PROJECT NAME

Document prepared by

Name of the project	*Andes Solar IV*
Project holder	*Andes Solar IV SpA.*
Account holder	*Aes Andes S.A.*
Legal representative	*Legal Representative of the account holder in the Global CarbonTrace registry*
Project holder's contact information	*E-mail address, telephone, cell phone and physical address*
Other project participants	*Individuals or entities participating in the project*
Version	*1.0*
Date	*03/10/2025*
Project type	*Non-Conventional and Renewable Energy Sources (NCRE)*
Grouped project	*not applicable.*

Applied Methodology (ies)	*CDM-ACM0002_Grid-connected electricity generation from renewable sources Version 22.0*
Project location (City, Region, Country)	*Chile* *Antofagasta*
Starting date	30/09/2024
Quantification period of GHG emissions reduction	30/09/2024 to 29/09/2031-Renewable
Estimated total and average annual GHG emission reduction/removals amount	*Total amount of GHG emissions reductions (during the quantification period): 2,002,721 tCO2* *Estimated average annual amount of GHG emission reductions: 286,103 tCO2*
Sustainable Development Goals	 *Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all* *Goal 8. Decent work and economic growth* *Goal 13. Take urgent action to combat climate change and its impacts*
Special category, related to co-benefits	*Not applicable*

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1 Project type and eligibility

1.1 Scope in the BCR Standard

The project is eligible under the scope of the BCR Standard by meeting on the following conditions.

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O).	X
GHG projects using a methodology developed or approved by BioCarbon, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	
Quantifiable GHG emission reductions and/or removals generated through implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	
GHG projects using a methodology developed or approved by BioCarbon, applicable to activities in the energy, transportation and waste sectors.	X
Quantifiable GHG emission reductions generated through implementation of activities in the energy, transportation and waste sectors.	X

Table 1: Scope of the BCR Standard

The Andes Solar IV project will displace the generation of fossil fuel-based electricity from thermal power plants connected to the SEN grid, therefore generating GHG emission reductions. The Andes Solar IV PV power plant will generate 615 GWh per year with a plant load factor of 52.9%, and is expected to reduce 286,103 tCO_2 per year, which translates into 2,002,721 tCO_2 during the 7-year crediting period. Due to the utilization of BESS technology, the project plant will have a higher plant load factor than the more typical 30%-35% plant load factor observed in traditional solar PV plants without BESS in the country.

The solar energy is a type of non-conventional renewable energy source covered by the large-scale consolidated methodology ACM0002 v22.0 for Grid-connected electricity generation from renewable sources of the Clean Development Mechanism (CDM) of the United Nations

Framework Convention on Climate Change (UNFCCC). This methodology is approved by the BioCarbon Standard (BCR Standard) and falls under the activities in the energy sector as indicated in the corresponding BCR Standard guide (BCR Energy Sector Guide v1.1).

1.2 Project type

Activities in the AFOLU sector, other than REDD+	
REDD+ Activities	
Activities in the energy sector	X
Activities in the transportation sector	
Activities related to Handling and disposing of waste	

Table 2: Project type

1.3 Project scale

Large scale project activity according to the definitions and criteria established by the CDM.

2 General description of the project

The Andes Solar IV photovoltaic power plant with BESS project activity (from now on, "Andes Solar IV") is a Greenfield renewable electric power plant equipped with a Battery Energy Storage System (from now on, BESS) developed by Andes Solar IV SpA. (Legal Owner). The project consists of a new solar photovoltaic (PV) power plant with a total peak power generation installed capacity of 210 MWp.

As is described in section 1.1, the Andes Solar IV project will displace the generation of fossil fuel-based electricity from thermal power plants connected to the SEN grid, therefore generating a total of 2,002,721 tCO_2 emission reductions during a 7-year crediting period.

The project, located in the region of Antofagasta, Chile, is also equipped with BESS with a total AC power capacity of 130 MWac (for 5 hours) that will allow electricity injections to periods in which there is demand and the electricity can be transmitted through the grid. The project holder will use safe and proven solar PV technology as well as storage technology from a certified manufacturer. This will reduce the "wasted energy" condition of the power plant, increasing the electricity amount that the project plant can generate and effectively

transmit through the grid to the consumption centres. It must be noted that at the time of writing this PD, the transmission congestion problem had become increasingly relevant in Chile, due to the fact that the reinforcement of the transmission system required to deal with more distributed and fluctuating power injections from wind and solar.

The project will be connected to the National Electric System (SEN) through the "Andes" substation, contributing to Chile's sustainable development through the following:

- *SDG 13: Delivering clean and carbon-neutral electricity to the SEN grid, displacing polluting and carbon intensive fossil fuel electricity sources. The project activity will increase the penetration of intermittent renewable power generation technologies (such as wind and solar) in the country's electricity system. The higher penetration of these technologies is crucial for the country to achieve its GHG mitigation goals under the Paris Agreement. As a result, the proposed project activity will positively contribute to the country's capacity to achieve its NDCs under the Paris Agreement.*

- *SDG 7: Positively contributing to the stability of the transmission system and the quality service to the end consumers. The utilization of BESS technology will provide more flexibility to the transmission system to cope with power fluctuation derived from the operation of intermittent power producing plants such as wind and solar. This will make the system more resilient and less prone to back-outs. As in the previous case, the introduction of BESS technology will also contribute to alleviate this problem.*

- *SDG 8: Creating and spreading new local "know-how" around the new electricity storage technology (BESS) implemented in the context of big scale renewable power generation plants. This know-how will facilitate and most likely incentivize other power producers to also incorporate this technology in their new power plants, increasing the penetration rate of this technology throughout the country and the associated environmental benefits.*

Andes Solar IV SpA. seriously considers and incorporates environmental aspects into its business strategy in order to ensure the protection of natural resources and the minimization of adverse environmental impacts. The implementation of the proposed project activity is an example of this, as the project activity is clearly aligned with the national and international policies aimed at speeding up the decarbonization process of the national economy.

2.1 GHG project name

Andes Solar IV.

2.2 Objectives

Relieving the electric system from electricity congestion in the transmission system during peak generation hours from intermittent power sources such as wind and solar. Unlike conventional intermittent power generation plants (without BESS), the proposed project activity will have the capacity to manage its electricity injections by using its storage capacity. This will allow the power plant to inject electric power when there is demand and the power can be transmitted through the grid.

The introduction of BESS clearly contributes to alleviate this problem, delaying the need for transmission reinforcement projects.

2.3 Project activities

The GHG emissions within the project activity boundaries are associated to the baseline, produced from electricity generation in fossil fuel-fired power plants connected to the SEN grid.

The project activity will supply zero-emissions electricity to the grid, thus avoiding greenhouse gases emissions associated to the dispatch of fossil fuel-based thermoelectric power plants. There are no greenhouse gases emissions associated to the operation of the project activity, except for the ones under the extraordinary or emergency conditions described above.

It must be noted that when using Lithium-Ion batteries (and perhaps other battery chemistries as well) in BESS, the charge and discharge cycle does not generate any GHG emissions at all. However, Lithium-Ion batteries are sensitive to heat and in some cases prone to fires. For that reason, Lithium-Ion battery banks are normally equipped with the following systems:

a) A cooling system.

b) A fire protection system.

The cooling system consists of a ventilation system and a chiller. The chiller uses a mix of 50% Ethylene Glycol y 50% of water. Therefore, there are no GHG emissions involved in this case.

The fire protection system though, can contemplate 2 alternatives: a FM200 system or a DSPA system. The first uses Hydrofluorocarbons (HFC) to suppress fires, while the DSPA system uses a powder that is not harmful to the environment.

In the case of the proposed project activity, the DSPA system will be used, so there are no potential HFC emissions associated at all. However, according to the technology provider, even if the HFC system were used, it is a sealed system that does not require periodic HFC gas recharges. So even in this case, there would still be no HFC emissions at all, at least under normal operation conditions.

2.4 Project location

The project will be located in Chile in the Province and Region of Antofagasta, at 2,800 m above the sea level. This area is outside the city limits defined by the Municipal Regulator Plan of Antofagasta, so it is classified as a rural area. There are no communities nearby the project site area.

