effects of climate change: 1) Energy by increasing reliable generation not dependent on hydrology; 2) Water resources, by using the Project's desalination plant to provide potable water access to communities that do not have stable supply. Indirectly, this will also contribute to creating healthier and more resilient local coastal communities; 3) Fishing and Aquaculture by designating a portion of funds provided in the social-productive agreements executed with organizations to help coastal communities diversify their local economies, which are highly dependent on

natural extraction of sea resources. The social-productive funds will be aligned with the national adaptation plan for climate change at national, regional and local levels.

An additional opportunity that can be evaluated in the future relates to the seawater that will be stored in the reservoir, which could be potentially used as a source of water supply. Given that future water shortages are predicted for the desert in northern Chile, in part due to climate change, water stored by the Project could potentially be used for desalination and subsequent human consumption and/or to supply water to the region's large mining industry, which currently principally uses depleting groundwater resources in mining processes.

Avoidance of Lock-In of Long-Lived, High Emission and Climate-Vulnerable Infrastructure

The Project will also make a significant contribution in avoiding the lock-in of long-lived, high emission and climate-vulnerable infrastructure. As discussed above, the national electric system, the SEN, is currently highly dependent on fossil-fuel based (54% of current capacity) and hydroelectric generation (30% of current capacity). In northern Chile, which is mostly desert area, the predominance of thermoelectric generation is even more significant with approximately 25 energy generation plants, most of which burn coal, natural gas or diesel. In this sense, the avoidance of high emission infrastructure is an important contribution to low emission sustainable development pathways. Additionally, the Project will reduce the SEN's dependence on climate-vulnerable infrastructure which includes both hydroelectric generation plants and port infrastructure for the import of fossil fuels. In recent years, Chile has been affected by droughts and the closing of ports due to ocean swells, both of which have directly affected electric supply.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

GCF core indicators	Expected tonnes of carbon dioxide equivalent (t CO ₂ eq) to be reduced or avoided (Mitigation only)	Annual	1,001,187 tCO ₂ eq
		Lifetime	35 million tonnes of CO ₂
	- Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience); - Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)	Total	Primary direct beneficiaries in vulnerable local communities of water security and economic diversification: 550 people (59% male / 41% female in San Marcos and Rio Seco). Indirect beneficiaries of increased resilience of the energy system against climate variability: Chile's population of 17.6 million inhabitants (50% male / 50% female).
		Percentage (%)	Project's clean, economic and reliable renewable energy generation of approximately 1,500 GWh per year directly benefits 13% of Chile's population equivalent to 2,368,056 inhabitants.

- Total tonnes of CO₂ eq to be avoided or reduced per annum

The Project will avoid on average the emission of 1,001,187 tCO₂eq per annum, with a total amount avoided of 35 million tonnes of CO₂. This estimate considers total energy generation in the 35-year evaluation period, from the start of commercial operations in 2025 to 2059 and an emission factor for the grid of 0.667 tCO₂e/MWh which was calculated by the external consultant ImplementaSur Climate Action using the methodology ACM0002 from the United Nations Framework Convention on Climate Change. This calculation is detailed in the supporting documentation provided in Annexes 9 and 10 which include a procedure report and calculation spreadsheet. The spreadsheet details the assumptions and the report summarizes the selection and applicability of the methodology utilized.

- **Expected total number of direct and indirect beneficiaries and number of beneficiaries relative to total population (e.g. total lives to be saved from disruption due to climate-related disasters)**

Beneficiaries from the Project can be identified at the national, regional and local level. Chile's entire population of approximately 17.6 million inhabitants will benefit from a cleaner, more resilient electricity system. The Project will contribute to this improvement directly with the supply of approximately 1,500 GWh of renewable energy annually, avoiding 1,001,187 tCO₂eq per annum, and indirectly by providing additional flexibility to the system and catalysing the development of additional renewable energy projects.

The regional community from the Tarapacá Region of approximately 400,000 inhabitants where the Project is located, will benefit directly from the creation of new employment and related service opportunities during construction and operation of the Project. It has publicly indicated its objective of becoming a leading region in the development of clean energy and as a result, it will also indirectly benefit from additional renewable energy projects being constructed in the area as a result of the Project's energy storage facility. It should be noted that this region is facing severe water shortages and potential use of the Project's large natural reservoir in the future to desalinate seawater is also an important upside for the Project and the region.

The local communities of approximately 550 inhabitants will benefit directly from the provision of a stable water supply and funds to diversify the local economy, which is highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and climate change. As part of the collaboration agreement executed with the local community, the Project agreed to provide it with potable water (sold at cost) from the desalination plant that will be built for the PSH facility and also create funds for fishing and related local organizations for implementation of economic development projects. At present, potable water supplied from depleting groundwater sources is currently transported by truck from Iquique (approximately 100 km.) twice monthly. The Project plans to play a key role not only in the development of the local community as a whole, but particularly in the empowerment of women by creating new economic activities, providing training opportunities and developing recreational activities.

It is important to note that indicators such as the expected increase in the number of households with access to low emission energy are hard to determine as the generation of energy is not for individual or communal use, but all electric generation is injected into the SEN for supply to the interconnected system.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyse impact beyond a one-off project/programme investment

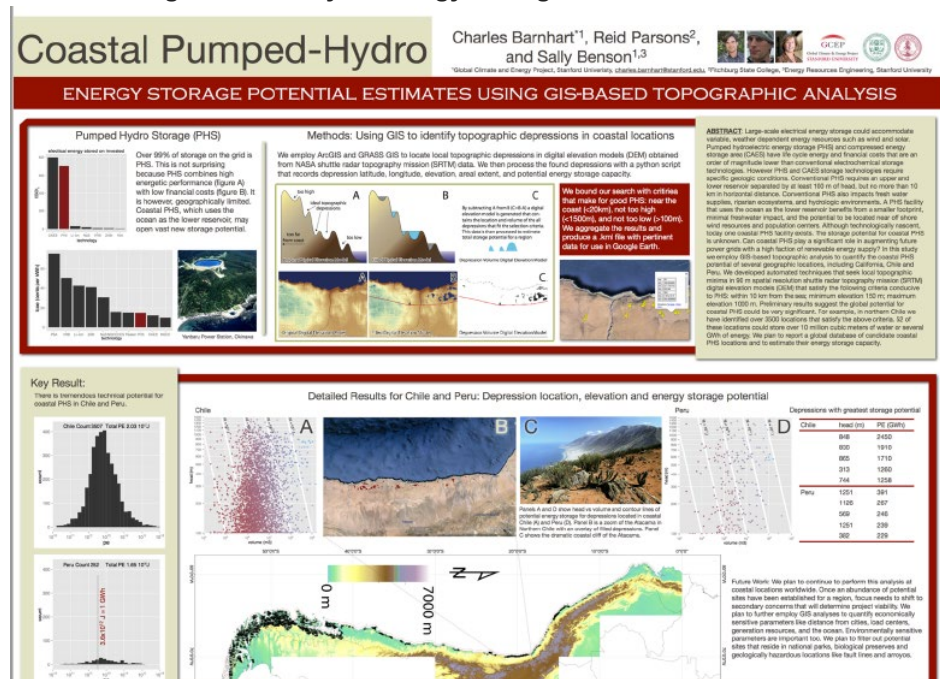
E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

Describe how the proposed project/programme's expected contributions to global low-carbon and/or climate-resilient development pathways could be scaled-up and replicated including a description of the steps necessary to accomplish it.

The Project's large natural reservoir is highly scalable, facilitating the addition of several similar PSH plants. Moreover, additional power plants using the same reservoir can be built at a lower unitary cost by taking advantage of the certain portions of the existing infrastructure (powerhouse access tunnel and access roads, among others). The energy storage provided by the pumped storage plant can also be paired with other types of intermittent renewable technologies such as third party solar and/or wind—catalysing significant renewable energy investments by enabling them to deliver 24/7 power.

The Project's innovative seawater pumped-storage hydroelectric design can be replicated in geographic locations with suitable topography both in Chile and around the globe, resolving the problem of intermittency by integrating it with other renewable technologies. In 2013, Valhalla together with researchers from Stanford University completed an extensive study which identified the natural concavities found along the coasts of Chile, Peru and Mexico. As shown in Figure 11 below, this study identified the locations with the natural depressions and greatest energy storage potential.

Figure 11: Study of Energy Storage Potential Estimates¹⁴



Additionally, as described briefly in last section, it should be noted that the desert region where the Project is located is facing severe water shortages and potential use of the large natural reservoir in the future to desalinate seawater is also an important upside for the Project and other replicable pumped storage seawater projects. In fact, an article prepared by researchers from the Massachusetts Institute of Technology and the University of Hawaii suggests co-locating and combining pumped hydro plants with reverse osmosis desalination plants in drought stricken mountainous areas and describes an algorithm that weights distance from the ocean and mountain height to explore where around the world such combined energy and water systems might be located. The paper notes that in addition to resolving supply problems, this combination could reduce capital investments and also solve the desalination brine disposal challenge, since much more

¹⁴ Charles Barnhart, Reid Parsons and Sally Benson, Energy Storage Potential Estimates Using GIS-Based Topographic Analysis, Stanford University's Global Climate and Energy Project.

water is required to generate power than to generate fresh water, allowing brine outflow to be diluted by turbine output water.¹⁵

Figure 12: Theory of Change for Scaling Up and Replication

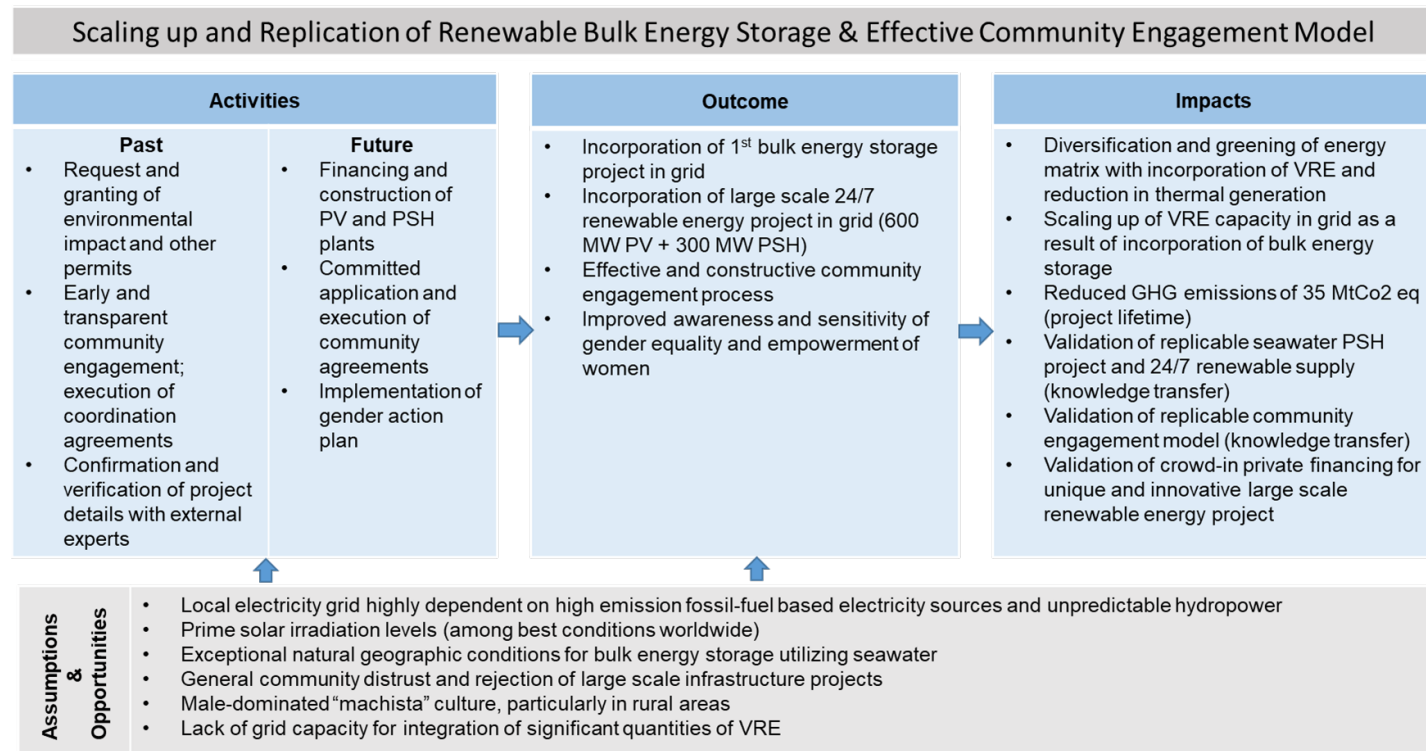


Figure 12 above describes a theory of change for the scaling up and replication of renewable bulk energy storage and meaningful and effective community engagement model. The logic framework presents the main activities and direct outcomes of the Project. Finally, the expected impacts of the Project are presented as they contribute to an overall paradigm shift in the Chilean energy sector within the context of low emission development.

¹⁵ Integrated Pumped Hydro Reverse Osmosis systems, Alexander H. Slocum, Maha N. Haji, A. Zachary Trimble, Marco Ferrara, Sasan J. Ghaemsaïdi, Sustainable Energy Technologies and Assessments, Volume 18, December 2016. <https://www.sciencedirect.com/science/article/pii/S2213138816300492>

E.2.2. Potential for knowledge and learning

Describe how the project/programme contributes to the creation or strengthening of knowledge, collective learning processes, or institutions.

Technical and Community Track Record

The Project's innovative design provides an opportunity to gain experience and knowledge in the integration of two proven technologies, PV and PSH, to provide firm 24/7 energy. In this sense, the Project will provide information and establish a track record for the design, construction and operation of large scale commercial PSH plants operated with seawater which can be replicated in other places, as the Stanford and MIT reports mentioned above suggest.

The Project will also provide an opportunity to gain knowledge and experience in the continued implementation of its precedent setting community engagement programs throughout the construction and operating phases. The Project's goal is to implement the Project while creating benefits –social development– for adjacent communities beyond the generation of clean electricity. The community engagement program will continue to focus on the development of economic activities, wellbeing and health, gender equality and the empowerment of women, as well as helping to create local communities more resilient to climate change. The community engagement program will be led by the Project NGO, Fundación Espejo de Tarapacá, which will work on the execution of the community agreements through the co-construction of governance with local organizations. The NGO will take into consideration the needs of the beneficiaries and develop programs oriented towards collective learning, with a bottom up approach, and will ensure the development of local institutions.