The approximate geographic coordinates (DMS and DD) that demarcate the project emplacement are provided in the following table:

Address and geodetic coordinates of the physical site of the Project Activity		
Physical address	**Latitude***	**Longitude***
Antofagasta Region	24° 1' 15.903" S	68° 34' 19.607" W
	-24.021084166666665	-68.57211305555555

* https://www.sirgaschile.cl/ConversionSC/Convertidor.php

Note: Geo-coordinates to presented in degree minute seconds as well in decimal place format (4 decimal places).

2.5 Additional information about the GHG Project

The Andes Solar IV photovoltaic power plant with BESS is a Greenfield solar PV power plant equipped with a battery energy storage system.

The technology used in this project is environmentally safe and sound solar photovoltaic panels sourced from a certified and respected supplier. The manufacturer will transfer to the Host Party its knowhow by means of training the power plant staff during the construction, commissioning, and operation of the project activity.

The main technical specifications of the project activity are presented in the following table:

Item	*Specifications*
Total installed capacity	*210 MWp (peak power)*
Estimated energy generation	*615 GWh/y*
Type of technology	*PV Modules: bifacial monocrystalline.*
Technical lifetime	*25 years.*
Estimated plant load factor	*52.9% (considering the BESS power generation).*
Main solar equipment	*Astro twins 525W~ 540W P type monocrystalline PV module.* *CHSM72M(DG)/F-BH Series (182). + Longi LR5-72HBD 540-545M* *Inverter model: AMPS 2x 2M2.3BWD3-3L-V850 made by GPTech.*

Table 3: Solar PV modules description

Item	*Specifications*
Total installed capacity	*130 MWac (during 5 hours)*
Batteries storage capacity	*650 MWh (130 MWh @ 5h)*
Type of technology	*Lithium-Iron-Phosphate or LFP batteries*
Technical lifetime	*20 years*
Main characteristics	*Manufacturer: Fluence Model: 500 T*

Table 4: BESS module description

The following diagram illustrates the electrical configuration of the Andes Solar IV PV power plant.

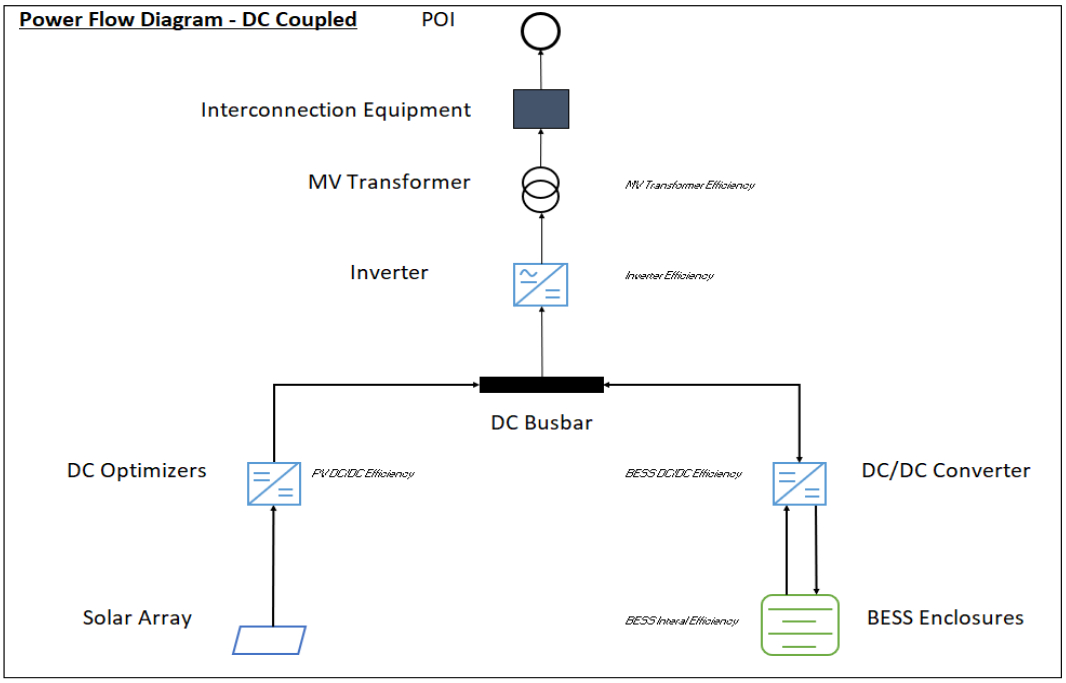

Figure 1: Electrical configuration of the Andes Solar IV PV power plant

The monitoring equipment will consist in an electricity meter that will measure the net energy from the power plant and will be located at the Andes Substation. The meters specification will comply with the current national regulations which at the present time correspond to bidirectional meters Class 02 with a 0.2% of accuracy.

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

The proposed project activity uses the approved consolidated baseline and monitoring methodology ACM0002: "Grid-connected electricity generation from renewable sources" version 22, Sectoral Scope 01: https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

This methodology also refers to the following tools:

- *Biocarbon tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY: GHG Projects generate verified carbon credits (VCC) that represent emissions reductions, avoidance, or removals that are additional.*

Version 1.0: https://biocarbonstandard.com/wp-content/uploads/Baseline_additionality_tool.pdf

- *TOOL07 "Tool to calculate the emission factor for an electricity system" Version 07.0: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf*

3.1.1 Applicability conditions of the methodology

The Project holder used the approved consolidated methodology ACM0002 version 22 to develop the Project Document (PD) due to the fact that this methodology is applicable to grid-connected renewable power generation project activities that involve the installation of a new power plant to be equipped with BESS. The project activity fulfils the applicability conditions of the methodology as follows:

Table 5: ACM0002. (Version 22.0) – Grid-connected electricity generation from renewable sources

Applicability criteria (According to section 2.2. Applicability and 2.4 Applicability of sectoral scopes)	***Project activity***
Par. 3: This methodology is applicable to grid-connected renewable energy power generation project activities that: *(a) Install a Greenfield power plant, with or without BESS.*	*The project activity considers the installation of a Greenfield solar PV power plant equipped with BESS.*
Par. 4: The methodology is applicable under the following conditions: *(a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;* *(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this*	

minimum historical reference period and the implementation of the project activity. *(c) The project activity wherein a BESS has been deployed, can either be a Greenfield installation wherein the BESS had been conceptualized along with the renewable energy generation unit or may be retrofitted into an existing setup of renewable energy project, whether or not registered with the CDM.*	
Par. 5 and Par. 6 refers to hydro power projects.	*These conditions do not apply since the proposed project activity considers the installation of a solar PV power plant.*
Par. 7: The methodology is not applicable to: *(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;* *(b) Biomass fired power plants/units.*	*The proposed project activity does not involve switching from fossil fuels to renewable energy sources or the use of biomass, so this criteria does not apply.*
Par. 8: In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	*This condition does not apply in this case since the proposed project activity does not consider a retrofit, replacement or capacity addition to an existing plant.*
Par. 9: In addition, the applicability conditions included in the tools referred to below apply.	*The following tables below analyze the corresponding applicability of the tools cited in methodology ACM0002.*
Par. 11: For validation and verification of CDM projects and programmes of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 01 is mandatory.	*The proposed project activity corresponds to sectoral scope 01: Energy industries (renewable/non-renewable sources). So, this applicability criterion applies.*

Table 6: Biocarbon tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY: GHG Projects generate verified carbon credits (VCC) that represent emissions reductions, avoidance, or removals that are additional. Version 1.0

Applicability criteria (According to section 4. Scope)	***Project activity***
Par. 2: The tool is applicable across all sectors covered by the Program, including but not limited to: (a) Agriculture, Forestry, and Other Land Use (AFOLU); (b) Energy generation and efficiency; (c) Transport systems; (d) Waste management and disposal.	*The Project holder will use the Biocarbon Additionality Tool-version 1.0 to demonstrate the additionality of the proposed project activity.*
Par. 6: The BIOCARBON STANDARD does not maintain positive lists of eligible project types for the purposes of additionality assessment. All project activities are subject to individualized evaluation under this tool. This approach ensures that eligibility is not assumed by default and that all mitigation outcomes are assessed against rigorous additionality criteria in accordance with high-integrity crediting principles.	

Table 7: TOOL07 (Version 07.0): Tool to calculate the emission factor for an electricity system

Applicability criteria (According to section 2.2. Scopes and applicability)	***Project activity***
Par. 3: This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	*The project activity uses this TOOL07 (Version 07.0) to calculate the emission factor for the electricity system, as it will be shown further on this PDD (section B6).*
Par. 4: Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include offgrid power plants. In the latter case, two sub-options under the step 2 of	*The proposed project activity only considers grid-connected power plants for the calculation of the OM and the BM.*

the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
Par. 5: In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	*Chile is the host country of the proposed project activity and the electricity system where the project is connected is not located partially or totally in an Annex I country.*
Par. 6: Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	*The OM and BM calculation used to calculate the GHG emission reductions of the proposed project activity considers a zero CO_2 emission factor for biofuels.*

3.1.2 Methodology deviations (if applicable)

Due to commitments made prior to the registration of the project activity, during the monitoring periods in which the project will issue carbon credits under the BioCarbon Standard, the proposed project activity will also issue IRECs[1] with a fraction of the generated energy. To avoid any form of double-counting of the GHG emission reductions associated with the renewable electricity generated by the project activity, a methodology deviation is required.

[1] International Renewable Energy Certificate. An Energy Attribute Certificate (EAC) that proves and tracks a unit of electricity produced from renewable sources.

The methodology deviation is straightforward and simple, since it only consists in subtracting the total amount of IRECs generated (MWhs destined to IRECs) from the net electricity generated by the project plant during the monitored period. This is because one IREC is equivalent to 1 MWh generated by the project plant.

Since the project involves installing a Greenfield power plant that will generate IRECs and carbon credits during the same monitoring period, equation N°12 of the ACM0002 version 22.0 baseline methodology must be modified to account for IREC generation.

$$EG_{PJ,y} = (EG_{facility,y} - EG_{IRECs,y}) \qquad \text{Equation (1)}$$

Where:

$EG_{PJ,y}$	=	*Quantity of net electricity generation that is produced and supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).*
$EG_{facility,y}$	=	*Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).*
$EG_{IRECs,y}$	=	*Quantity of net electricity generation supplied by the project plant/unit to the grid used in the generation of IRECs in year y (MWh/yr).*

3.2 Project boundaries, sources and GHGs

3.2.1 Spatial limits of the project

Regarding the spatial limits of the project, ACM0002 version 22.0 states the following:

"The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to."

Considering that the project activity is located in the Antofagasta region, the renewable electricity generation is going to be delivered to the SEN grid as it is shown in the figure below.

Figure 2: National Electric System in Chile (SEN), North zone.

Figure 3: National Electric System in Chile (SEN), Central and South zone

3.2.2 *Carbon reservoirs and GHG sources*

The emissions sources included in or excluded from the project boundary are:

Source or reservoir	GHG	Included (Yes/No/Optional)	Justification
Baseline: CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source.
	CH_4	No	Minor emission source.
	N_2O	No	Minor emission source.
Baseline: CO_2 emission from incremental electricity delivery to the grid by BESS installation in case of retrofit.	CO_2	Yes	Main emission source.
	CH_4	No	Minor emission source.
	N_2O	No	Minor emission source.
Project Emissions: Extraordinary or emergency charging of BESS (e.g. in case of deep discharge) using electricity from the grid.	CO_2	Yes	It can be a relevant emission source in emergency situations in which the BESS is charged using grid electricity. This may happen in cases of deep BESS discharge condition or in cases of exceptional operational circumstances dictated by the Central Dispatch System authority, under which the charge of the battery storage system of a renewable power plant is required in order to safeguard the safety and service quality of the grid system.
	CH_4	No	Minor emission source.
	N_2O	No	Minor emission source.

3.2.3 Time limits and analysis periods

3.2.3.1 Project start date

According to the definitions established in section 11.4 of the BCR Standard, projects can only be certified and registered with the BCR Program if the start date is within three years prior to the start of validation. Section 11.4 also defines the start date of a GHG Project as the date when activities that result in actual GHG emission reductions or removals begin. For projects in the energy sector This includes will be the initiation of operational activities directly linked to the mitigation outcome.

The start date of Andes Solar IV corresponds to the date on which the national electricity coordinator (CEN) authorizes the plant's operation in the national electricity system (SEN): 30/09/2024[2].

3.2.3.2 Quantification period of GHG emission reductions/removals

According to the definitions established in section 11.5 of the BCR Standard, the project length will be 21 years. Regarding the quantification periods, there will be 7-year periods that will be renewed a total of 2 times over the duration of the project.

3.2.3.3 Monitoring periods

The monitoring periods shall be conducted at least every two years.

3.3 Identification and description of the baseline or reference scenario

As per paragraph 27 of ACM0002 v22.0, if the project activity is the installation of a Greenfield power plant, the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (TOOL07 v7.0). These calculations are shown in detail in section 3.7.3 (GHG emissions reduction/removal in the baseline scenario).

The proposed project activity will replace the energy generated by fossil fuel power plants operating in the SEN grid. The list of power plants that are operating in the SEN grid along with the energy source that they use is publicly available in the "Coordinador Eléctrico

[2] COD_ASIV.pdf

Nacional" (CEN) official web page. The CEN is the central dispatch center of the SEN grid. (https://infotecnica.coordinador.cl/instalaciones/unidades-generadoras).

3.4 Additionality

In this case, the project proponent will use Biocarbon tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY: GHG Projects generate verified carbon credits (VCC) that represent emissions reductions, avoidance, or removals that are additional. Version 1. to demonstrate the additionality of the proposed project activity.

Prior Consideration of the project

The following table provides evidence of the prior consideration in accordance with applicable provisions related to the project standard.

Dates	*Milestones*
July 30th, 2020	*Environmental approval of Parque Andes Solar with BESS (Resolution N°183) phase III and IV.*
June, 2021	*1st financial analysis of the Project.*
October 5th, 2021	*The project proponent sent the "Prior Consideration" form to the CDM Secretariat[14] and the Chilean DNA.*
December 6th, 2021	*The Project holder signs the service contract with StratCarbon to develop the baseline methodology and register the proposed project under the GCC.*
July 22nd, 2022	*Upgrade to the financial analysis of the Project: Revision of the solar panel's degradation factor (Enertis report).*
August 31st, 2022	*Signature of the procurement contract of the BOP of the Andes Solar IV power plant.*
November 1st, 2022	*Project construction starting date.*

Table 8: Meaning milestones of the Project Activity

According to the information provided in the table above, the "Prior Consideration" notification was sent before the decision date of the project activity. Therefore, the Project Holder fully complies with the requirement of early consideration in the case of the proposed project activity.

Step 1: Identification of Alternatives Scenarios

There are many realistic and credible alternatives to the proposed project activity that fully comply with the current regulations that are relevant and applicable in this case.

Sub-Step 1.a. Define alternatives to the project activity.

The project activity consists in the installation of a new grid-connected photovoltaic power plant equipped with BESS that will generate clean and carbon-free power to the SEN grid. There are several alternatives to the proposed project activity, which are presented below:

1. The same photovoltaic power plant without BESS.

2. A wind farm with the same capacity as the one of the proposed project activity without BESS.

3. Other conventional power generation units, such as hydro and thermoelectric power plants.

4. The same photovoltaic power plant with BESS but not registered under a GHG program.

Sub-step 1b: Consistency with mandatory laws and regulations.

At present, the short-term power prices in the SEN system are determined by the National Energy Commission (CNE). This is accomplished by simulating the operation of the system considering the deployment of all viable power generation technologies in an optimum way during a timeframe of 10 years. The most recent version of this report: "FIJACIÓN DE PRECIOS DE NUDO DE CORTO PLAZO SEGUNDO SEMESTRE 2025, INFORME TÉCNICO DEFINITIVO, JULIO 2025, the national authority considered all the power generation technologies mentioned above to determine the short- term power prices in the system[3]. Therefore, all the identified alternatives to the project activity are viable options for the

[3] Reference: ITD-PNCP-Julio-2025.pdf. See section 2.6.2, Table 20 of the report, in which the national authority clearly considers all power generation technologies mentioned in this section to elaborate the indicative power generation expansion plan for the next 10 years. This report is also available at: https://www.cne.cl/en/tarificacion/electrica/.

future development of the power generation system, and therefore fully comply with Chile's current outstanding laws and regulations.