Monitoring, Evaluation and Sharing of Lessons Learned

The frequency of results monitoring and evaluation will serve as inputs for sharing lessons learned so that they can be incorporated in other projects, as well as in improvements to the Project itself. The Project plans to be open for guided tours and meetings for organizations interested in the Project's development, design and operations. Furthermore, the Project plans to continue to actively participate in distinct local, national and international conferences, seminars and other public opportunities, in order to share the Project's design, track record and lessons learned, openly discussing its experience and vision as it has done since Project inception.

An accountability policy will also be implemented. The Project will produce an annual sustainability report in order to document and share the progress of the Project in distinct areas. Accordingly, EdT will continue to work with stakeholders in the same transparent manner.

The Project is interested in promoting the replicability of this innovative 24/7 renewable baseload solution in Chile and around the globe. In this sense, the Project is willingly participate in conferences and seminars to explain and promote this solution. It is also willing to prepare presentations and papers which contribute to providing knowledge and learning of this solution for application in other locations.

In addition to above, MUFG and the sponsors will prepare some type of media (video or presentation) to disclose and share the Project development information and present the Project as a case study for other emerging countries' governments. The Project and MUFG will also prepare a manual which details the communication strategy, publications, outreach to communities and industries for sharing of the Project development know-how/experiences.

E.2.3. Contribution to the creation of an enabling environment

Describe how proposed measures will create conditions that are conducive to effective and sustained participation of private and public sector actors in low-carbon and/or resilient development that go beyond the program.

Describe how the proposal contributes to innovation, market development and transformation. Examples include:

- *Introducing and demonstrating a new market or a new technology in a country or a region*
- *Using innovative funding scheme such as initial public offerings and/or bond markets for projects/programme*

As demonstrated by the Project's expected economics in the financial model included in Annex 2, the Project will achieve a long term, low carbon and financially sustainable outcome with sustained participation of private sector investors. In this sense, the financial viability of the Project will provide multiple benefits to the energy sector in Chile, promoting renewable pumped storage hydro and bulk energy storage initiatives.

As a ground-breaking and innovative renewable energy storage project, EdT will stimulate similar investments within Chile and internationally—both by setting a precedent and establishing a track record. The Project will also attract create an enabling environment within the financial sector by reducing risks and attracting private sector investors and financial institutions to invest in innovative climate change initiatives.

The Project's innovative design also provides an opportunity to gain experience and knowledge in the integration of two proven technologies, PV and PSH, to provide firm 24/7 energy. Additionally, the Project will provide information and establish a track record for the design, construction and operation of large scale commercial PSH plants operated with seawater which can be replicated in other places. Finally, it is important to note that with GCF involvement, the Project will be able to contribute overcoming systematic barriers to low carbon development in Chile, as stated in section C.2, catalysing impacts beyond the scope of the Project.

E.2.4. Contribution to regulatory framework and policies

Describe how the project/programme strengthens the national / local regulatory or legal frameworks to systematically drive investment in low-emission technologies or activities, promote development of additional low-emission policies, and/or improve climate-responsive planning and development.

Since inception, Valhalla has been proactive in promoting its vision in the definition of electricity storage within the Chilean legal framework in order to systematically promote investment in low emission development. In 2015 and 2016, it actively participated in the discussion of new standards for PSH technology given the existing regulatory void for this type of technology and the need to provide regulatory certainty for investors. In 2016, a new regulation for "Pumped Storage Plants Without Hydrological Variation" was enacted to confirm the dispatch and operation of pumped storage plants.

The Chilean regulator is currently implementing a participative process to design new transmission and ancillary service regulations which include energy storage as a critical technology type. Valhalla and the Project plan to continue to participate in these and other critical sector discussions in order to actively promote policies which facilitate the installation of multi-service energy storage and increase the system's capacity for the installing VRE while also making it more secure and resilient, in order incentivize low carbon development, as well as to promote the mainstreaming of climate considerations in national policies. The successful construction and operation of the PSH plant will provide critical experience and demonstrate the effectiveness of proactively incorporating new innovative technologies in the regulatory framework,

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Economic Co-Benefits

Construction of the Project will be performed by major contractors who will hire temporary workers for a variety of semi-skilled, skilled, and unskilled jobs. The construction major contracts include an incentive for hiring local labour. For the permanent operations of the PSH plant, the Company expects to employ approximately 50 employees. For PV plant operations, the Company plans to enter into an agreement for operations and maintenance with an experienced supplier who will directly contract employees.

Given the Project's locations in the Tarapacá Region and in particular, its proximity to capital city of Iquique with population of around 200,000 (the PSH plant is located 100 km south of Iquique and the PV plant is located 80 km southeast of Iquique), it is expected that the city and other surrounding population centres, will benefit from the expenditures made by contractors and temporary employees (i.e., accommodations, goods and services, etc.).

Social Co-Benefits

Community engagement based on the establishment of early, transparent, meaningfully participative and empathetic relationships with the community—has been an integral and fundamental part of the Project's development. Interaction with the local communities located close to the PSH plant location (the fishing villages, Caletas San Marcos and Rio Seco) was initiated in 2012, approximately 2 years prior to submission of the environmental permit for the PSH plant, in order to address community concerns in early development. Collaboration agreements have been executed with the community which govern the Project's interaction during development, construction and operation of the plant. These agreements set a precedent by recognizing the Project's responsibility to respect the lives and values of communities affected by its development, construction, and operations and work together for mutual benefit.

The agreement executed with local community organizations, which includes the neighbourhood council, fishermen's union, and kelp gatherers' union, includes the following stipulations which aim to share the benefits of successful Project advancement and completion with these affected groups (a detailed summary of the provisions in all executed community agreements is included in Annex 5 in the Gender Action Plan):

- Creation of a development fund for the San Marcos Fishermen's Union to help them implement economic development projects (~\$100K USD/year) upon start of construction;
- Creation of a social fund for Caleta San Marcos to support economic development projects and student scholarships throughout the operation of the PSH plant (~\$95K USD/year);
- Creation of a development fund for the Kelp Harvesters' to build a meeting space and other economic development projects (~\$70K USD one-time payment with \$10K USD/year for the first 5 years of operation);
- Creation of a development fund for the Rio Seco Fishermen's Union to help them implement economic development projects (~\$100K USD/year for seven years);
- Creation of a social fund for Caleta Rio Seco to support economic development projects and student scholarships (~\$45K USD/year for four years);
- Provision of potable water for Caletas San Marcos and Rio Seco at a fraction of the current cost (potable water is currently trucked in from Iquique), which will help to significantly improve their quality of life and health;
- Incentive for construction contractors to hire local labour.

Additional details regarding the community agreements and their respective investment execution plans can be found in Annex 1 of the Gender Action Plan which is attached to this Funding Proposal in Annex 5.

Improved access to education

During the development stage, a school-levelling program was implemented to help adults finish primary and secondary education and in May 2015, the Project's office was expanded to include a public connectivity centre for use by students and other residents, who previously did not have access to the internet.

The Company has also implemented training programs for community members interested in taking part in the semi-skilled and skilled tasks that will be required during construction and operations. Further, the social fund will support education programs during the operating life of the PSH plant.

Improved regulation or cultural preservation

During the environmental review process for the PSH plant, extensive marine-related modelling and analysis was performed, confirming that the Project is compatible with the fishing activity and it will continue to promote maintaining and preserving the traditional marine-related culture.

The Project provides a means for families (particularly female-headed households) to sustain a living not solely dependent on fishing activities (principally men engage in fishing-related activities) in Caleta San Marcos. At present, the primary economic alternative is moving away from existing homes to work in Iquique, the closest urban centre which is at an approximately one hour distance by bus. The installation of the Project reservoir in the arid desert also has the potential to become a tourist attraction in the area and further facilitate economic opportunities for the community which could be indirectly considered as a measure of climate change adaptation for the tourism sector.

The closest community to the PV plant is approximately 8 km from the plant site. Valhalla initiated contact with the communities in the site area prior to submission of the EIA for the PV plant and the Project plans to consider ways to support local development in these communities, which are particularly interested in taking advantage of potential opportunities during the construction period.

Environmental Co-Benefits

The main environmental co-benefit from the Project is the provision of a stable large scale source of zero emissions energy, as well as the catalysation of investment in other renewable projects, which help clean the Chilean energy grid currently highly dependent on fossil fuels. Similarly, the Project will improve the resilience of the energy system against climate variability. Utilization of the Project for desalinization of seawater in the region would also provide an important future environmental co-benefit, reducing the impact of climate variability on groundwater supplies and contributing in this sense to the overall health and well-being of the surrounding communities.

Gender-Sensitive Development Impact

In the community of Caleta San Marcos, a dramatic gender gap remains related to workforce participation and income inequality, among others. The historic cultural operation of fishing industries dominated by males is one of the principal causes for this inequality. Additionally, low levels of education and the lack of economic opportunities beyond those related with the fisheries also contribute to the current realities of women in Caleta San Marcos.

The Project plans to play a key role not only in the development of the community which is vulnerable to climate change, but specifically in the empowerment of women. As detailed in the Gender Action Plan in Annex 5, the Project plans to focus on implementing programs to help improve gender equality to ensure that women and men have equal access to the opportunities, benefits, and decision-making processes associated with the Project. The contribution of the Project will also be monitored on regular basis in order to measure progress and also detect early on any potential cultural friction related to gender equality issues or tensions within the community as a result of the new economic opportunities. The Gender Action Plan developed by the Project details specific objectives, outcomes and activities that will be followed to improve gender equality in Caleta San Marcos. In implementing successful community engagement, an important goal of the Project will be to empower local women to act as agents of change in a community that is already experiencing the negative impacts of climate change.

The Gender Action Plan proposed by the Project includes the following specific initiatives for promoting gender equality and the empowerment of women:

- Psychological training sessions with local men and women during early construction period to educate and sensitize the community regarding gender equality and the empowerment of women (~\$30K);
- Training sessions with local women during early construction period to promote economic opportunities (~\$15K);

- Counselling/training sessions during early construction period to improve networking capacity and establish mentoring relationships with women in business or leadership positions in other communities (~\$25K);
- Counselling/training sessions during early construction period to promote social participation and knowledge and utilization of networking (~\$10K);
- Program during early construction period for providing microcredits to women (~\$75K); and
- Training and mentoring sessions related to business management, accounting and credit agreements (~\$25K).

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

Describe the scale and intensity of vulnerability of the country and beneficiary groups, and elaborate how the project/programme addresses the issue (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc).

In accordance with Chile's Third Communication – UNFCCC (2016), Chile possesses seven of nine characteristics that the UNFCCC uses to define vulnerability and needs to focus on effective climate change adaptation strategies in these sectors: water resources, biodiversity, forestry & agriculture, fishing and aquaculture, energy, infrastructure, cities and coastal areas, health and tourism. EdT will contribute to climate change adaptation in three of the vulnerable sectors as detailed below.

Energy Sector

Chile's electric grid is very dependent on hydrology. At present, 30% of the system's installed capacity is comprised of dam and run-of-river hydroelectric power plants. This is alarming, since climate change has resulted in a decrease of more than 20% in available hydroelectric energy, comparing the last 5 years to the last 56 years. This reduction of 21% represents more than 5,726 GWh of energy that has not been available each year during the last 5 years. Additionally, climate change has not only increased the vulnerability of the water dependent Chilean electric grid, but also increased the number and probability of natural disasters occurring in Chile, as presented in the 2017 Global Climate Risk Index.

The past seven years have been catalogued as part of the ten driest hydrological years of the past six decades. Additionally, ports more frequently have had to close for fossil fuel imports due to strong swells and cities have suffered blackouts due to landslides and extreme temperatures that have provoked extensive wild fires. In 2017, 57% of Chile's total energy generation was thermoelectric (provided by coal-fired or natural gas-fired plants which utilize imported fuel) and 29% was hydroelectric.

The Project will help Chile build capacity to adapt to climate change by improving grid flexibility and catalysing additional investments in variable renewable energy and also by reducing the national grid's dependence on fossil fuels and hydrology affected by droughts (In 2017, Chile's power generation was comprised of 57% thermoelectric generation and 29% hydroelectric).

Water Resources Sector

In the arid desert of northern Chile, drinking water is a critical issue and at present, the local communities surrounding the Project do not have access to stable drinking water supply. Potable water is currently sourced from groundwater and transported to the communities by truck. The local communities located close to the PSH site, Caletas San Marcos and Rio Seco, are extremely vulnerable communities dependent almost exclusively on sea-related economic activities. Currently, they receive subsidized water supplies from the regional capital (100 km north) which delivers water in trucks twice a month. At present, this provides approximately ~20L/day per person, significantly below the optimum of 100 L/day recommended by the World Health Organization. As part of the general agreements between the Project and San Marcos, a supply of 50 m³/day will be provided at cost by the Project's desalination plant to the local water council, enough to raise the level of water per person to ~150L/day. Additionally, Rio Seco's rural water council will be provided

at cost with a supply of 25 m³/day. The Project's desalination plant will contribute indirectly to improve the quality of health and well-being at the local level.

Fishing and Aquaculture Sector

The economies of the local communities close to the Project, Caletas San Marcos and Rio Seco, are highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and change in water temperatures which is attributed to climate change. The Project agreements executed with the communities includes annual funds to support development of new lines of work that can help the community adapt to the harvesting of fewer traditional resources. Additionally, in San Marcos, the Project will supply 15 m³/day of water for use in a processing plant in order to add value to their products. The Project will help these economies adapt by seeking new opportunities and enhancing the productivity of aquaculture projects, thereby improving overall community wellbeing.