Step 2: Barrier analysis

Through this analysis, the Project holder will identify and assess barriers that prevent the implementation of the proposed project activity, but do not prevent the implementation of the other identified project alternatives in Chile. To carry out this analysis, the Project holder will take into consideration the guidelines and recommendations of the latest version of the Biocarbon tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY, available on the Bicarbon website.

Sub-step 2a: Identify relevant barriers

The following barriers are related to BESS-equipped variable renewable power plants, such as wind and solar. Therefore, these barriers would prevent the implementation of the proposed project activity in Chile if it was not registered as an emissions reduction project activity.

1. Regulatory barriers:

Uncertainty on power price arbitrage income: Currently, the Chilean regulation does allow power plants equipped with BESS to arbitrage on power prices. That means charging the BESS in times when the marginal cost in the system is low and discharging it when the marginal cost in the system is high. However, in practice, the owners of BESS-equipped power plants can only use the expected marginal costs from the programmed system operation to charge and discharge the BESS. According to the "Sistema Eléctrico Nacional" (SEN) coordination and operation rules[4], it is the Central Dispatch Center (CEN) the entity in charge of actually operating the system in real time at minimum cost. This means that the instructions of charging and discharging the storage system of a BESS-equipped power plant will be subject to contingencies in the system (i.e. power plants failures, unplanned maintenances, whether conditions, etc.). These contingencies will most likely cause deviations in the marginal costs from the original values in the programmed operation. As a

[4] Article 112 of "Decreto 125 aprueba reglamento de la coordinación y operación del sistema eléctrico nacional",
published on December 20th, 2019, by the Ministry of Energy. Available at: https://www.bcn.cl/portal/.

result, the information of the real operation of the system will only be known ex-post by the power generators in the system. This impossibility of operating the BESS in real time prevents BESS-equipped project owners to estimate the expected income of power arbitrage accurately and reliably.

As previously mentioned, BESS technology is new in the country, so there is no previous operational data available that could be used to perform a probabilistic analysis in order to reliably estimate the historical discrepancy between the arbitrage income based on planned operational data versus the one based on real operational data in the SEN system. In the short term, it is necessary to improve the programming processes of the National Electric Coordinator ("Coordinador eléctrico nacional") with a view to programming in real time to improve the arbitration process, as well as to improve the frequency in the calculations made by the Coordinator. In the long term, it may be necessary to migrate to a market regime that allows BESS to make dynamic offers that allow them to maximize their benefits. These aspects have been recognized by the regulator in the report "Public-private dialogue workshop: short term market" issued in January 2023[5].

Uncertainty on power income: In Chile, the total income of an electric power generation plant is comprised of the following components: Energy income (60% to 70%), Power Sufficiency income (10% to 20%) and Ancillary Services (the rest). Currently, there is ongoing a complete reformulation of the Power Sufficiency income. The reason is that the regulation does not contemplate a mechanism that allows determining the capacity contribution of a BESS equipment, with which the Electrical National Coordinator must adapt the existing methodology for hydroelectric plants to assimilate it to a BESS equipment. In this way, with the current mechanism, it is possible that the power contribution of a BESS has a negative impact with respect to its real contribution to the system, which should not be conditioned to the contribution for 5 hours as the current regulation established (DS N°62)[6].

[5] Available at: https://www.cne.cl/wp-content/uploads/2023/01/2023.01-Informe-Mesa-Mercado-Corto-Plazo.pdf.

[6] "Decreto 62 Aprueba reglamento de transferencias de potencia entre empresas generadoras establecidas en la Ley General de Servicios Eléctricos" Available at: https://www.bcn.cl/leychile/navegar?idNorma=250604&idParte=8662573&idVersion=2020-12-26. "Norma Técnica de transferencias de potencia entre empresas generadoras". Available at: https://www.cne.cl/en/normativas/electrica/normas-tecnicas/.

In this regard, the Ministry of Energy acknowledges in a presentation made in January 2023[7] that storage systems require a regulatory adaptation to recognize the contribution of systems of less than 5 hours.

The official study "Estrategia de flexibilidad para el sistema eléctrico nacional el camino para un sistema eléctrico sostenible" issued on September 2020 by the Ministry of Energy[8] explicitly identifies the lack of recognition in Power Sufficiency contribution to the system of BESS-equipped power generation plants (different from hydro plants), as a regulatory barrier for these kinds of plants in the country. Considering that this regulation is currently under review in order to change this situation, at present it is not possible to reliably estimate this income component in the case of a variable renewable power generation plant equipped with BESS in Chile.

Uncertainty on ancillary services income: The ancillary services are another source of revenue for power generation plants. Currently, these services are segmented in ancillary services related to frequency and voltage levels. According to the current regulation, BESS owners can participate in both markets. In the case of frequency services, the market is subdivided again in fast frequency control (within seconds), secondary frequency control (within minutes) and tertiary frequency control (within hours). BESS technology is suitable for the first service category and in some cases, the second service category. To participate in these markets, the Dispatch Center Authority has to organize a bidding process. However, the current regulation does not allow service providers to include in their offers the opportunity costs involved in providing the service by ceasing to participate in the energy market. The regulation establishes that the coordinator must compensate these costs ex-post, which constitutes a high risk for the BESS systems of having a negative impact on their general balance of energy plus ancillary services, which implies a significant disincentive to present these services.

In addition to the above, the regulation for ancillary services has been constantly subject to modifications, which makes it very difficult –if not impossible- to reliably translate these services into a predictable and significant income for BESS owners in the system (i.e., whether the BESS operates individually in the system or associated to a power plant). The

[7] Mesa de Diálogo Público – Privado Supuestos de aplicación temporal de la nueva reglamentación de transferencias de potencia https://energia.gob.cl/sites/default/files/pptsesioncierremesapotencia20_1_2022_version_final_v3.pdf

[8] Available at: https://www.energia.gob.cl/sites/default/files/estrategia_de_flexibilidad.pdf.

regulatory changes as well as the absence of bidding processes for fast frequency control services can be seen in Resolution 443 from the National Energy Commission, dated November 23, 2020[9].

In summary, though the current regulation does allow for BESS owners to participate in all the available electric power markets, the regulation is not mature enough to provide enough certainty to the potential investors in order to confidently implement this technology more widely. This is ratified by the current extremely low penetration of the BESS technology in the country, even considering the high penetration that wind and solar generation technologies have had in the last years. Both generation technologies could clearly benefit from electric power storage systems. As a result, and according to the current applicable CDM guidelines for barrier assessment, it is possible to conclude that BESS equipped power plants do face regulatory barriers in Chile.

2. Risk of technological failure:

In this case such risks are related to occurrence of fires in lithium-ion BESS equipment. According to the technical document "Battery Energy Storage Systems (BESS), using Li-Ion batteries" by Allianz Global Corporate & Specialty[10], at present, there are no formal guidelines for the protection of BESS. The knowledge gaps include the following:

- *No public fire test data demonstrating fire behavior.*
- *Limited public fire test data related to large format batteries.*
- *Limited incident data on large-scale (grid size).*
- *Methods of thermal runaway protection.*
- *Post-fire incident response and recovery procedures.*

The loss experience involving lithium-ion BESS is limited, but these units have been involved in several fires since 2012. The following table shows some of these cases:

[9] Available at: https://www.cne.cl/wp-content/uploads/2020/11/Res.-Exta.-N%C2%B0443_Valores-M%C3%A1ximos- SSCC_23-11-2020.pdf.

[10] Allianz Global Corporate & Specialty (AGCS) (https://www.agcs.allianz.com/about-us/about-agcs.html) is a leading global corporate insurance carrier and a key business unit of Allianz Group. The technical document is available at: https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/pdfs-risk-advisory/tech-talks/ARC-Tech-Talk- Vol-26-BESS.pdf.