E.4.2. Financial, economic, social and institutional needs

Describe how the project/programme addresses the following needs:

- *Economic and social development level of the country and the affected population*
- *Absence of alternative sources of financing (e.g. fiscal or balance of payment gap that prevents from addressing the needs of the country; and lack of depth and history in the local capital market)*
- *Need for strengthening institutions and implementation capacity.*

As reported by the World Bank, Chile has been one of Latin America's fastest-growing economies in recent decades, enabling the country to significantly reduce poverty. Between 2000 and 2015, the population living in poverty decreased from 26% to 7.9% and the middle class is growing. Nevertheless, GDP growth fell from a high of 6.1% in 2011 to 1.5% in 2017 because of declining copper prices, which negatively affected private investment and exports. In this context, the unemployment rate has remained relatively stable, largely due to rising self-employment in response to the stagnation of wage employment. Growth is expected to recover during 2018-2020 as private-sector prospects improve and copper prices rise.

The population closest to the Project displays a low socio-economic level and its principal productive activity is fishing, or the extraction of sea products. Major barriers for the development of the affected population include lack of access to drinking water, sewage service and stable work. Detailed information related to the local community is presented in Section E.4 and in the Gender Action Plan included in Annex 5.

Chile's private market-based electric sector regulation does not recognize the social benefits and externalities related to installation of renewable energy or energy storage. As a result, despite the social economic benefits from emission reductions, in addition to the flexibility and resiliency benefits that the Project would provide to the electric system, it must compete head-to-head with existing depreciated generation facilities as well as new generation projects. The regulator has recognized the need to implement remuneration for ancillary services, primarily in response to the rapid incorporation of intermittent wind and solar projects. Additionally, in the past, the regulator has considered the potential incorporation of storage as part of the transmission system. However, operating markets and related compensation for both new initiatives are highly uncertain and not expected to be functioning prior to 2020.

While Chilean capital markets and power regulatory frameworks are well-established, the local market lacks depth and availability of long-term capital for large scale renewable energy projects, particularly those introducing new and innovative concepts, such as energy storage. Additionally, the scale of the Project, which requires investment capacity of close to US\$ 1.1 billion, including debt and equity, is extremely large for the relatively small Chilean market. Development and international commercial banks have been responsible for the majority of long term project financing for electric generation projects over the past 5 years. Given the significant amount of exposure to Chile related to recent projects, the development banks have slowed their lending activities, leaving a gap in available funding.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

Please describe how the project/programme contributes to country's identified priorities for low-emission and climate-resilient development, and the degree to which the activity is supported by a country's enabling policy and institutional framework, or includes policy or institutional changes.

Contribution to Chile's Priorities for Low Emission and Climate Resilient Development

Prior to its participation in COP21, Chile submitted its climate action plan to the UN Framework Convention on Climate Change (UNFCCC) in September 2015. This "Intended Nationally Determined Contribution" ("INDC") includes the following commitments:

- Reduction in CO₂ emissions per capita by 30% versus 2007 levels (i.e., down from 1.02 tCO₂e/million CLP\$ 2011 to 0.71 tCO₂e/million CLP\$ 2011);
- Contingent upon receiving international grants, reduction in CO₂ emissions per capita by 35-45% versus 2007 levels (i.e., down from 1.02 tCO₂e/million CLP\$ 2011 to 0.56-0.66 tCO₂e/million CLP\$ 2011);
- Sustainable management and recovery of 100,000 hectares of forest, representing captures and reduction of greenhouse gases estimated at 600,000 tCO₂e per annum beginning in 2030;
- Contingent on extension of Decree-Law 701 and the approval of a new forestry development act, reforestation of 100,000 hectares, representing captures of 900,000-1,200,000 tCO₂e per annum beginning 2030.

In 2016, the authorities, with a wide consensus from a diverse number of stakeholders, agreed on the 2050 Energy Agenda which includes the following goals:

- At least 70% of total energy generation sourced from renewable energy by 2050;
- Increased reliability of the electric system, with downtimes that should not exceed 1 hour per year on a regional basis;
- Reduction in electricity prices in order to rank third among OECD countries with lowest energy prices.

In 2018, the government announced its 2018-2022 Energy Plan which includes initiation of a program to "decarbonise" the existing energy matrix. In accordance with this initiative the government has formalized a working group led by the Ministry of Energy with participation from the energy sector, in particular the owners of existing coal-fired facilities, to analyse the current situation and design a timetable for the retirement of coal facilities which do not possess adequate systems for capture of CO₂. In 2017, coal generation represented 39% of total national generation, requiring decarbonisation to be accompanied with investment in renewable generation alternatives in order maintain supply. It should be noted that the 2018-2022 Energy Plan also contains other important objectives such as multiplying distributed renewable generation, increasing the circulation of electric vehicles, and implementing a regulatory framework for promoting energy efficiency and creating an "energy culture" in the country, among others. Through the installation and operation of 900 MW of renewable energy capacity, the Project would make a significant contribution to Chile's energy policy objectives.

In addition to energy, EdT will also directly contribute to two of the other top priority areas in the Chilean National Climate Change adaptation plan 2017-2022: water resources and fishing & aquaculture, helping to build communities more resilient to climate change.

Support of Chiles Enabling Policy and Institutional Framework

The Project will help Chile meet its renewable energy targets, address the goals of its national energy agenda and comply with its commitments under the Paris Agreement. These goals, centred on environmental and energy reliability concerns, indicate that this is the optimal time to implement paradigm-changing solutions in the electricity sector. This general agreement has translated into vocal support by public officials and media for the Project. In this context, the Project would help Chile achieve all of its stated goals, strengthening implementation of the Paris Agreement, both by

mitigating global greenhouse gas emissions and helping the country to build capacities to adapt to climate change, particularly in the energy, water resources and fishing and aquaculture sectors.

E.5.2. Capacity of accredited entities and executing entities to deliver

Please describe experience and track record of the accredited entity and executing entities with respect to the activities that they are expected to undertake in the proposed project/programme.

Energía de Tarapacá: Executing Entity

The Executing Entity, Energía de Tarapacá, is at present wholly-owned by Valhalla. Valhalla assembled a highly qualified multi-disciplinary team for development of the Project which effectively integrates expertise, innovation and extensive local and international experience in the development, financing, construction and operation of electric generation plants. Valhalla's internal team includes professionals specializing in critical development areas such as commercial strategy and planning, logistics and permitting, community engagement, and finance and administration. Additionally, Valhalla has also engaged: an extensive team of expert external advisors to assist in development activities, specialized independent consultants to review and verify key Project issues, and qualified contractors to confirm technical specifications and capital expenditures.

The Project's external advisors and consultants have included the following renowned experts, among others: Poch (Engineering & Environmental), Skava Consulting (Engineering), +MG (Environmental), Gestión Ambiental Consultores (Environmental), Norconsult & Multiconsult (Engineering), Voith Hydro (Equipment Engineering), PRDW Consulting (Intake Coastal Engineering), CDM Smith (Reservoir Membrane), GTD Ingenieros Consultores (Transmission), Leidos (Independent Engineering), EN Engineering (Corrosion Engineering), Moray Development (Development & Project Finance), Philippi Abogados (Regulatory Counsel), Claro y Cia. (Project Finance Counsel), Vergara Galindo Correa Abogados (Environmental & Permitting Counsel), Corpo Communications (Communications), E&Y (Auditing), Deloitte (Tax Accounting), Fundación Chile (Stakeholder Engagement), Fundación Casa de la Paz (Stakeholder Engagement) and Consensus Building Institute (Stakeholder Engagement).

Since inception, Valhalla has proactively communicated its vision amongst authorities, academics, communities and other stakeholders positioning the Company as a model for the future development of large scale energy infrastructure in Chile. The Company has been recognized with multiple awards and has received extensive media coverage, locally and internationally.

MUFG Bank (Accredited Entity)

Building on over 350 years of financial expertise, Mitsubishi UFJ Financial Group ("MUFG") has grown to become one of the largest comprehensive financial groups in the world. Today MUFG's global network spans over 50 countries and regions, and employs 150,000 financial professionals in over approximately 2,300 offices, providing customers with a deep and diverse range of services and resources, to meet their local, regional and global financial needs.

The project finance practice within MUFG provides clients access to its global lending and capital markets businesses. MUFG has been Global No.1 in MLA League Table of Project Finance International (PFI) ¹⁶ for seven years in a row from 2012. MUFG was also ranked Global No.1 for the third straight year since 2016 in Clean Energy & Energy Smart Technology under Bloomberg New Energy Finance Asset Finance Lead Arrangers League Table.

MUFG Bank plays an active role in the Project, will channel the resources to the Project as a private accredited entity and monitor the Project's compliance with the Fund's standards (social, environmental, fiduciary and gender). MUFG Bank's supervision of the Project will be based on a periodic review of the Project provided by the Executing Entity.

E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

¹⁶ <http://www.pfie.com/Journals/2018/01/23/m/i/k/PFIFLeagueTables2017.pdf>

Please provide a full description of the steps taken to ensure country ownership, including the engagement with NDAs on the funding proposal and the no-objection letter.

Please also specify the multi-stakeholder engagement plan and the consultations that were conducted when this proposal was developed.

National Designated Authority

In January 2018, the Project met with Chile's NDA, which is led by the Economic Sustainability and Natural Resource Management Department of the Ministry of Finance. EdT provided the NDA with all documentation related to its proposal for GCF funding and a series of meetings were held. These meetings included presentation of the Project to an "Experts Panel" established by the NDA which was comprised of representatives from government and commercial banks, electric industry consultants and academics, among others. The Panel reviewed the Project's proposal and documentation, posed questions and provided comments.

On January 31, 2018, the National Designated Authority of Chile, the Ministry of Finance, provided a "no-objection" letter to the GCF with regard to the Espejo de Tarapacá Project, confirming that EdT conforms to Chile's national priorities, strategies and plans and all relevant laws and regulations.

Stakeholder Consultations and Engagement

The Project conducted a stakeholder engagement process at a national, regional and local level. This process was initiated at a very early stage, by preparing a stakeholder map and conducting preliminary interviews. The Stakeholder Engagement Plan implemented was designed to maintain fluent communication and relationships with the distinct stakeholders over the life of the Project. Once the stakeholders had been identified, meetings were coordinated with the most relevant parties to inform them about the Project and listen to their comments, questions and concerns. It should be noted that as part of the EIA approval processes for the PSH and PV plants, the Project also conducted the required formal "meaningful community participation" processes which include numerous community meetings and presentations to inform the communities about the Project and address their observations and concerns.

At a national level, the Project has been presented to leading figures in the political, academic, environmental and social spectrum. During the last several years, Valhalla has received numerous invitations to present the Project in conferences in Chile and abroad. It also organized a local energy storage conference in order to discuss the impact storage, and the Project in particular, could have on Chile, attracting more than 100 participants, among them leading authorities and figures from the energy sector. The Project has received broad positive support at the national level. The energy authorities view it as an opportunity to implement an innovative project which will provide flexibility and resilience to the energy grid. Environmental organizations and authorities also view the Project as an opportunity to reduce CO2 emissions and diversify away from fossil fuels without sacrificing stability.

The regional stakeholders located in the Tarapacá Region, where the Project is located, are highly dependent on the mining industry and local authorities have published plans to boost the renewable industry as an alternative to a more sustainable and diverse economy. The Project has been identified as a perfect fit to this end and the region is also aware of the Project's opportunity to serve as an innovative initiative which can be replicated in other areas of the world. A seminar was organized with a local university to present the Project and other relevant energy technologies to the broader community. Valhalla's management also taught a university class on "Sustainable Development" from 2014 to 2016 at a local university in northern Chile.

On a local level, the Project has prioritized engagement with local communities, establishing an early, transparent and empathic relationship, before initiating the preliminary engineering and environmental studies. This process was early and included active participation from senior management, in order to understand, consider and address potential community concerns during early project development. In particular, a significant amount of time and effort has been invested in establishing a proactive, transparent and solid relationship with the San Marcos fishing village located close to the PSH plant. As the community's principal concerns were related to the impact the Project would have on sea resources, most of community team's time was focused on this issue in the early years of engagement. Local fishermen participated in the execution of the marine studies, new studies were executed at the communities' request and

independent consultants were hired for the community which were paid for by the Project. After these issues had been advanced, discussions were held regarding how the Project would contribute to local development. The Project and several local organizations finally executed collaboration agreements which govern their interaction during development, construction and operation of the Project. These collaboration agreements were submitted to the authorities for inclusion in the environmental permits.

Since there are no existing communities close to the PV plant, less community activities have been undertaken. The closest communities believe that solar plants will bring opportunities for local development. Several meetings were held in Pintados, Victoria and Pozo Almonte, communities located at 8 km or more from the Project site, prior to submission of the environmental impact study and during its processing. The Project has also committed to work with local organizations so that the community can develop the skills necessary to work and provide services during construction and operation of the Project and other solar projects.

The Project has gained widespread support and recognition from national, regional and especially local stakeholders. It should be noted that the environmental impact studies for the Project were both approved unanimously, with no appeals or community opposition. The community collaboration process will remain of the highest priority for the Project and Valhalla through all phases of development, construction, and operation.

In addition to above, MUFG Bank as Accredited Entity has grievance mechanisms.

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objectives, including addressing existing bottlenecks and/or barriers; providing the least concessionality; and without crowding out private and other public investment.

Please describe the efficiency and effectiveness, taking into account the total project financing and the mitigation/adaptation impact that the project/programme aims to achieve, and explain how this compares to an appropriate benchmark. For mitigation, please make a reference to [E.6.5 \(core indicator for the cost per tCO2eq\)](#).

Given that the Chilean electricity market is driven strictly by economic competition without regard to potential social benefits, supplying 24/7 renewable energy at a price below the average variable cost of existing coal units in Chile is not sufficient to make the Project viable. There are significant financial and market entry barriers to which financial capacity, experience and established track record and creditworthy strategic partners. As a result, existing market mechanisms require minimum concessionality to stimulate a paradigm shift towards low-emission and climate-resilient development. Hence, funding from the GCF is requested in order to overcome barriers and appropriately align financial incentives with the economic benefits.

In the particular case of EdT, these barriers have prevented the Project from obtaining a PPA with a creditworthy offtaker and in turn, also prohibited incorporation of strategic equity investors, who as a rule, are not willing to invest without the guarantee of stable future cash flows. These barriers to market entry represent the principal reason for the absence of innovation and start-up companies in the development of large-scale energy projects; and is the foundation of EdT's application for support from the GCF.

The proposed GCF financing is comprised of minority equity. As defined in document B.20/19, "in equity, concessionality can be extended as first loss shares in junior positions in tiered funds or can be the "anchor" portion of the fund that de-risks the investment and thus catalyses further equity participation, with preferred equity returns for the private sector to move the flow of financing to climate finance sectors". The objective of GCF's support is to help maintain the viability of the Project during this period by providing equity to assist with last stage development expenses and by participating in the Project as an "anchor" equity investor in order to provide a "stamp of approval" and help attract additional private sector investors. Based on the Project's solid economics, which make it possible to offer an

energy price below the average variable cost of existing coal units in future PPA tender processes, it is confident that a PPA will be obtained but are not certain of the timing of execution.

With the support of GCF as an anchor equity investor, the Project is expected to raise approximately US\$ 1 billion from the private sector, excluding Valhalla's equity participation. Of the total private sector investment, approximately 59%, equivalent to US\$ 647.3 million is expected to be funded with debt from private commercial banks and the remaining US\$ 360.9 million, representing 81% of Project equity, will be funded by one or more strategic private investors. The financing terms and conditions are based on indicative financing proposals provided by international commercial banks.

Based on the competitiveness and solid economic returns offered by the Project, the potential investment universe of investors and financial institutions will include both traditional private sector investors, such as strategic energy companies, infrastructure funds, private equity funds, pension funds, insurance companies and commercial banks, as well as those entities focused on sustainable, responsible and impact investors. GCF funding would be value-add during the early years of the Project, with the possibility to "crowd-in" once the Project proves it has overcome market risks.

Considering the total energy generated during the 35-year evaluation period, the Project will avoid a total amount of 35 million tonnes of CO_{2e}. This results in a cost per ton of CO_{2e} avoided of 31.26 USD/tCO_{2e} for the total investment. Moreover, the CO₂ reductions compared to the total amount invested by the GCF results in the cost per ton of CO₂ avoided of 1.71 USD/tCO_{2e}.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

Please provide the co-financing ratio (total amount of co-financing divided by the Fund's investment in the project/programme) and/or the potential to catalyse indirect/long-term low emission investment.

Please make a reference to [E.6.5 \(core indicator for the expected volume of finance to be leveraged\)](#).

In the case of EdT, co-financing or leveraged financing from third parties is consistent with the objectives of the GCF to mobilize funds at scale from private investment, especially private financial institutions and institutional investors.

The GCF funding proposal is comprised of US\$ 60.0 million in direct equity. The Project proposes that the GCF participate as an "anchor" equity investor in order to help fund final development expenses and attract additional private sectors investors, thereby eliminating significant financial and market barriers and enhancing the viability the Project.

The proposal is that the GCF hold 13% equity participation. Private sector investors in the Project would hold 87% equity participation, with Valhalla providing 6% and other strategic private sector investors brought in to fund the remaining 81% controlling equity interest.

With the support of GCF as an anchor equity investor, the Project is expected to raise approximately US\$ 1,008 million from the private sector, excluding Valhalla's equity participation. Of the total private sector investment, approximately 59%, equivalent to US\$ 647.3 million is expected to be funded with debt from private commercial banks and the remaining US\$ 360.9 million, representing 81% of Project equity, will be funded by one or more strategic private investors. Considering both equity and debt co-financing sources, the co-financing ratio of the GCF investment is 17.5x.

We believe that the role of the GCF, as anchor investor, will be pivotal in catalysing additional indirect/long-term low emission investment in the Project. This presumption is based on the interest demonstrated to date from potential investors, which include private sector investors such as strategic energy companies, infrastructure funds, pension funds or private equity funds, among others.

MUFG Bank, as Accredited Entity will be responsible for fund administration. MUFG Bank has its own AML/CFT policy which depicted in C7 and does not process any transaction under Sanction imposed by UN and US (OFAC)/Japanese authorities.

E.6.3. Financial viability

Please specify the expected economic and financial rate of return with and without the Fund's support, based on the analysis conducted in [F.1](#).

Please describe financial viability in the long run beyond the Fund intervention.

Please describe the GCF's financial exit strategy in case of private sector operations (e.g. IPOs, trade sales, etc.).

A social economic evaluation considers the social cost of CO₂ of 40 USD/tCO₂e presented by the President of Chile in the Chilean State of the Union address on June 1, 2017. Moreover, it considers savings in energy cost with the Project, compared to the average energy cost of thermal units (55 USD/MWh). All of the above results in an unlevered social economic rate of return of 14.4%. It is important to note, that the economic return rate is expected to increase, as taxes on thermal units and fossil fuels costs are expected to be levied in the future.

The GCF's support is initially needed in order to catalyse investment in the Project given the significant financial and market entry barriers in the Chilean electricity sector. The objective of GCF's support is to support the Project during the final stage of development and by participating in the Project as an "anchor" equity investor in order to provide a "stamp of approval" and help attract additional private sector investors. Once private sector investors have been incorporated and the Project has established a track record, no additional support will be required and in fact, the Project will serve as an innovative model to be replicated in similar locations in Chile and worldwide in order to mitigate climate change by providing 100% renewable 24/7 electricity supply. At this point, the GCF could exit by selling its equity participation.

E.6.4. Application of best practices

Please explain how best available technologies and practices are considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.

The Project is committed to adopting and applying best international practices in development, construction, operation and maintenance of the Project and to manage and monitor safety, environmental, social and financial risks and impacts.

EdT's two principal generation technologies, photovoltaic solar and pumped-storage hydro, are both proven technologies with long track records. Power plants utilizing seawater, although limited in number, have been operating for nearly 50 years. The Project's utilization of seawater requires certain design/supply adjustments to mitigate corrosion and such specifications have been incorporated into the PSH design. The Project will utilize world-class EPC contractors for the principal construction contracts for the PSH plant. In addition, it plans to hold a competitive bid process to select the PV plant EPC contractor in order to ensure best terms and conditions in the increasingly competitive PV market.

The Project efficiently utilizes existing geography and conditions (including Chile's superb natural solar and hydroelectric resources, proximity to the Pacific Ocean and the large natural concavity utilized for the reservoir) and has been designed to minimize environmental and social impacts during construction and operation. The Project does not require resettlement as it will be constructed in sparsely populated areas.

E.6.5. Key efficiency and effectiveness indicators

GCF core indicators	Estimated cost per t CO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)	
	(a) Total project financing	US\$ <u>1,091,0</u>
	(b) Requested GCF amount	US\$ 60.0
	(c) Co-financing Ratio	1:18
	(d) Expected lifetime emission reductions overtime	<u>35 million</u> tCO ₂ eq
	(e) Estimated cost per tCO₂eq (d = a / c)	US\$ <u>31.26</u> / tCO₂eq
	(f) Estimated GCF cost per tCO₂eq removed (e = b / c)	US\$ 1.71 / tCO₂eq
	Considering the total energy generated for the 35-year evaluation period, the Project will avoid a total amount of 35 million tonnes of CO ₂ .	
	This results in a cost per ton of CO ₂ avoided of 31.26 USD/tCO ₂ e for the total investment. Moreover, the CO ₂ e reductions compared to the total amount invested by the GCF results in the cost per ton of CO ₂ e avoided of 1.71 USD/tCO ₂ e.	
	Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)	

	With the support of GCF as an anchor equity investor, the Project is expected to raise approximately US\$ 1,008 million from the private sector, excluding Valhalla's equity participation. Of the total private sector investment, approximately 59%, equivalent to US\$ 647.3 million is expected to be funded with debt from private commercial banks and the remaining US\$ 360.9 million, representing 81% of Project equity, will be funded by one or more strategic private investors. Including Valhalla's equity participation, 87% of Project equity will come from the private sector. The financing terms and conditions, including leverage, are based on indicative financing proposals provided by international commercial banks.
Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)	

* The information can be drawn from the project/programme appraisal document.

F.1. Economic and Financial Analysis

Please provide the narrative and rationale for the detailed economic and financial analysis (including the financial model, taking into consideration the information provided in [section E.6.3](#)).

Based on the above analysis, please provide economic and financial justification (both qualitative and quantitative) for the concessionality that GCF provides, with a reference to the financial structure proposed in section B.2.

Project Financial Model

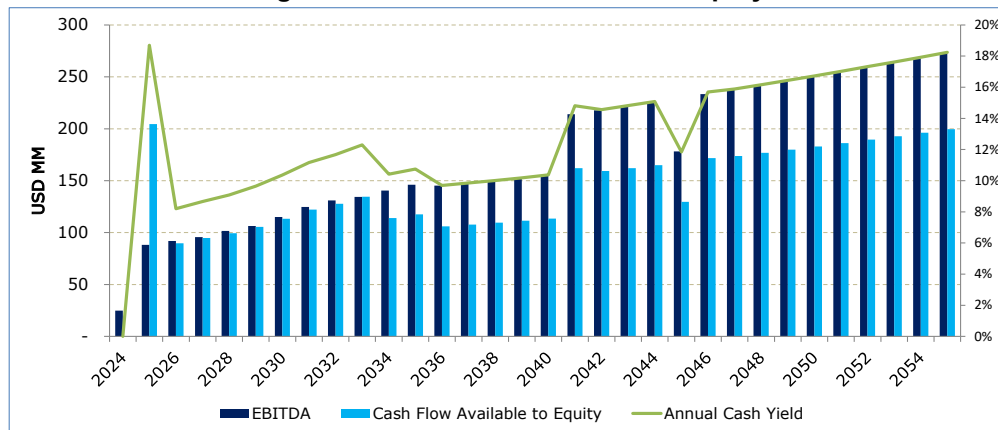
The Project business model is based on the commercial integration of the PV and PSH plants to provide 24/7 energy supply under a long-term PPA with a creditworthy off-taker. The Project is able to provide a 24/7 supply solution by utilizing solar generation from the PV plant which is available during sun-hours to serve the PPA during the day and utilizing hydroelectric generation which is available during dark-hours to serve the PPA during the night. The solar generation which is not utilized to serve the PPA is available to pump seawater into the PSH reservoir and the water stored in the reservoir can then be released for generation dark hours in the during early morning and evening (see Figure 3 for a graphic illustration the solar storage concept). Under the base case, approximately 80% of the Project's revenues are derived from PPA sales and firm capacity payments.

The base case financial model for the Project assumes a non-recourse project finance structure with leverage of 59% and award of a PPA for 1,500 GWh per year. The financing assumptions are based on indicative financing proposals received from various project finance banks active in Chile. As mentioned above, GCF support is requested in order to support the Project during the final stage of development and by stimulating private sector investment. The financial model and related assumptions have been included in Annex 2.

Key Financial Model Outputs

Key outputs are largely driven by the economic development and construction costs, efficient operating costs, strong PPA revenues, and stable cash flow.

Figure 13: Cash Flow Available to Equity



Rationale and Objective for GCF Support

The Project has been funded to date by a group of individual private investors, principally Chilean, who were attracted by the Project's unique vision and committed early but limited financial development support. Given the significant capital expenditure of approximately US\$ 1 billion associated with this large-scale opportunity, the Project needs to

incorporate one or more strategic private investors to finalize development and complete construction. The incorporation of new investors is challenging in the highly competitive Chilean electricity market, which does not recognize the social benefits associated with renewable power and energy storage. The objective of GCF's support is to provide funds for last stage development expenses and participate in the Project as an "anchor" equity investor in order to provide a "stamp of approval" and help attract additional private sector investors.

F.2. Technical Evaluation

Please provide an assessment from the technical perspective. If a particular technological solution has been chosen, describe why it is the most appropriate for this project/programme.

Project's Design and Technological Solution

The Project's innovative design resolves the intermittency problem inherent to solar and wind technologies by effectively integrating Chile's abundant sunlight and seawater resources to ensure electricity availability 24/7. The Project design fundamentals are based upon the availability of solar capacity to provide electricity during daylight hours and hydroelectric pumped storage capacity to provide coverage during night-time hours. The commercial integration of the two technologies allows the Project to continuously provide reliable power.

EdT's two principal generation technologies, photovoltaic solar and pumped-storage hydro, are both proven technologies with long track records. Grid-connected photovoltaic solar projects have been operating for over 20 years and over 230 GWs are in operation around the world. PSH technology using reversible turbines has been operating since the 1930s and over 140 GWs are installed globally today.

The PV plant is comprised of a 561 MW-AC PV solar park which will be constructed in phases. The solar plant equipment will consist of solar panels, inverters, underground and aerial cables, in addition to meteorological stations, a control room, O&M office and warehouse. The PV plant will utilize a single-axis tracking system in order to maximize energy output by tilting the panels to follow the sun throughout the day from east to west. The solar park installations also include a 220 kV step-up substation and 18 km transmission line from the site to the existing substation.

The PSH plant installations include reversible pumping equipment located in an underground powerhouse. When the Project is dispatched on a relatively continuous basis, during sun-hours, this equipment pumps water from the ocean to the upper reservoir on top of the coastal cliff, and during dark-hours, the equipment generates electricity with the water stored in the reservoir, which is released and returned to the ocean. There will be a single underground bi-directional water conduction system comprised of the ocean intake and tunnels, which will be used for the water flow in both pumping and generating modes. The turbines and substation will be installed in the underground powerhouse cavern approximately 45 m below sea level and all waterways will also be underground. The combined length of all tunnelling totals approximately 5.5 km. The PSH plant installations will also include a 65 km transmission line from the PSH plant to the existing substation.

Corrosion Measures

The Project has extensively prepared for the operation of the PSH Plant with seawater both through the careful selection of appropriate anti-corrosive materials and the delineation of maintenance and surveillance procedures to prevent any operational issues due to corrosion. The PSH plant has been designed to perform reliably and efficiently with seawater by inclusion of, among other things, the following tailored design and equipment measures:

- Anti-corrosive steel and paint for exposed components
- Cathodic corrosion protection
- Steel liners in shafts
- Special cement in applicable portions of tunnels and discharge/intake

- Use of copper-nickel alloy for seawater intake
- Highly resistant impermeable membrane lining for the reservoir

In particular, the Project pre-selected and starting working with a Tier 1 international hydroelectric engineering, procurement and construction contractor (EPC contractor) in 2014 in order to confirm the equipment and materials required for the PSH plant. During several years, the EPC contractor performed extensive studies, investigations, analyses, tests and R&D work related to the design and development of the manufacturing processes and materials required for the Project's PSH plant. As a result, the EPC contractor was able to conclude that the materials and manufacturing processes chosen for the PSH plant's components will have sufficient durability and reliability for long term operation, specifically considering a corrosive seawater environment. Additionally, a U.S.-based independent engineering firm and corrosion expert conducted a specialized review of the proposed design, protective coatings, and maintenance/surveillance procedures, and found that "plant performance will not be impacted by corrosion" given the proposed measures.