Fire incidents associated to BESS	*Incident description*
1. Kahuku, Hawaii wind farm (2012)	*10 MW battery system used to store electricity from 12 wind turbines (a total of 30 MW). Two fires occurred during 2011 in the power inverters. However, on August 3, 2012, a fire started at the wind farm during the night. The fire department notification was delayed for more than seven hours after the fire began. They used dry chemical to try to extinguish the fire but failed. Firefighters faced thick smoke, toxic fumes, and other hazards. The loss amount is estimated to be between $10 and $30 million.*
2. Flagstaff, Arizona solar plant (2012)	*A 1.5 MW containerized BESS system, part of a solar energy system. The BESS used lithium-ion batteries. A fire started on November 26, 2012, and caused significant damage to the $3 million installation. The fire did not affect the nearby substation. The exact cause of the fire is not known.*
3. Frankling, Wisconsin, BESS under construction (2016)	*The BESS was under construction at the time and utilized lithium-ion batteries. The fire started in one of the battery manufacturer's DC power and control compartments, not the batteries themselves. The fire department arrived quickly on the scene and controlled the fire by an initial application of alcohol-resistant, aqueous film forming foam and 500 gpm hose streams. A fire suppression system had been installed in the BESS but was not fully functional at the time of the fire. Damage estimates are between $3 and $4 million.*
4. Drogenbos, Belguim 1 MW BESS containerized system (2017)	*On November 11, 2017, a fire started in one of the containers associated with the 1 MW BESS located in Drogenbos, Belgium. The firefighters arrived quickly and rapidly extinguished the fire, preventing spread to the adjacent containers. The French multinational utility ENGIE, was in the process of commissioning the lithium- ion battery system at the time of the fire. The BESS was equipped with a fire detection and extinguishing system, but it failed to contain the fire. The cause of the fire is not known at this time.*

Table 9: Source: "Battery Energy Storage Systems (BESS), using Li-Ion batteries" by Allianz Global Corporate & Specialty.

Though these examples are merely anecdotal, they have involved big multinational power companies and clearly show that in some cases, the potential economic loss can be significant[11].

At present, the hazards associated with BESS are not fully known or understood, but based on existing loss experience, there appears to be three different causes of a fire event:

a) Thermal event: External heating associated with a failure of the ventilation system or improper design.

b) Electrical event: Internal short circuit due to internal cell defects, overvoltage charging or a defect on internal resistance.

c) Mechanical failures: Physical damage to a cell which may have occurred during the manufacturing or installation process, as well as damage caused by vibration or expansion.

These events can lead to thermal runaway, which is a chain reaction leading to a decomposition reaction of the cell that spreads to adjacent cells. Once thermal runway starts, it is difficult to stop. The main consequences are:

1. Exothermic reaction with heat release.

2. Release of flammable and toxic gases, such as carbon monoxide (CO), hydrogen chloride (HCL), hydrogen fluoride (HF), hydrogen cyanide (HCN), benzene and toluene. The gases are generated within the cell enclosure before venting.

3. Intense fire due to the fact that the cells are constructed primarily of plastic. It is important to note that re-ignition can occur long after the fire is fully extinguished.

Even when the fire is extinguished, stranded electrical energy is observed. It is a unique hazard that can make an incident unsafe for long periods of time (from hours and days to weeks). Thermal runaway can cause re-ignition long after the fire is fully extinguished. Re-ignition always involves an external electrical, thermal, or mechanical stimulus, which is the

[11] A recent article that addresses risks posed by fires to the newly born Lithium-ion battery storage industry worldwide can be found here: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/burning- concern-energy-storage-industry-battles-battery-fires-51900636

cause of the thermal runaway. Based on loss history, the batteries do not reignite on their own once they are properly cooled. This is why it is important to understand the differences between cooling and extinguishing.

As previously mentioned, and considering the early stages of the BESS technology deployment worldwide, there is insufficient data to effectively deal with the potential hazards associated to the use of the lithium-ion BESS technology and reliably translate these risks into an expected cost item. For that reason, the fire risk associated to the use of BESS technology clearly represents a barrier that would prevent the implementation of the proposed project activity.

Ways in which BioCarbon registry would alleviate the identified barriers:

Outcome of Sub-step 2a
As can be seen, the identified barriers clearly prevent the use of BESS technology in the context of renewable power plants (i.e., the proposed project activity) but pose no difficulties for conventional power generation plants in Chile.

Sub-step 2b: Demonstrate barrier prevents project activity

Since the identified barriers are strictly related to the use of BESS technology, it is very clear that they would not prevent the implementation of any of the alternative projects, since none of them consider the use of electric power storage technologies and more specifically, the use of lithium BESS technology.

In order to demonstrate the relevance of the identified barriers related to the use of the BESS technology in Chile, the following table shows the total installed capacity of this technology compared to the other power generation technologies currently used in the country:

Total installed power capacity in Chile (February 2023)

Power generation technologies	Net power (MW)	Net power (%)
Non-conventional technologies	11,912	38.1%
Biogas	60	0.2%
Biomass	430	1.4%
Wind	3,824	12.2%
Geothermal	83	0.3%
Mini-hydro run-of-the-river	539	1.7%
Solar PV	6,868	22.0%
Thermo-solar	108	0.3%
Conventional hydro	6,733	21.5%
Full-scale reservoir hydro	3,357	10.7%
Full-scale run-of-the-river hydro	3,376	10.8%
Thermal power generation	12,562	40.2%
Coal	4,503	14.4%
Cogeneration	18	0.1%
Fuel Oil N° 6	44	0.1%
Natural gas	3,869	12.4%
Diesel	4,092	13.1%
Propane gas	14	0.0%
Petcoke	21	0.1%
Storage technologies	64	0.2%
BESS	64	0.2%
Total	31,271	100.0%

Notes: Includes the SEN, Aysén, Magallanes, Los Lagos and Easter Island grid systems.

Sources: "Reporte capacidad instalada Generación", CNE. February 2023. Available at: https://www.cne.cl/normativas/electrica/consulta-publica/electricidad/ "Estadísticas Sector de Generación de Energía Eléctrica Renovable" Table 4. February 2023. Acera. http://acera.cl/wp-content/uploads/2023/03/2023-02-Boletin-Estadisticas-ACERA.pdf

As can be seen, the use of BESS technology in Chile was extremely marginal at the project activity decision date (i.e., less than 1%). This confirms the fact that this technology has still not reached maturity, which explains the little information available worldwide about its commercial application in the context of full-scale power generation plants.

Sub-step 2c: Demonstrate Alternatives are not prevented

Alternative scenario from step 1	*Justification of differential barrier impact*	*Evidence for each scenario analyzed.*
1. The same photovoltaic power plant without BESS.	*During the last 10 years, the penetration of conventional solar-photovoltaic electricity generation technology has shown a steep increase in the country. As a result, solar-photovoltaic power generation technology accounts for more than 10% of the total installed capacity in the SEN grid.*	*Considering the extremely low penetration of BESS-equipped solar-photovoltaic technology currently observed in the country, it is very likely that a conventional solar-photovoltaic power plant would be economically more attractive than the proposed project activity, which incorporates the utilization of power storage technology.*
2. A wind farm with the same capacity as the one of the proposed project activity without BESS.	*Similar to the solar-photovoltaic power generation technology, the wind power generation technology shows the second highest growth rate in Chile.*	*This project option would also be a viable and credible alternative to the proposed project activity.*
3. Other conventional power generation units, such as hydro and thermoelectric power plants	*- Hydroelectric plants emit no direct CO_2, so they remain exempt from GHG standards as long as those rules only target emitting sources.* *- Thermoelectric plants (gas or coal) has to pay the*	*These plants continue with traditional generation permits and environmental impact assessments without the additional Monitoring, Reporting, and Verification (MRV)*

	carbon tax in force since 2017, but they don't need to register reduction projects under the new regime until the ETS or performance standards become fully operational.	*protocols required by the GHG program.*
4. the same photovoltaic power plant with BESS but not registered under a GHG program.	*Choosing not to register a photovoltaic plant with battery storage under GHG standards allows you to:* *• Avoid defining an emissions baseline or certifying reductions.* *• Operate under current rules of the National Energy Commission and SEIA, speeding up approvals and lowering administrative costs.* *• Maintain dispatch and energy sales flexibility in the spot market or bilateral contracts without emission-quota constraints.*	*Until the decision date, There is no exist a project similar to the project activity. In addition, a registered project must develop specific verification protocols, submit periodic reports, and meet offset or credit-sale milestones—burdens that can delay commissioning and increase operating costs.*

Sub-step 2d: Demonstrate carbon credit revenues are decisive

The BioCarbon registry would significantly contribute to alleviate each of the identified barriers to a level in which the proposed project activity is not prevented anymore:

• The expected revenues (or avoided taxes) from the BioCarbon registry are significant when put into relation with the risk(s) caused by the barrier(s) and/or total cost of the project.

- *The registration of the proposed project activity in the BioCarbon registry would allow the Project holder to compensate its own GHG emissions currently subject to the Green Tax, through the Green Tax Compensation System. This would demonstrate climate change proactivity since it would most likely be the first company in Chile to participate in the compensation system with a new type of GHG emission reduction project. It will showcase the company's initiative to spearhead the development of a new version of the baseline methodology applicable to renewable power generation projects, which will facilitate an increased penetration of intermittent power generation technologies (i.e., wind and solar-photovoltaic), which is absolutely key for the country to reach its climate mitigation goals (NDCs) in 2030. Furthermore, the possibility of using certified GHG emission reductions locally will positively contribute to the national mitigation goals (NDCs). All of this will significantly improve the Project holder's climate and environmental reputation, which has become increasingly relevant over the last years.*

Outcome of Step 2
Since Sub-step 2a, Sub-step 2b, Sub-step 2c and Sub-step 2d are fully satisfied, the Project Holder will proceed voluntarily with Step 3 and mandatory Step 4.

Step 3: Investment analysis

The investment analysis in this section will show that the proposed project activity is clearly not the most financially attractive option for a new power generation project in Chile. To carry out this analysis, the Project holder will consider the latest version of the Biocarbon tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY Version 1.0, available on the Biocarbon website.

Eligible Analysis Options.

Since the proposed project activity and the alternatives identified in Step 1 generate financial or economic benefits other than Biocarbon related income, the Project holder will use the benchmark analysis (Option 2) to carry out the financial analysis in this case.

Selection of Financial Indicator

The Project holder will use the project IRR, or Internal Rate of Return, as the most suitable economical/financial indicator, since the project will be considered as financially attractive

when this IRR is better than the Benchmark IRR. The IRR will correspond to the post-tax IRR, since it includes all input and output cash flows.

For simplicity, the Benchmark IRR will be chosen from the Appendix of TOOL27 Version 11[12], available at the project activity decision date and applicable to Energy Industries (Group 1). The Benchmark available for projects located in Chile corresponds to 7.08%, expressed in real terms.

Since the Investment Analysis will be carried in nominal terms, the Benchmark must be corrected by adding Chile's projected inflation rate. According to the latest inflation forecast by the host country's Central Bank[13], the projected annual inflation rate for the next years is estimated at 3.0%. Therefore, the corrected Benchmark that will be considered in this analysis is shown in the following table:

	Benchmark IRR (%)
Benchmark IRR in real terms	*9,29%*
Projected inflation rate[14]	*3.0%*
Benchmark IRR corrected for inflation	*12.29%*

[12] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v11.0.pdf
[13] Please see file "IPoM Junio 2025.pdf", available also at: https://www.bcentral.cl/documents/33528/7321693/IPoM+Junio+2025.pdf/baeda29a-1131-6d9e-4b2b-f1a2509eec5f?t=1750353170508
[14] Banco Central de Chile projections. "IPoM Junio 2025.pdf".

Sub-step 3a: Calculate Financial Indicator

The project's investment analysis (free cash flow calculation) was developed by the Project holder and considers the following key parameters and assumptions:

Key parameters	Input value	(Units)	Supporting information
Electricity generation	615,056	(MWh/yr)	PVSYST report for the Andes site. Annual average (30 years) considering a degradation factor of 0.43% for the solar panels.
Average energy price (nominal)	53.86	(US$/MWh)	Company´s internal projections.
Average sufficiency capacity recognized	85	(MWyr)	Company´s internal projections.
Average sufficiency capacity price (nominal)	11.15	(US$/KW-month)	Chilean National Energy Commission (Comisión Nacional de Energía, Fijación de Precios de Nudo de Corto Plazo).
Annual income	43,953,000	(US$/yr)	Calculated based on energy generation, sufficiency capacity, and energy and capacity prices.
Total investment	307,200,000	US$	Internal assumption based on estimated unitary prices for main equipment and other components.
Average Annual Operational Costs[15]	10,333,000	(US$/yr)	Internal assumption, based on estimated O&M costs for BESS equipment, PV panels maintenance, among others.
Evaluation horizon	30	(yrs)	
Income taxes	27.0	(%)	Chilean tax authority.
IRR without ACCs sales	7.58	(%)	

Table 10: Andes Solar IV key parameters evaluation data

[15] Average Annual Operational Costs includes O&M costs, insurances, administration, taxes, contingences, tolls, etc.

The project activity's post-tax project IRR (without the VCC income) is 7.58%. This value is significantly below the selected Benchmark of 12.29%, and, even if the benchmark of the last version of the TOOL27 it would be use (version 14.0, Real term Benchmark for Chile equal to 7.08%, Corrected for inflation rate Benchmark equal to 10.08%) the IRR is still below the selected Benchmark. This indicates that the project activity itself is not sufficiently attractive from an economic standpoint to happen without the aid of the Biocarbon registry.

The economic benefits associated to the registration of the proposed project activity under the CDM would positively contribute its economic feasibility, as well as report significant benefits to the Project holder's environmental reputation in the host country. Considering the novelty of these types of projects (i.e. with BESS), it would clearly position the Project holder as a front-runner in the implementation of new GHG mitigation technologies in the region.

Sub-step 3b: Sensitivity Analysis

The sensitivity analysis is required in order to show whether the conclusion regarding financial/economic attractiveness of the proposed project is robust to reasonable variations in the critical parameters and/or assumptions that represent a material influence on the financial outcome. In this case, the following parameters are considered for the sensitivity analysis:

- *Project Investment. (Static total investment).*
- *Operational and Maintenance Costs (O&M Cost).*
- *Annual supplied electricity (Generation).*
- *Energy Sale Price / Revenues (Spot price).*

According to Biocarbon Tool: IDENTIFICATION OF A BASELINE SCENARIO AND DEMONSTRATION OF ADDITIONALITY-version 1.0, the sensitivity analysis should at least cover a variation of ±10% in each of the selected parameters, unless such variation is not deemed appropriate in the context of the specific project circumstances.

The following table shows the results of the sensitivity analysis of the investment analysis carried out in this section:

	IRR with variation in key parameters					Required variations to reach the Benchmark
	-10%	-5%	0%	5%	10%	
Project Investment	8.52%	8.03%	7.58%	7.16%	6.77%	-37.22%
Operational and Maintenance Costs (O&M Cost	7.85%	7.71%	7.58%	7.44%	7.31%	< -100%
Annual supplied electricity	6.71%	7.15%	7.58%	8.00%	8.41%	60.96%
Energy and capacity sale price (revenues)	6.41%	7.00%	7.58%	8.14%	8.69%	45.60%

Table 11: Andes Solar IV sensitivity analysis results

As can be clearly seen from the table above, no reasonable variations of the considered parameters make the project's calculated IRR surpass the Benchmark. More so, the table shows that in order to reach the Benchmark, the variations of the considered parameters would be so extreme, that in practical terms it would be nearly impossible for the proposed project to reach the Benchmark. Next paragraphs explain variations to reach benchmark and why it is unlikely that these variations occur.