It should be noted that power plants utilizing seawater, although limited in number, have been operating for more than 50 years. Power plants such as EDF's La Rance tidal power project in France (1966) and J-Power's Yanbaru seawater pumped storage project in Japan have operated reliably since their respective commissioning dates. It should be noted that the Project team visited the Yanbaru seawater PSH plant in Japan in July 2015 and obtained first-hand information regarding construction, operation and maintenance of this experimental plant. Additionally, seawater is used in many other industrial operations including cooling processes for electric generation (coal, natural gas and nuclear plants), regasification processes for liquefied natural gas plants, and for pumping at some of the largest copper mines in Chile and other parts of the world. The Project's utilization of seawater requires certain design/supply adjustments to mitigate corrosion and any impact on marine life, and such specifications have been incorporated into the PSH design.

The Project's excavated tunnels will generally be reinforced with anti-corrosive support material including galvanized rock bolts, plastic fibre, corrosion-resistant cement and/or steel-based protected linings, which will be determined on a case by case basis depending on the geological and structural conditions found during construction.

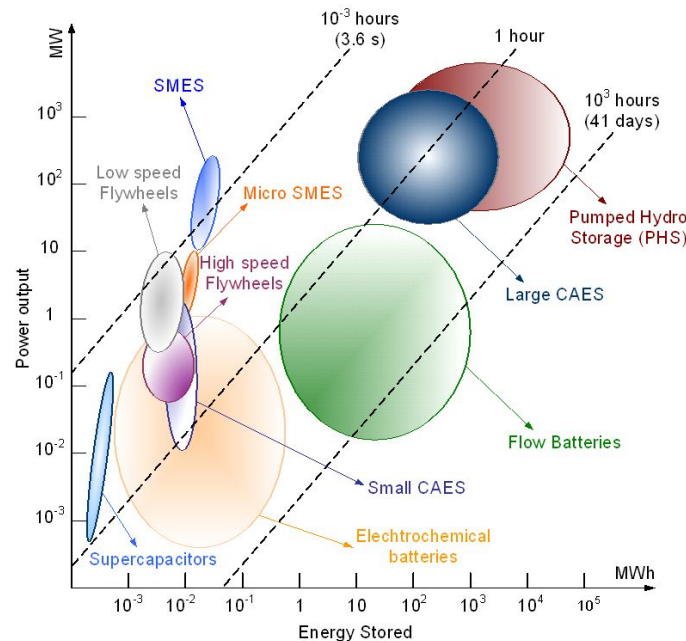
It should be noted that the Project proposes to hire an independent engineer to prepare a technical due diligence report for the PSH plant in order to confirm the engineering and design and associated Project capital expenditure prior to presentation of PPA bid. The independent engineer's technical due diligence report would also be made available for interested debt and equity investors.

Competitive Analysis of Storage Technologies

As compared to other energy storage technologies, pumped storage hydro is the most efficient alternative, both financially and technically, to meet the current challenge of the energy industry: integration of variable renewable energy. As shown in Figure 14 below from *Techno-Economic Analysis of Different Energy Storage Technologies* (H. Ibrahim and A. Ilinca, 2013), storage systems need to be closely adapted to the type of application they are meant to support. In the case of energy management, which required both high power output and energy storage capacity, PSH technologies are the most efficient.

Figure 14:

Fields of Application of the Different Storage Technologies According to Stored Energy and Power Output



At present, there are three feasible commercial alternatives that allow for the supply of renewable electricity 24 hours a day using storage technologies to complement solar production. These alternatives and the principal characteristics of each are summarized below.

- i. **Thermal Storage or Concentrated Solar Power:** Involves the heating of molten salts stored in a large tank, with electrical resistance to charge during solar hours and then to discharge heat which produces steam and generates electricity with a turbine-generator group.
 - Unitary cost: 1350 USD/kW
 - Roundtrip efficiency: 35%
 - Storage capacity: 5.5 hours
 - Lifespan: 25 years
- ii. **Chemical batteries:** Involves the utilization of different chemicals to configure a cathode and anode to charge and discharge through chemical reactions. Lithium-ion batteries currently are the most cost-effective battery alternative for bulk energy storage due to their relatively high density, low self-discharge and high charging efficiency.
 - Unitary cost: 2850 USD/kW
 - Roundtrip efficiency: 85%
 - Storage capacity: 10 hours
 - Lifespan: 25 years
- iii. **Pumped Hydro:** Involves utilization of two vertically separated water reservoirs located at different heights to allow potential energy to generate electricity with water previously pumped from the lower reservoir to the upper reservoir. The storage system is charged by pumping water to the upper reservoir and discharged by releasing the water which passes through an electricity-generating turbine system. In the case of EdT, the PSH plant is charged with solar energy.
 - Unitary cost: 1790 USD/kW
 - Roundtrip efficiency: 75%
 - Storage capacity: >5 days
 - Lifespan: >60 years

The technological efficiency of PSH, and particularly of the solution offered by Espejo de Tarapacá, is due to:

- The extraordinary geographical situation, taking advantage of the sea as lower reservoir and natural concavities as upper reservoir, Espejo de Tarapacá's total cost is in the lower range of PSH costs, which in turn is the largest and most-used storage technology in the world.
- The roundtrip efficiency of pumped storage is 75%, allowing the PSH to efficiently take advantage of the amount of daylight hours with low energy prices compared to night hours with high energy prices.
- The large upper reservoir provides security of supply to the system, ensuring the Project a stable capacity revenue stream (Chilean regulation requires at least 5 hours of stored capacity every hour available at any time of the year in order to benefit from 100% of capacity revenues).
- PSH is the most versatile technology to provide the widest range of ancillary services needed by the market in order to integrate high variable renewable energy such as Inertia, Frequency Control, Voltage Control, Ramping, and Black-Start Capability, among others.
- The PSH lifespan is greater than 60 years and can be extended even further through refurbishment.
- The technology is scalable: the cost to increase the installed capacity (MW) and storage capacity (days) is much lower.
- The technology is sustainable: no recycling, rare minerals or chemical components are required for its life cycle.

F.3. Environmental, Social Assessment, including Gender Considerations

Describe the main outcome of the environment and social impact assessment. Specify the Environmental and Social Management Plan, and how the project/programme will avoid or mitigate negative impacts at each stage (e.g. preparation, implementation and operation), in accordance with the Fund's Environmental and Social Safeguard (ESS) standard. Also describe how the gender aspect is considered in accordance with the Fund's Gender Policy and Action Plan.

Environmental Assessment

Since the inception of the Project in 2011, Valhalla has made it a priority to develop and design EdT in a manner that is sustainable and environmentally-friendly. The environmental approval process in Chile is rigorous, requiring detailed preparation, modelling and analysis by project developers. The Project submitted an EIA for the PSH plant and the corresponding transmission line in August 2014 and approval was unanimously granted by authorities, without opposition or observations, in December 2015. The Project also submitted an EIA for the PV plant and associated transmission line in January 2015 which was unanimously approved, without opposition or observations, in January 2016.

Chilean environmental regulations also require extensive monitoring throughout the life of approved projects. Additionally, as explained in detail in the Environmental and Social Management Framework (ESMF) included in Annex 3, the Project plans to avoid and mitigate negative environmental impacts during all stages of construction and operation with detailed monitoring and supervision in order to ensure strict compliance with all permit requirements, applicable laws, World Bank Guidelines, and Equator Principles by all Project parties. The Project will also conduct environmental compliance audits and inspections and review and approve all contractor environmental plans and manuals prior to initiation of activities.

Social Assessment

The Project has also prioritized the establishment of an early, transparent, meaningful and inclusive relationship with the local communities. EdT's PSH plant is located approximately 100 km south of Iquique, adjacent to the Caleta San Marcos fishing village with a population of around 300 inhabitants. A portion of the main works for the Espejo de Tarapacá Project, including the entrance to the powerhouse cavern, the ocean intake and the reservoir, are located close to the village. Most of the economic activities in San Marcos are related to the ocean, primarily fishing, and as a

result, the community's principal concern relates to a potential impact from the Project on their livelihood. Interaction with the San Marcos community was initiated in 2012, approximately 2 years prior to submission of the environmental permit for the PSH plant, in order to address community concerns in early development.

In 2012, initial contact with community representatives from San Marcos was made by Valhalla's founders, who explained the Project and expressed their desire to establish an open dialogue with the community and involve them throughout project development, by identifying and addressing concerns and finding opportunities for mutual collaboration. Valhalla also engaged external local and international advisors to assist in the community engagement process, including the Consensus Building Institute, an international NGO dedicated to promoting dialogue and effective stakeholder engagement, in order to help design and facilitate a collaborative and interactive process. In early 2013, three open meetings were held with the community and a separate meeting was conducted with the local fisherman's union. During these meetings the team presented the Project and listened to the concerns of community members. In October 2013, the team organized face to face visits to every house in San Marcos in order to introduce the Project on a more personal level.

Upon commencement of the environmental studies, Valhalla established and implemented a formal work methodology with San Marcos, which included joint working table sessions (*mesas de trabajo*). One of the outcomes of these sessions was the creation of a special commission focused on addressing issues related to ocean studies and impacts. By August 2014, more than 20 meetings had been held resulting in a series of measures taken by the Project development team, including improved communication lines with community representatives, joint visits to existing power plants, and the hiring of a special consultant to support the community with its analysis of the EIA. In August 2014, prior to submission of the PSH EIA to the authorities, two working plan agreements (*planes de trabajo*) were executed, one with representatives of the general community and another with the fishermen's union. Both agreements constitute a commitment to maintain a constant dialogue between the community and the Project.

In March 2015, individual collaboration agreements were executed with the Neighbourhood Council (*Junta de Vecinos*) and the Fishermen's Union of San Marcos (*Sindicato de Pescadores*) to govern the interaction with the community during development, construction and operation of the Project. The Company later signed similar agreements with the Kelp Gatherers' Union (*algueros*) of San Marcos (April 2016) and the Neighbourhood Council, Fishermen's union and Rural Water Authority of Rio Seco (October 2016), another fishing community located relatively close to certain minor Project works. Additional information related to the community and a summary of the provisions of all four community agreements executed can be found in the Gender Assessment and Gender Action Plan, respectively, included in Annexes 4 and 5 to this Funding Proposal.

The Project's commitment to establishing a sustainable, transparent and mutually collaborative relationship with the community, as demonstrated with the team's time and active presence, has helped build a trustworthy relationship which was fundamental in reaching and addressing difficult issues and reaching constructive agreements. The Project continues to actively participate in the community. In May 2015, the San Marcos office was expanded to include a Public Connectivity Centre, a public internet space, for use by students and other residents, who previously did not have access to the internet. The Project has implemented other community initiatives such as an education programs to assist adults in finishing high school and surveys to determine the specific areas of interest for establishing technical training.

With regard to community engagement surrounding the PV plant site, Valhalla initiated contact with the communities in the site area in August 2014, approximately six months prior to submission of the EIA for the PV plant. The closest communities are approximately 8 km from the Project site. The agricultural village, Pintados, is located approximately 8 km north of the site and Victoria, a small settlement, is approximately 8 km west of the site. Meetings with both communities were held prior the presentation of the EIA, in addition to the community participation meetings held later as part of the EIA process. Despite the distance between the site and the communities, the Project also plans to explore ways to support local development in these communities, which are particularly interested in taking advantage of potential opportunities during the construction period.

Assessment of Project Compliance with IFC Performance Standards (GCF ESS)

The AE has assigned a Category B to the Project based on IFC Performance Standards.

- PS 1: Assessment and management of Environmental and Social Risks and Impacts (Minimal or No impact)
The regulations associated with the Chilean Environmental Impact Evaluation Service (SEIA), including its technical regulations, the development of EIAs and required approvals will all serve as safeguards. Please see Environmental and Social Management Framework for details.
- PS 2: Labour and Working Conditions (Minimal or No impact)
All relations between employers and workers are regulated under Labor Code Book, Sanitary Code Book.
- PS 3: Resource Efficiency and Pollution Prevention (Limited Adverse Impact)
The Project must comply with regulations for the control of quality standards for environmental variables such as air, soil, water, waste management among others, as mandatory compliance in distinct project stages.
- PS 4: Community Health, Safety, and Security (Limited Adverse Impact)
 - (EdT PSH Plant) No residents are identified in the project location (p. 30 of EdT EIA). The closest community is San Marcos (fishermen's community), 750m from the site. The impact is expected to be limited and the community will receive clean portable water at cost, which has positive impact to them.
 - (CdT PV Plant) Victoria (10km from the site), Colonia de Pintados (50km from the site) are the closest cities from the site. It has been observed that there is no possibility of affecting the socioeconomic activities in Colonia de Pintados and Victoria due to the works or actions of the Project (2.3 of CdT EIA).
- PS5 : Land Acquisition and Involuntary Resettlement (Minimal or No impact)
Most of the Project area, as in most of the northern regions of Chile, is state owned. As a result, the Project has or will enter into leases, easements or concessions with the Ministry of Public Property in order to use the seashore and marine area, as well as to permanently secure the land needed for the entire generation facility, the transmission line and substation.
- PS 6 : Biodiversity Conservation and Sustainable Management of Living Natural Resources (Limited Impact)
 - (EdT PSH Plant) The reptiles group may be affected and in accordance with the terms of the EIA and approved permit, the Project will implement a mitigation plan for rescue and relocation of certain reptiles found in the reservoir area prior to the start of construction.
 - (CdT PV Plant) No/Minimal impact.
- PS7 : Indigenous Peoples (Minimal or No impact)
No Indigenous Peoples.
- PS8 : Cultural Heritage (Limited Impact)
 - (EdT PSH Plant) 23 points of archaeological interest were identified, but no historical, anthropological or typical monuments are registered. In accordance with the approved permit, any findings from the site must be rescued by specialists and the material will be delivered to the regional museum.
 - (CdT PV Plant) 85 heritage elements were identified. In accordance with the approved permit, any findings from the site must be rescued by specialists and the material will be delivered to the regional museum.