Annual supply energy: *This parameter would need to be 60.95% higher than projected for the IRR to reach the benchmark. This is very unlikely since the projected energy generation is based on the installed capacity and the geographic solar radiation index. Also, the estimated net output of electricity for the project activity is 606,705 megawatt-hours (MWh) per year, which is assumed as an initial average value since it is considered an annual degradation of 0.43% for the solar panels.*

Energy and capacity sale base price: *This parameter would need to be 45.59% higher than projected for the IRR to reach the benchmark. Energy base prices are estimated by the National Energy Commission (CNE, Spanish acronym) through a modelling system which allows the detailed representation of the transmission system and considers the incorporation of the total, existing and future, generation units. Capacity base prices are estimated by the National Energy Commission from the cost of extending the installed capacity of gas turbines with size and characteristics appropriate to the SEN. Since capacity base prices are small, they have little influence on overall project economics and would need a decrease over 100%, which is very unlikely to happen. Therefore, an increase over 45.59% is not expected in the following years. In fact, over time, the price of energy has continuously decreased*[16] *due to many reasons, such as the decrease in the costs of wind and solar technologies.*

Project Investment: *The investment costs would need to be reduced by 37.22% for the IRR to reach the benchmark. The main project investment costs were already identified based on the arrangements that the project proponent has made with the technology providers, the permits & rights to be paid, technical consultants, the insurances, and the engineering budget. Therefore, a reduction of 37.22% of the investment costs is not possible.*

Operation & Maintenance cost: *The O&M costs would need to be decreased more than 100% for the IRR to reach the benchmark. The importance of this cost component is*

[16] See: "Reporte-Anual-2020_Generadoras-Chile.pdf."

particularly high for base-load units, such as the project activity since they are intended to be run at close to full capacity as much of the time as possible. Hence proper maintenance of all facilities is crucial to ensure a high availability plant factor. Therefore, a reduction of more than 100% of the investment costs is not possible. It is concluded that the sensitivity analysis does not affect the project additionality.

Outcome of step 3
As can be seen from the analysis performed above, the proposed project activity does not present a sufficiently attractive financial performance, so that it would happen without the aid of the GCC. Considering the results of the sensitivity analysis, this result is fairly robust, therefore it can be concluded that the proposed project activity can be considered additional from a financial perspective.

Step 4. Common Practice Analysis

According to the Biocarbon additionality tool version 1.0, the common practice analysis allows us to assess the extent to which the proposed project activity has already diffused in the relevant sector and region. To do so the mentioned Tool identify and discuss the existing common practice through the following sub-steps.

Sub-step 4a: Define the applicable measure and scope of comparison

According to Biocarbon Additionality Tool, it is mandatory to provide some definitions that must be established in the case of the proposed project activity:

a) Applicable geographical region: As suggested by the tool 07, the applicable geographical region would be the entire host country: Chile.

b) Measure: The proposed GHG emission reduction project activity corresponds to a switch of technology with change of energy source (measure type defined in paragraph 10 b) of TOOL24: Common practice Analysis): power generation based on renewable (solar) energy source (i.e. instead of conventional power generation based on fossil fuels sources).

c) Output: The output corresponds to electric power delivered to the SEN grid.

d) Different technologies: In this case, the Project holder will use criteria e) "Other features, inter alia; Nature of the investment" to establish relevant technological differences

from other comparable solar-photovoltaic power plants located in Chile. In particular, the Project holder will outline the lithium-ion based BESS technology, which clearly distinguishes the proposed project activity from other conventional solar-photovoltaic power plants.

According to the definitions above the common practice analysis is carried out through the following considerations:

Consideration 1-Relevant capacity range: Since the project activity's capacity is 210 MW, the capacity range of other similar power plant between (-50%, +50%), then, the relevant capacity range is 105 MW to 315 MW.

Consideration 2-Identification of similar projects to the proposed project activity: Similar projects to the proposed project activity correspond to other solar-photovoltaic project connected to the SEN system. In this case, all the selected projects started commercial operation before the start date of the proposed project activity (in this case, this is the earliest date). As per the official information of the SEN Dispatch Center (Coordinador Eléctrico Nacional), there are currently 18 power plants operating in the relevant geographical region, within the power range calculated in the previous consideration.

Power plants	*Capacity (MW)*	*Main technological characteristics*
Proposed project activity: Andes Solar IV	***210***	***Lithium-ion BESS, with tracking system, monocrystalline PV panels.***
1. PFV LUZ DEL NORTE	*141*	*No BESS, with tracking system, thin-film PV panels.*
2. PFV FINIS TERRAE	*138*	*No BESS, with tracking system, policrystalline PV panels.*
3. PFV EL ROMERO	*196*	*No BESS, no tracking system, policrystalline PV panels.*
4. PFV EL PELÍCANO	*108*	*No BESS, no tracking system, policrystalline PV panels.*
5. PFV BOLERO	*138*	*No BESS, with tracking system.*
6. PFV GRANJA SOLAR	*105*	*No BESS, with tracking system, policrystalline PV panels.*
7. PFV SANTA ISABEL	*170*	*No BESS, with tracking system.*
8. PFV ATACAMA SOLAR II	*171*	*No BESS, with tracking system, monocrystalline PV panels.*
9. PFV SAN PEDRO	*105*	*No BESS, tracking system, bifacial PV modules.*
10. PFV RIO ESCONDIDO	*161*	*No BESS, with tracking system, monocrystalline PV panels.*
11. PFV MALGARIDA	*204*	*No BESS, with tracking system.*
12. PFV SOL DEL DESIERTO	*231*	*No BESS, thin-film with tracking system.*
13. PFV SOL DE LILA	*152*	*No BESS, with tracking system.*
14. PFV DOMEYKO	*204*	*No BESS, no tracking system, policrystalline PV panels.*
15. PFV VALLE ESCONDIDO	*108*	*No BESS, with tracking system, policrystalline PV panels.*
16. PFV TAMAYA SOLAR	*113*	*No BESS with tracking system.*
17. PFV DIEGO DE ALMAGRO SUR	*212*	*No BESS, with tracking system, policrystalline PV panels.*
18. PFV COYA	*180*	*Considers installation of BESS post-construction and operation start.*

Sources: *"Coordinador Eléctrico Nacional, Información de instalaciones" (https://infotecnica.coordinador.cl/instalaciones/unidades-generadoras), report, downloaded on April 27, 2023.*
"Sistema de Evaluación de Impacto Ambiental" (https://sea.gob.cl/)
Official and public information about each project.

Table 12: Power plants within ± 50% of the proposed project activity's capacity

Consideration 3: Since none of the identified power plants were developed as GHG emission reduction projects under Biocarbon standard or another carbon crediting program, M_{all} is 18.

Consideration 4: In this case none of the power plants identified in the previous point counts with a Lithium-ion BESS system. This constitutes a relevant technological difference that clearly distinguishes the proposed project activity from the power plants identified in the previous step. According to this, M_{diff} equals 18.

Consideration 5: According to the above:

$$F = 1 - \left(\frac{M_{diff}}{M_{all}}\right)$$

Common practice stepwise analysis		
Step 1: Calculation of the capacity output range	Range	(105 MW to 315 MW)
Step 2: Identify of similar projects to the project activity	(N°)	18
Step 3: From projects in Step 2, identify CDM projects	(N°)	0
Step 3: From projects in Step 2, deduct CDM projects (M_{all})	(N°)	18
Step 4: Projects that use different technologies (M_{diff})	(N°)	18

Step 5: Calculation of $F = (1 - (M_{diff}/M_{all}))$	**(N°)**	**0.0**
Step 5: Calculation of $M_{all} - M_{diff}$	**(N°)**	**0.0**
Comon Practice analysis result	**(Result)**	**Additional**

Table 13: Common practice analysis summary and results

Outcome of step 4
As a result, the Common Practice analysis indicates that the proposed project activity does not correspond to the common practice within the relevant geographical region.

According to the results of the analysis above, it is clear that the proposed project activity is additional, as it fully complies with the additionality criteria of Biocarbon Additionality Tool version 1.0.