Gender Assessment

Although as explained in the Gender Assessment included in Annex 4, Chile has implemented and continues to actively implement public policies aimed at closing the gap between males and females, in the community of Caleta San Marcos, a significant gender gaps remain related to workforce participation and income inequality, among others. In San Marcos, as in most other fishing villages in Chile, the historic cultural operation of fishing industries dominated by males is one of the principal causes for this inequality. Additionally, low levels of education and the lack of economic opportunities beyond those related with the fisheries also contribute to the current realities of women in Caleta San Marcos.

The Project plans to play a key role not only in the development of the community which is vulnerable to climate change, but specifically in the empowerment of women. As detailed in the Gender Action Plan, the Project plans to focus on implementing programs to help improve gender equality to ensure that women and men have equal access to the opportunities, benefits, and decision-making processes associated with the Project. The contribution of the Project will also be monitored on regular basis in order to measure progress and also detect early on any potential cultural friction related to gender equality issues or tensions within the community as a result of the new economic opportunities. The Gender Action Plan developed by the Project details specific objectives, outcomes and activities that will be followed to improve gender equality in Caleta San Marcos. In implementing successful community engagement, an important goal of the Project will be to empower local women to act as agents of change in a community that is already experiencing the negative impacts of climate change.

Stakeholder Engagement

- A history of the Community Engagement Process, was prepared by The Consensus Building Institute (CBI) as an independent third party (November 2016) (See attached Gender Action Plan).
- Interaction with the San Marcos community was initiated in 2012, approximately 2 years prior to submission of the environmental permit for EdT. Valhalla's founders explained the Project and expressed their desire to establish an open dialogue with the community and involve them throughout project development, by identifying and addressing concerns and finding opportunities for mutual collaboration. Valhalla also engaged external local and international advisors to assist in the community engagement process, including the Consensus Building Institute, an international NGO dedicated to promoting dialogue and effective stakeholder engagement, in order to help design and facilitate a collaborative and interactive process. In early 2013, three open meetings were held with the community and a separate meeting was conducted with the local fisherman's union. During these meetings the team presented the Project and listened to the concerns of community members. In October 2013, the team organized face to face visits to every house in San Marcos in order to introduce the Project on a more personal level.
- By August 2014, more than 20 meetings had been held resulting in a series of measures taken by the Project development team, including improved communication lines with community representatives, joint visits to existing power plants, and the hiring of a special consultant to support the community with its analysis of the EIA.
- In August 2014, prior to submission of the EdT EIA to the authorities, two working plan agreements (planes de trabajo) were executed. In March 2015, individual collaboration agreements were executed with the Neighbourhood Council (Junta de Vecinos) and the Fishermen's Union of San Marcos (Sindicato de Pescadores) to govern the interaction with the community during development, construction and operation of the Project.
- Annex 1 of the *Gender Action Plan* includes a summary of the agreements executed with the local organizations of Caleta San Marcos and Caleta Rio Seco (which include agreements for the supply of water, and educational and development programs) during the distinct phases of the Project. Annex 2 of the same document (also attached) includes the support letter from the Neighbourhood Council Representatives (signed on July 13, 2018) of Caleta San Marcos.

(Related video is disclosed on webpage: [short version of the video](#) [long version here](#))

<https://vimeo.com/293459058>

<https://vimeo.com/176210481>

MUFG Bank, as Accredited Entity will establish and maintain grievance mechanisms depicted in C.7.

F.4. Financial Management and Procurement

Describe the project/programme's financial management and procurement, including financial accounting, disbursement methods and auditing.

The financial resources from the GCF will be managed according to the general provisions of the AMA between the GCF and MUFG Bank. In using GCF funding for the Project, MUFG Bank will, unless otherwise specified in the AMA, use the same internal financial management policies and procedures when administering funds. MUFG Bank will exercise the same amount of care and diligence in using the GCF funding as when using its own capital resources. MUFG Bank internally has a responsible department to monitor the compliance if the administration is within MUFG Bank's policies.

Procurement

MUFG Bank has submitted its own procurement guideline and it is currently reviewed by GCF Accreditation Panel, and it would be fulfilled prior to the first disbursement by GCF for the Project, as set out in GCF's board document. Under its procurement guidelines, MUFG Bank intends to promote efficiency and effectiveness and minimize credit and other risks in MUFG Bank's operations.

All procurement of goods and works will be in accordance with MUFG Bank's procurement guidelines. The Project will utilize world-class EPC contractors for the principal construction contracts for the PSH plant PV plants, selected through competitive tender processes and negotiations in order to ensure best terms and conditions.

Financial Management

The Executing Entity, and all project companies (Espejo de Tarapacá and Cielos de Tarapacá) will apply IFRS standards which are applicable in Chile. An annual audit of the financials will be performed by an independent auditor. The Executing Entity and project companies will provide the auditor with the required information. Further audits on social and economic safeguards or impact shall be performed on an ad-hoc or regular basis.

G.1. Risk Assessment Summary

Please provide a summary of main risk factors. Detailed description of risk factors and mitigation measures can be elaborated in G.2.

The main identifiable Project risks and applicable mitigation measures are summarized below in G.2. As discussed throughout this Funding Proposal, the principal risk for the viability of the Project relates to financing the last stage of development in order to obtain a PPA with a creditworthy offtaker and move forward with equity and debt financing. Without GCF support in this stage, it is unlikely that the Project will be developed.

No	Risk Factor
1	PPA Execution Risk
2	Financing Risk
3	Regulatory Risk
4	Spot Market Risk
5	Construction/Completion Risk
6	Permitting Risk
7	Operating/Technological Risk
8	Corrosion Risk
9	Environmental Risk
10	Social Risk

G.2. Risk Factors and Mitigation Measures

Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
PPA Execution Risk: Risk that the Project will not be able to enter into a long term PPA with a creditworthy offtaker	Financial	High (>20% of project value)	Medium

Mitigation Measure(s)

Given the Project's solid economics, which make it possible to offer an energy price below the average variable cost of existing coal units in future PPA tender processes, it is confident that a PPA will be obtained but are not certain of the timing of execution. The objective of GCF's support is to help fund last stage development expenses, including guarantees necessary to participate in PPA tender processes. In addition, GCF's participation as an "anchor" equity investor in the Project is expected to provide a "stamp of approval" and help provide security to potential PPA clients and attract additional private sector investors.

Selected Risk Factor 2			
Description	Risk category	Level of impact	Probability of risk occurring
Financing Risk: Risk that Project will not attract investment and financing from one or more strategic equity investments and commercial or multilateral banks	Financial	High (>20% of project value)	Medium
Mitigation Measure(s)			
Based on the competitiveness and solid economic returns offered by the Project, the potential investment universe of investors and financial institutions includes both traditional private sector investors, such as strategic energy companies, infrastructure funds, private equity funds, pension funds, insurance companies and commercial banks, as well as those entities focused on sustainable, responsible and impact investors. The principal barrier for investors is the absence of a long term PPA which provides stable cash flow. With the support of the GCF, including the provision of funds to participate in PPA tender processes, the Project expects to execute a PPA and move forward with the financing process. The Project has held meetings with numerous international and local banks and multilateral institutions, which have expressed interest in participating as lenders in a future financing transaction. The Project has also requested and received multiple indicative financing proposals from banks on which the financing terms and conditions in the financial model are based. The base case funding plan is to source debt from a group of international and local commercial banks, export credit agencies and multilateral development institutions, particularly those that have a strong track record with recent participation and/or leadership roles in Chilean power project financings of similar size. Execution of a long term PPA and incorporation of a strategic equity partner are requisites for successful debt financing of the Project.			
Selected Risk Factor 3			
Description	Risk category	Level of impact	Probability of risk occurring
Regulatory Risk: Risk of a change in energy sector regulations that negatively impacts Project economics	Financial	High (>20% of project value)	Low
Mitigation Measure(s)			
Risk of a change in regulations that would negatively impact the Project is viewed as unlikely. Chile has one of the most stable, transparent and private sector oriented electric sectors in Latin America. The sector benefits from a long track record of respecting bilaterally negotiated PPAs and providing stable and transparent regulation of firm capacity payments, which are the two core revenue streams for this Project. Although payments are made in Chilean Pesos, the functional currency of Chile's electric market is the U.S. Dollar. The importance of energy storage as a facilitator and source of system stability for growth in intermittent renewable power associated with strong government support provides the Project with additional protection from regulatory risk. The potential for additional remuneration for energy storage through transmission or ancillary services are positive upsides for the Project.			
Selected Risk Factor 4			
Description	Risk category	Level of impact	Probability of risk occurring
Spot Market Risk: Financial exposure to volatile electricity spot market prices	Financial	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			

A foundation of the Project's commercial structure is securing a PPA with an optimal supply volume (approximately 1,500 GWh). PPA and firm capacity revenue will account for approximately 80% of annual Project revenues, with net spot market sales representing 10% on average. When the Project is dispatched on a relatively continuous basis (i.e. solar in the day and hydro at night), there will be some residual exposure to spot pricing driven by the seasonality of monthly solar radiation. During the summer, the Project would be expected to sell some excess solar production in the spot market and during the winter there may be a need to purchase some additional energy during dark hours to completely cover the PPA obligations. However, the Project's market exposure is minimal as compared to certain run-of-river hydro plants and intermittent renewable projects. The actual pumping and dispatch profile of the PSH will be dictated by daily market pricing, which provides additional mitigation to spot price exposure.

Selected Risk Factor 5

Description	Risk category	Level of impact	Probability of risk occurring
Construction/Completion Risk: Risk of delay or cost overruns related to construction and termination of Project	Technical and operational	High (>20% of project value)	Low

Mitigation Measure(s)

The Project will contract a large proven solar EPC contractor to construct the PV plant on a lump sum turnkey basis with a guaranteed completion date and associated liquidated damages for delays.

The PSH construction contract structure will include fixed pricing, robust schedule guarantees, and associated liquidated damages. The Project's cost estimates and engineering have been validated by third-parties. Leidos Engineering, LLC conducted an independent engineer's limited technical due diligence review to confirm the Project's engineering, construction, and cost estimates, as well as the cost and time contingency levels included in the budget and schedule. World-class, experienced contractors will be employed for all construction components and top-tier generation plant and equipment will be utilized. Significant contingency levels between 40%-60% have been included in the budget for underground works. The PSH plant construction schedule includes a 6 month delay contingency period and overall average cost contingency of 15%.

Selected Risk Factor 6

Description	Risk category	Level of impact	Probability of risk occurring
Permitting Risk: Risk in delay or increased cost associated with difficulties in the permitting process	Technical and operational	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The permitting process was initiated in early stage development and the Project is currently at an advanced stage. The principal permits have been received or are expected in 2019, including the environmental permits, maritime concessions and hydraulic works concession. The remaining critical permits are all in advanced stages of the approval process. Permit monitoring, execution, and compliance are top priorities for the Project's management team.

Selected Risk Factor 7

Description	Risk category	Level of impact	Probability of risk occurring
Operating/Technological Risk: Risk of production loss resulting from inadequate or failed plant operations or technology	Technical and operational	High (>20% of project value)	Low

Mitigation Measure(s)

The Project will engage proven EPC contractors and equipment suppliers for all of the key equipment components (e.g. panels, inverters, transformers, reversible pump turbines/powerhouse). PV solar and PSH are both proven technologies with each having over 100 GW of installed capacity in the world today along with operational histories of over 20 years for PV solar and 75 years for PSH plants using reversible pump technology. The Project will also hire and/or secure experienced and proven O&M operators for the plants and transmission lines.

Selected Risk Factor 8

Description	Risk category	Level of impact	Probability of risk occurring
Corrosion Risk: Operational risk related to the utilization of seawater by the PSH plant	Technical and operational	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The Project's operations management team has extensively prepared for the operation of the PSH Plant with seawater both through the careful selection, together with the EPC contractor, of appropriate anti-corrosive materials and the delineation of maintenance and surveillance procedures. Additionally, an independent engineering firm and corrosion expert conducted a specialized engineering review confirming the proposed design, protective coatings, and maintenance/surveillance procedures. The Project team visited the Yanbaru seawater PSH plant in Japan in July 2015 and obtained first-hand information regarding construction, operation and maintenance of this experimental plant which successfully completed 17 years of operation in 2016. In addition, seawater is used abundantly in other industrial processes such as electric generation cooling, LNG regasification and mining processes in Chile and other parts of the world.

Selected Risk Factor 9

Description	Risk category	Level of impact	Probability of risk occurring
Environmental Risk: Risk of adverse unforeseen environmental impacts caused by construction of the Project	Social and environmental	High (>20% of project value)	Low

Mitigation Measure(s)

Since the inception in 2011, a fundamental priority has been to develop and design the Project in a manner that is sustainable and environmentally-friendly. For example, the PSH plant will have a limited visual impact as it will be located underground. The Project performed detailed engineering and environmental studies prior to requesting the environmental permits in 2014 (for the PSH plant) and in 2015 (for the PV plant), both of which were unanimously approved by the regulatory authority. Additionally, the Project has and will continue to maintain a qualified and experienced environmental management team to ensure that environmental impacts are avoided throughout the development, construction, and operational phases of the Project. Specific mitigation measures employed during construction to prevent environmental risks will include the following:

- Monitoring and supervision to ensure strict compliance with all permit requirements, applicable laws, World Bank Guidelines, and Equator Principles by all Project parties
- Continual monitoring of environmental compliance during all construction activities and conducting environmental compliance audits and inspections
- Approval of contractor environmental plans and manuals to be included in Project contracts prior to initiation of construction activities

The Environment and Social Management Framework (ESMF) has been included in Annex 3 to this Funding Proposal.

Selected Risk Factor 10

Description	Risk category	Level of impact	Probability of risk occurring
Social Risk: Risk of adverse unforeseen social impacts caused by construction of the Project	Social and environmental	High (>20% of project value)	Low

Mitigation Measure(s)

Community engagement is an integral and fundamental part of Project development. The Project has strived to implement a precedent-setting community engagement model in Chile which is based on establishing early, transparent and empathetic relationships with the local communities close to the Project. Collaboration agreements which govern the Project's interaction with the local communities during development, construction and operation of the PSH plant have been executed with various community organizations and the local communities support development of the Project. No opposition from the communities, or any other stakeholders, was presented during the environmental permitting processes. Both environmental permits were unanimously approved without objection. Specific mitigation measures employed to prevent potential issues with the communities will include the following:

- Community managers will be designated to lead and maintain relationships with local authorities and community representatives
- Local community information offices with dedicated Project representatives will be established to provide information during the construction period (offices will be located close to the plant sites)
- Community Managers will be responsible for: (i) identifying, creating, and executing beneficial community outreach projects and programs, (ii) ensuring accuracy and availability of project information to the communities, (iii) evaluating potential negative impacts, mitigation measures and community concerns, and (iv) ensuring that the Project has a positive impact on, and inclusive relationship with, representative groups for the community and their constituents.

Other Potential Risks in the Horizon

Please describe other potential issues which will be monitored as "emerging risks" during the life of the projects (i.e., issues that have not yet raised to the level of "risk factor" but which will need monitoring). This could include issues related to external stakeholders such as project beneficiaries or the pool of potential contractors.

** Please expand this sub-section when needed to address all potential material and relevant risks.*

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's Performance Measurement Framework under the Results Management Framework.

The Results Management Framework (RMF) describes the detailed process to measure, report and verify the set of indicators proposed in this Section H of the Project's Funding Proposal. The indicators describe the results based on the paradigm-shift objective of the Project, Fund level impacts and Project outcomes related to mitigation and adaptation logic models. The RMF framework is complemented with the ESMF and the Gender Action Plan, which are included as Annexes 3 and 4 to this Funding Proposal, as these documents also indicate and explain the indicators related to social, environmental and gender impact.

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level¹⁷

Paradigm Shift Objectives

<i>Shift to low-emission sustainable development pathways</i>	The Project seeks to achieve multiple objectives in the development of low-emission pathways by stimulating a paradigm shift in the Chilean electric sector and helping it transition from heavy dependence on conventional energy generation to renewable energy. These objectives include: 1) Reduction of GHG emissions: It is estimated that the Project will avoid on average 1,001,187 tonnes of CO_{2e} every year, with 35 million tonnes of CO_{2e} avoided over the Project's 35-year project lifetime. 2) Catalysation of Additional Investment in Variable Renewable Energy: Implementation of the 1st renewable bulk energy storage project in the Chilean electric grid will enhance grid flexibility and improve grid resiliency, thereby catalysing additional investment in variable renewable energy projects. 3) Decarbonisation of the Electric Grid: Implementation of the 1st renewable bulk energy storage project will provide a renewable replacement for existing coal facilities which are presently needed to maintain system supply reliability when renewable energy is not available (when the sun goes down or the wind is not blowing). 4) Enhancement of Enabling Environment: Implementation of this innovative bulk energy storage Project, which integrates PV solar and PSH technology using seawater will provide experience, knowledge and learning which can be used to replicate similar innovative projects both locally and worldwide. 5) Strengthening of Regulatory Policies: The principal barrier to entry faced by the Project is the lack of stable remuneration for bulk renewable energy storage which adequately compensates it for the multiple electric system and social benefits that it provides. Implementation of the Project will set a precedent and establish a track record demonstrating its benefits which will help enable the appropriate regulatory incentives for future facilities.
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¹⁷ Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that [some indicators are under refinement](http://www.greenclimate.fund/documents/20182/239759/5.3_-_Performance_Measurement_Frameworks_PMF_.pdf/60941cef-7c87-475f-809e-4ebf1acbb3f4)):
[http://www.greenclimate.fund/documents/20182/239759/5.3 -
_Performance_Measurement_Frameworks_PMF_.pdf/60941cef-7c87-475f-809e-4ebf1acbb3f4](http://www.greenclimate.fund/documents/20182/239759/5.3_-_Performance_Measurement_Frameworks_PMF_.pdf/60941cef-7c87-475f-809e-4ebf1acbb3f4)

Increased climate-resilient sustainable development		The Project will directly contribute to the creation of adaptation actions and more resilient communities in three of these sectors that are currently experiencing significant effects of climate change in Chile: 1) Energy Access and Power Generation from Solar and Hydroelectric Power: The Project will help Chile build capacity to adapt to climate change by improving grid flexibility and catalysing additional investments in variable renewable energy and also by reducing the national grid's dependence on fossil fuels and hydrology affected by droughts (In 2018, Chile's power generation was comprised of 54% thermoelectric generation and 31% hydroelectric). Implementation of the Project will also create an enabling regulatory environment for a multi-service asset by setting a precedent for future facilities and providing experience, knowledge and learning that can be used to replicate similar projects both locally and worldwide. . 2) Most Vulnerable People and Community Support: Under the long-term collaboration agreements executed with the vulnerable fishing communities close to the Project, EdT will provide funds and training for social and productive investments which will help diversify the local economy, which is highly dependent on sea products that have been in steady decline in recent years due to over-exploitation and higher water temperature due to climate change. 3) Water Security: EdT will benefit the vulnerable local communities by providing stable water supplies from the Project's desalination plant to the communities at cost. Currently, the local communities surrounding the Project do not have access to stable drinking water supply, which is currently sourced from groundwater and transported bi-weekly to the communities by truck from the closest city, Iquique, which is located about 100 km north.				
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-Term	Final	
GCF Core Indicators	M1: Tonnes of carbon dioxide equivalent (tCO _{2eq}) reduced or avoided	Project annual energy generation (GWh produced) / Electricity receipts	0	17.5MTCO _{2eq}	35MTCO _{2eq}	Only considers CO ₂ reductions associated with the Project; additional upside from catalysation of addition VRE
	M2: Cost per tonne of CO ₂ -equivalent reduced	Tonnes of CO _{2eq} to be determined based on energy generation (GWh produced); cost per tonne of carbon emitted	0	\$547 million (17.5MTCO _{2eq} multiplied by social cost of \$31.26 per TCO _{2eq})	\$1.1 billion (35MTCO _{2eq} multiplied by social cost of \$31.26 per TCO _{2eq})	Only considers CO ₂ reductions associated with the Project; additional upside from catalysation of addition VRE

		(estimate \$31.26 per TCO _{2eq}) to be based on final Project investment				
	M3: Volume of Finance leveraged by Fund funding	Project financial reports	0	\$1 billion in private sector co-financing leveraged	\$ 1 billion in private sector co-financing leveraged	Assumes leveraging of private sector debt and equity
	Total number of direct and indirect beneficiaries (disaggregated by gender)	Pre-Project and post-Project assessments and community household surveys; Project reports and Chilean electric system annual report prepared by national independent grid coordinator (CEN)	0	Primary direct and indirect beneficiaries in vulnerable local communities related to water security, economic diversification and gender empowerment: 550 people (59% male / 41% female in San Marcos and Rio Seco). Indirect beneficiaries of increased resilience of electric sector against climate variability: Chile's population of 17.6 million inhabitants (50% male / 50% female).	Primary direct and indirect beneficiaries in vulnerable local communities related to water security, economic diversification and gender empowerment: 550 people (59% male / 41% female in San Marcos and Rio Seco). Indirect beneficiaries of increased resilience of electric sector against climate variability: Chile's population of 17.6 million inhabitants (50% male / 50% female).	Only considers CO2 reductions associated with the Project; additional upside from catalysation of addition VRE

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
Fund Level Impacts – (Mitigation and Adaptation)						

1.0-Reduced emissions from improved access to low emission energy and power generation	Tonnes of carbon dioxide equivalent (tCO ₂ eq) reduced or avoided as a result of Fund-funded project	Project annual energy generation (GWh produced)		17.5MTCO ₂ eq	35MTCO ₂ eq	1.0-Reduced emissions from improved access to low emission energy and power generation
A.1 Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions	Number of beneficiaries reached	Project assessments and community household surveys	Pre-Project construction baseline survey; Together with community household survey conducted in 2016 in San Marcos	550 people; 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and remaining 54% child population as indirect beneficiaries	550 people; 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and remaining 54% child population as indirect beneficiaries	Implementation of Project training, funds and supply of drinking water from Project's desalination plant AE to confirm MoV and Baseline details in Inception Report
	A1.2 Number of males and females benefiting from the adoption of diversified, climate resilient livelihood options	Project assessments and community household surveys; including gender sensitive survey	Pre-Project construction baseline survey; Together with community household survey conducted in 2016 in San Marcos	550 people; 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and remaining 54% child population as indirect beneficiaries	550 people; 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and remaining 54% child population as indirect beneficiaries	Implementation of educational and skill training programs to promote creation of new economic activities, focusing in particular on the empowerment of women AE to confirm MoV and Baseline details in Inception Report
A.2. Increased resilience of health and wellbeing, and food and water security	A2.3 Number of males and females with year-round access to reliable	Community household survey; including gender	Pre-Project construction baseline survey; Together with community	550 direct beneficiaries; 100% of total local population	550 direct beneficiaries; 100% of total local population	Construction and operation of Project water supply infrastructure (desalination)

	and safe water supply despite climate shocks and stresses	sensitive survey	household survey conducted in 2016 in San Marcos	(59% male / 41% female in San Marcos and Rio Seco)	(59% male / 41% female in San Marcos and Rio Seco)	plant) as part of PSH plant which will also be used to supply communities
A.3 Increased resilience of infrastructure and the built environment to climate change threats	A3.1 Number and value of physical assets made more resilient to climate variability and change, considering human benefits (reported where applicable)	Project reports and Chilean electric system annual report prepared by CEN	0	300 MW PSH and 561 MW PV to provide 24/7 continuous energy supply	300 MW PSH and 561 MW PV to provide 24/7 continuous energy supply; and additional seawater PSH capacity in the system of 1,000 MW	Does not estimate installed capacity from catalysation of additional VRE investments Project will establish benchmark and track record for future energy storage projects

H.1.2. Outcomes at Project/Programme Level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-Term (if applicable)	Final	
Project/ programme Outcomes	Outcomes that contribute to Fund-level impacts					
M.5 Strengthened institutional and regulatory systems for low-emission planning and development	M5.1 Institutional and regulatory systems that improve incentives for low emission planning and development and their effective implementation	Regulatory framework assessment prepared by independent market consultant	Pre-Project assessment	Modification of regulatory framework to incorporate remuneration of social benefits provided by multi-service storage and renewable generation	Modification of regulatory framework to incorporate remuneration of social benefits provided by multi-service storage and renewable generation	Energy regulator implements changes to recognize social benefits of multi-service storage and renewable generation / Change in regulatory qualification for storage asset
M.6 Increased number of small, medium and large low emission power suppliers	M6.1 Proportion of low-emission power supply in a jurisdiction or market	Chilean electric system annual report prepared by CEN	Pre-Project Chilean electric system annual report	Net Project generation of 1,500 GWh/year of low emission power supply with	Net Project generation of 1,500 GWh/year of low emission power supply with	Project's energy storage will improve grid flexibility and resilience, thereby catalysing

			prepared by CEN	very low risk associated to climate variability or droughts	very low risk associated to climate variability or droughts	additional VRE investment Catalysation of additional small, medium and large low emission power suppliers Project will establish benchmark and track record for future energy storage projects
	M6.3 MWs of low emission energy capacity installed, generated and/or rehabilitated as a result of GCF support	Chilean electric system annual report prepared by CEN	Pre-Project Chilean electric system annual report prepared by CEN	New installed renewable energy and storage capacity from Project of 300 MW PSH and 561 MW PV	New installed renewable energy and storage capacity from Project of 300 MW PSH and 561 MW PV	Project's energy storage will improve grid flexibility and resilience, thereby catalysing additional VRE investment Catalysation of additional low emission installed capacity
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	A7.1: Use by vulnerable households, communities, businesses and public-sector services of Fund supported tools, instruments, strategies and activities to respond to climate change and variability Number of Fund funded	Community household survey including gender sensitive survey	Pre-Project construction baseline survey; Together with community household survey conducted in 2016 in San Marcos	550 people (59% male / 41% female in San Marcos and Rio Seco) 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and	550 people (59% male / 41% female in San Marcos and Rio Seco) 46% adult population (members of neighbourhood association and other community organizations) as direct beneficiaries and	Project will implement educational and skill training programs to promote creation of new economic activities, focusing particularly on the empowerment of women Diversification of community economic

	projects/programmes that support effective adaptation to fish stock migration and depletion due to climate change			remaining 54% child population as indirect beneficiaries	remaining 54% child population as indirect beneficiaries	activities away from depleting sea resources Provision of stable drinking water supply from Project's desalination plant Grants to support diversification of productive activities and infrastructure for fishing and kelp gatherers' unions faced with depleting sea resources AE to confirm MoV and Baseline details in Inception Report
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H.1.3. Outputs, Activities and Inputs at Project/Programme level

Project/ programme outputs	Outputs that contribute to outcomes					
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-Term (if applicable)	Final	
COMPONENT 1 – Project Development & Preparatory Work						
Output 1.1 Commercial viability of the Project with full funding	Execution of equity and debt agreements to secure complete Project funding	Project reporting	0	Equity and debt commitmen ts for full Project funding of \$1,094 million	Equity and debt commitments for full Project funding of \$1,094 million	Incorporation of one or more strategic or financial investors in Project equity; and syndicated project finance credit agreement with international banks and/or other financial institutions
COMPONENT 2 – Project Construction						
Output 2.1 Construction of PV plant which will deliver clean, economic and reliable renewable energy	Annual PV plant generation	Project reports and Chilean electric system annual report prepared by CEN	0	Average annual PV plant generation of 1,600 GWh/year of clean energy	Average annual PV plant generation of 1,600 GWh/year of clean energy	Successful construction and operation of PV plant
Output 2.2 Construction of PSH plant, including desalination plant, which will deliver clean, economic and reliable renewable energy storage	Annual PSH plant generation and pumping	Project reports and Chilean electric system annual report prepared by CEN	0	Average annual PSH plant generation of 800 GWh/year of clean energy	Average annual PSH plant generation of 800 GWh/year of clean energy	Successful construction and operation of PSH plant
COMPONENT 3 – Community Works						
Output 3.1 Improvement in economic, gender	Number of additional non- climate	Project and community	Pre-Project assessment	Improvemen t in economic,	Improvemen t in economic,	

empowerment and climate change adaptation capacity in vulnerable local community	dependent businesses and diversification of existing economic activities; number of women incorporated in the workforce	monitoring report		gender empowerment and climate change adaptation capacity of 50% with respect to Pre-Project baseline assessment	gender empowerment and climate change adaptation capacity of 100% with respect to Pre-Project baseline assessment	
Output 3.2 Stable and secure water supply for vulnerable local community	Volume of water supplied to local community from Project's desalination plant	Project and community monitoring report	0	Supply of desalinated water supply of up to 90/m ³ per day from Project's water desalination plant	Supply of desalinated water supply of up to 90/m ³ per day from Project's water desalination plant	

Activities – Who, What, Where

Activities	Description	Inputs	Indicator
COMPONENT 1 – Project Development & Preparatory Work			
Output 1.1 Commercial viability of the Project with full funding			
Activity 1.1.1 Participation in PPA tender process (or transmission or other service contract) providing for stable long term revenue)	Execution of PPA (or transmission or other service contract) providing for stable long term revenue	GCF funding of \$4.8 million in pre-PPA development costs and funding of \$13 million guarantee for participation in tender process and \$1.4 million guarantee to secure permits	PPA award and contract execution
Activity 1.1.2 Selection process for strategic and/or financial equity investor(s) to participate in the Project post-PPA	Invitation and selection process for strategic and/or financial equity investor(s) to participate in the Project post-PPA	GCF participation as early anchor equity investor--funding \$4.8 million in pre-PPA development costs and \$4.2 million in post-PPA development costs	Execution of shareholders' agreement(s) for \$357 million with third party investor(s) in order to complete full equity funding with equity participation of 6% Valhalla, 13% GCF, and 81% new investor(s)
Activity 1.1.3 Debt financing process	Invitation and selection of group of commercial banks and/or	GCF participation as early anchor equity investor--	Execution of syndicated credit facility for US\$ 647 million with

with commercial banks and/or other potential financial institutions	other financial institutions to participate in project financing process	funding \$4.8 million in pre-PPA development costs and \$4.2 million in post-PPA development costs	commercial banks and/or other financial institutions
COMPONENT 2 – Project Construction			
Output 2.1. Construction of PV plant which will deliver clean, economic and reliable renewable energy Activity 2.1.1 Construction of PV plant Activity 2.1.2 Initiation of commercial operation of PV plant	Completion of PV plant construction period Start-up of commercial operations of the PV plant	2.1.1.1 Construction management of contractors 2.1.1.2 Management of permitting and land requirements 2.1.1.3 Timely receipt of equity and debt contribution disbursements 2.1.1.4 Community engagement and support 2.1.2.1 Training of personnel for operation and maintenance of the PV plant	Timely completion of construction of PV plant including associated transmission line Commercial declaration PV plant in-service and ready for dispatch by independent grid operator
Output 2.2 Construction of PSH plant, including desalination plant, which will deliver clean, economic and reliable renewable energy storage Activity 2.2.1 Construction of PSH plant	Completion of PSH plant (including desalination plant) construction period	2.1.1.1 Construction management of contractors 2.1.1.2 Management of permitting and land requirements 2.1.1.3 Timely receipt of equity and debt contribution disbursements	Timely completion of construction of PSH plant including associated transmission line

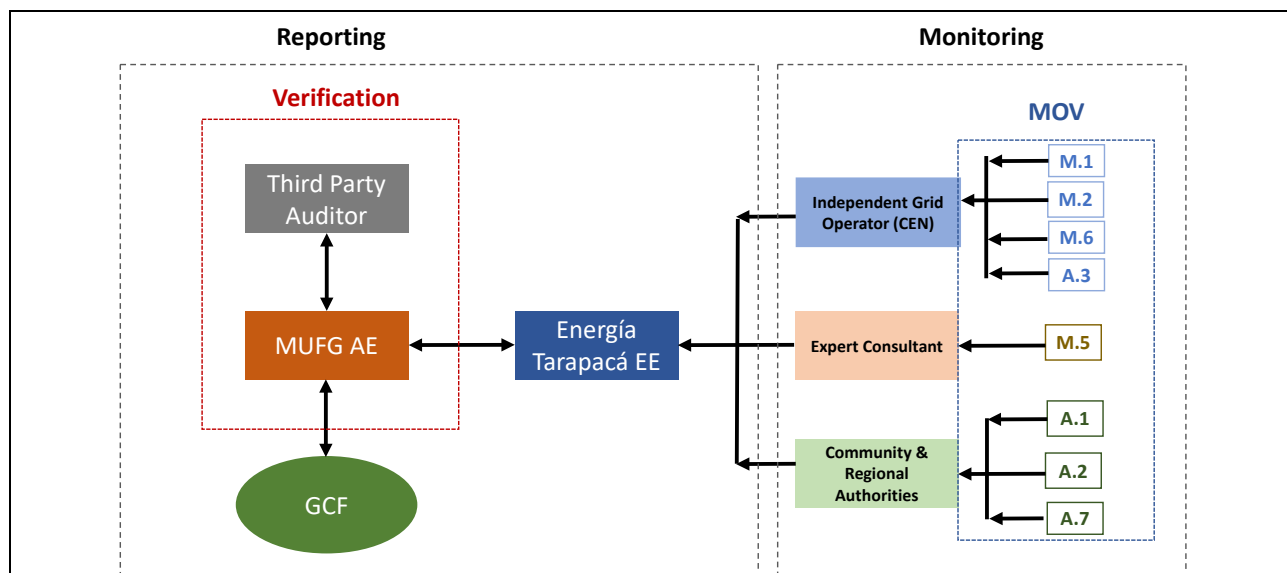
		2.1.1.4 Community engagement and support	
Activity 2.2.2 Initiation of commercial operation of PSH plant	Start-up of commercial operation of the PSH plant	2.1.2.1 Training of personnel for operation and maintenance of the PSH plant	Commercial declaration PSH plant in-service and ready for dispatch by independent grid operator
COMPONENT 3 – Community Works			
Output 3.1 Improvement in economic, gender empowerment and climate change adaptation capacity in vulnerable local community			
Activity 3.1.1 Implementation of educational and skill training programs	Project will implement activities to assist in training and employment of San Marcos and Rio Seco inhabitants located close to the PSH plant. These local economies are dependent almost exclusively on sea-related activities dominated by men; the community is vulnerable to the economic impact of climate change	3.1.1.1 Implementation of Project incentives and work opportunities' coordination office for hiring of local labour 3.1.1.2 Implementation of training for Project-related support activities such as provision of related goods and services.	Community and Project reports
Activity 3.1.2 Implementation of funds for social and productive investments	Project will implement funds for social and productive investments in San Marcos and Rio Seco in accordance with the executed community collaboration agreements. These local economies are dependent almost exclusively on sea-related activities dominated by men; the community is vulnerable to the economic impact of climate change	3.1.2.1 Implementation of competitive social grant program for development projects 3.1.2.2 Implementation of grant program to support productive activities for fishermen and kelp gatherers' unions 3.1.2.3 Implementation of infrastructure grant to support productive and recreational activities	Community and Project reports
Activity 3.1.3 Implementation of Project Gender Action Plan	Project will implement programs to build capacity and awareness to facilitate gender equality and empowerment	3.1.3.1 Implementation of psychological training sessions with local men and women to educate and sensitize the community regarding gender equality and empowerment. Sessions will include sexual harassment	Community and Project reports

		management and prevention training. 3.1.3.2 Implementation of counselling/training sessions with local women to promote economic opportunities 3.1.3.3 Implementation of counselling/training sessions to promote social participation and knowledge and utilization of networking, including establishment of mentoring relationships with women in business or leadership positions 3.1.3.4 Establishment of program for providing microcredits to women, including training and mentoring sessions related to business management, accounting and credit	
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H.2. Arrangements for Monitoring, Reporting and Evaluation

In order to evaluate and determine progress of the objectives, a Monitoring, Report and Verification (MRV) system will be implemented. Figure 15 below describes the flow of information between the stakeholders responsible for the RMF, including the relationship between the parties involved in the monitoring of the MoV for each indicator as specified above. The information required by the MoV for A.3 is available from government sources, such as public reports from the SEN Coordinator and the Ministry of Energy. However, MoV M.1, which requires calculation of GHG reductions by the Project, will be evaluated by external qualified consultants using methodology ACM0002 – “Large-scale Consolidated Methodology Grid-Connected electricity generation from renewable sources” as explained in the Annex 9 “Methodology Applicability and Emission Reductions Calculation Procedure”. Additionally, the information required the MoV A.1 and A.2 will be complied based on Project, community and regional information.

Figure 15: MRV Structure and Flow of Information



With regard to the reporting process, Energía de Tarapacá (Executing Entity) will consolidate the monitoring information, in accordance with the format established by the accredited entity. The accredited entity will be responsible for communication with the third party auditor and the GCF. The bidirectional arrows show the process to be followed for review of the observations in preparing the report to be delivered to the GCF with final results of the Project. The specific roles and responsibilities of the MRV system are described below.

Table 10: MRV Roles and Responsibility

Role	Institution	Responsibility
Monitoring Entity	Energía de Tarapacá SpA	Provide MUFG Bank with the information required for evaluation of the Project in accordance with GCF standards (see Table 11) Energía de Tarapacá SpA is the executing entity of the Project – It will consolidate the information from the monitoring phase, and elaborate the interim reports in collaboration with MUFG that will act as the final reporting entity to the GCF
Reporting Entity	MUFG Bank (Accredited Entity)	Review and validate the evaluation reports from Energía de Tarapacá
Verification Entity	External Consultant	Verify the information collecting process and the veracity of the results provided in the report from MUFG Bank. A third party with experience in the application of methodology ACM0002 will be responsible for calculating the GHG emissions reduction of the Project.
Monitoring Entity	Ministry of Energy	Highest regulatory authority for the Chilean electric sector – The ministry is in charge of approving and promoting laws and norms in the energy sector. Regulatory modifications will be published on the Ministry's website ¹⁸ .

¹⁸ <http://www.Energía.gob.cl/Energía-s-renovables>

Monitoring Entity	National Electric Coordinator	National independent grid operator for the Chilean electric system – The coordinator maintains statistics of the national electric system, the information for MoV A.3 and M.6 will be published on the Coordinator's website. ¹⁹
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As detailed in Table 10, Energía de Tarapacá will be responsible for developing and providing the reports with the indicators shown in Table 11, requiring coordination with the Ministry of Energy and the National Electric Coordinator and/or any other entities necessary in order to appropriately measure the indicators as described in the ESMF and Gender Action Plan found in Annexes 3 and 5, respectively. This information will be developed in two reports as detailed below. The reports will be prepared following a uniform evaluation approach in accordance with the terms of the AMA.

- **Annual Progress Report:** The annual progress report will include the indicators described in Table 11, which will be complemented by field missions from MUFG bank. The report will be prepared every year from the date of reception of the GCF funds.
- **Final Report:** The final report will systematize the results of the interim report in a final assessment of the accomplishment and values of the indicators during the entire process. This report will be delivered after completion of construction of the Project, when the plant starts commercial operation.

Table 11: Frequency and Type of Indicators

Type of Indicator	Indicator	Type	Frequency of Monitoring
Outcomes	Tons of carbon dioxide equivalent (tCO _{2eq}) reduced as a result of the Project	Quantitative	Annual
	Volume of finance leveraged by Fund financing	Quantitative	Annual
	Number of males and females benefiting from the adoption of diversified, climate-resilient livelihood options (including fisheries, agriculture, tourism, etc.)	Quantitative	Annual
	Institutional and regulatory systems that improve incentives for low emission planning and development and their effective implementation	Qualitative	Annual
	Database from environmental service area	Quantitative	Annual
	Revision of grid emission factors	Quantitative	Annual
	External Surveys	Quantitative	Annual
	Impact on sites identified with archaeological value	Quantitative	Annual

¹⁹ <https://www.coordinador.cl/>

Environmental and Social Management Framework	Affectation of deposits or paleontological materials	Quantitative	Annual
	Risk of affectation of avifauna species in high voltage electrical transmission lines	Quantitative	Annual
	Air Quality	Quantitative	Annual
	Water Quality	Quantitative	Annual

I. Supporting Documents for Funding Proposal

- ☒ NDA No-objection Letter
- ☐ Feasibility Study
- ☒ Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable)²⁰
- ☐ Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- ☐ Project/Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – *see the Accreditation Master Agreement, Annex I*
- ☒ Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (If applicable)
- ☒ Appraisal Report or Due Diligence Report with recommendations (If applicable)²¹
- ☐ Evaluation Report of the baseline project (If applicable)
- ☒ Map indicating the location of the project/programme
- ☒ Timetable of project/programme implementation
- ☒ Appendix – Methodology Applicability and Emission Reductions Calculation Procedure
- ☒ Emissions Reduction Calculation Spreadsheet

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

List of Annexes:

1. NDA No-Objection Letters from Chilean Ministry of Finance
2. Integrated Financial Model (in Excel) – [Contains Confidential Information](#)
3. Environmental and Social Management Framework
4. Gender Assessment
5. Gender Action Plan
6. Independent Technical Due Diligence report prepared by Leidos Engineering, LLC – [Contains Confidential Information](#)
7. Map indicating the location of the project
8. Timetable of project/programme implementation
9. Methodology Applicability and Emission Reductions Calculation Procedure
10. Emissions Calculation Spreadsheet
11. Letter of support to for the Project addressed to the Green Climate Fund from Ricardo Lagos, ex-Chilean President and former Special Envoy on Climate Change for the United Nations Secretary-General Ban Ki-moon
12. MUFG Bank Procurement Guidelines draft

²⁰ Confidential not for public disclosure

²¹ Confidential not for public disclosure