3.5 Uncertainty management

The GHG emissions of the baseline scenario are based on CDM tool to calculate the emission factor of the electric grid (TOOL07 v7.0). On the other hand, project's emission reduction calculations are based on CDM methodology ACM0002 v22.0. In the case of the Project

activity, all the information required to calculate the emission reductions is readily available, precisely measured and cross-checked by the corresponding national authority. This means that there will be a low degree of uncertainty in the calculation of net GHG emission reductions and therefore, the need to implement conservative safeguards to avoid over crediting is relatively low.

The following information does substantiate the completeness, accuracy and quality of the data that will be used in the net GHG emission reduction calculation of the project activity:

Electricity measurements:

a) According to the national regulation in Chile, all grid-connected electricity meters must comply with the accuracy requirements (class meter 0.2 or 0.5 at least), which is tested and verified at the factory according to IEC (International Electro technical Commission) and ANSI (American National Standards Institute). These meter are digital and do not require calibration, only accuracy verification check. Electricity meters will also receive periodic maintenance, as per the corresponding national regulation.

b) In accordance with Article 12 (Information availability factor) of the Technical Annex: "Measuring Systems for economic transfers", the coordinated power companies must guarantee availability of information greater than or equal to 97%, measured in a moving window of 12 months, including the availability calculation of electric meters (EMs). The National Electric Coordinator (CEN) is in charge of checking and auditing the information availability. In case of partially or not receiving such information, the data report will be qualified as "incomplete data".

c) Electricity meter failure: According to Article 16 (Deadlines to normalize measuring equipment failures and communication) of the Technical Annex: "Measurement systems for economic transfers", the period to normalize an electric meter and communication failures, that is, the recovery of the registration activity and reading capability, must not exceed three days, from the date that the Electric Toll Department (DP) detects and notifies said irregularity in the measurement or integration of the "coordinated" energy flows.

In the event of abnormalities or failures that are not resolved before the use of the EM records in the economic transfer processes, the DP will estimate the energy profile in a conservative way, considering the history that the PRMTE (National Electric Coordinator Platform) has about the affected measurement point.

In addition, the monthly measurements verification of the amount of energy generated by each grid-connected power plant is carried out by the dispatch operator CEN through an integral balance at the transmission bus bars. The loss of energy in the transmission lines

generates a conservative difference between the energy reported monthly to the coordinator and the energy billed.

Emission factor calculation:

The grid emission factor calculation is supported by public data collected by the Chilean Electric Coordinator (CEN www.coordinador.cl) and the National Energy Commission (CNE https://www.cne.cl/en/). Both organizations guarantee the quality, continuity, transparency, and availability of the information required to calculate both the charge and discharge grid emission factors.

In line with the principle of conservative attitude, TOOL07 and ACM0002 use conservative assumptions, values, and procedures to ensure that there is not overestimation of emission reductions or increases in GHG removals, applying mechanisms to manage uncertainty in the quantification of baseline and mitigation results.

3.6 Leakage and non-permanence

According to paragraph 71 of ACM0002 v22.0: "No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g., extraction, processing, transport etc.) are neglected." Therefore, there are no potential leakage associated to the project activity.

All the parameters used to calculate the emissions reduction of the project activity are supported and publicly available by the national authority (Coordinador Electrico Nacional, CEN, coordinador.cl). With regard to information quality, the CEN's role is to request, receive, store and verify the timely, complete and accurate delivery of all information necessary for coordinating the continuity, estability and efficient operation of the electricity system.

The CEN establishes and applies operating procedures and methodologies for data reporting, used to perform analyses and calculate relevant country metrics, as well as serving as the basis for reports to other agencies, such as the CNE and the SEC.

3.7 Mitigation results

As demonstrated below, the mitigation results achieved through the implementation of this project activity is verifiable in accordance with the ISO 14064-3:2019 Standard.

3.7.1 Eligible areas within GHG project boundaries (AFOLU sector projects)

Not applicable to this project activity.

3.7.2 Stratification (Projects in the AFOLU sector)

Not applicable to this project activity.

3.7.3 GHG baseline emissions

According to ACM0002 version 22, baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad \text{(Equation 11, ACM0002 version22)}$$

Where:

BE_y	*Baseline emissions in year y (t CO2/yr).*
$EG_{PJ,y}$	*Quantity of net electricity generation that is produced and supplied to the grid as a result of the implementation of the project activity in year y (MWh/yr).*
$EF_{grid,CM,y}$	*Combined margin CO2 emission factor for grid connected power generation in year y calculated using TOOL07 (t CO2/MWh).*

During the first crediting period, the power plant energy generation of the project activity is estimated as follows:

Quantity of net electricity generation

According to ACM0002 version 22, paragraph 59, if the project activity is the installation of a Greenfield power plant with or without the BESS, $EG_{PJ,y}$ shall be calculated as follows:

$$EG_{PJ,y} = EG_{Facility,y} \qquad \text{(Equation 12, ACM0002 version 22)}$$

Where:

$EG_{PJ,y}$	*Quantity of net electricity generation that is produced and supplied to the grid as a result of the implementation of the project activity in year y (MWh/yr).*
$EG_{Facility,y}$	*Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).*

Nevertheless, and according to section 3.1.2, since the project involves installing a Greenfield power plant that will generate IRECs and carbon credits during the same monitoring period, equation N°12 of the ACM0002 version 22.0 baseline methodology must be modified to account for IREC generation:

$$EG_{PJ,y} = EG_{Facility,y} - EG_{IRECs,y}$$ *Deviation to Equation 12, ACM0002 version 22*

Where:

$EG_{PJ,y}$	*Quantity of net electricity generation that is produced and supplied to the grid as a result of the implementation of the project activity in year y (MWh/yr).*
$EG_{Facility,y}$	*Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).*
$EG_{IRECs,y}$	*Quantity of net electricity generation supplied by the project plant/unit to the grid used in the generation of IRECs in year y (MWh/yr).*

According to the above, the estimated net electricity displaced by the project activity is calculated as follows:

$Load\ factor = 33.43\%$

$Installed\ capacity = 210\ MWp$

$Yield = 365 \times 24 \times 33.43\% = 2{,}928.84\ {}^{Kwh}/_{Kwp}$

$Annual\ degradation = 0.3\%$

$EG_{Facility,y} = 210\ MWp \times (1 - 0.3\%) \times 2{,}928.84h = 613{,}210.46\ MWh$

The estimated quantity of net electricity generation supplied by the project plant/unit to the grid used in the generation of IRECs in year y by contract is 12.44% of the generated energy, then:

$EG_{IRECs,y} = EG_{Facility,y} \times 12.44\% = 76{,}283.38\ MWh$

Then:

$EG_{PJ,y} = EG_{Facility,y} - EG_{IRECs,y} = 613{,}210.46MWh - 76{,}283.38MWh = 536{,}927.08\ MWh$

Combined margin CO2 emission factor

The CO2 emission factor of the grid is calculated in a transparent and conservative manner as a combined margin consisting in a combination of operating margin (OM) and a build margin (BM) according to procedures prescribed in the TOOL07: "Tool to calculate the Emission Factor for an electricity system" version 7.0. The stepwise calculation of this emission factor is described as follows:

Step 1: Identify the relevant electricity systems

The Andes Solar IV photovoltaic power plant with BESS project is connected to the "Sistema Electrico Nacional" (SEN, Spanish acronym). Therefore, and according to the corresponding baseline methodology, the SEN was the relevant electricity system to consider in the case of the project activity. SEN is centrally coordinated by the "Coordinador Eléctrico Nacional" (CEN, Spanish acronym) and all the information and data base are publicly available in the official web site: https://www.coordinador.cl/.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

As previously mentioned, the Project Participant only includes grid-connected power plants to calculate the Operating Margin and Build Margin

Step 3: Select a method to determine the operating margin (OM)

As previously mentioned, the Project Participant uses option A to calculate the Operating Margin: Simple OM.

According to TOOL07, paragraph 40, the simple OM method can only be used if any one of the following requirements is satisfied:

- *Low-cost/must-run resources constitute less than 50 per cent of total grid generation (excluding electricity generated by off-grid power plants) in average of the five most recent years:*

LCMR generation MWh	***2020***	***2021***	***2022***	***2023***	***2024***
Thermal LCMR	*27,810,321*	*13,889,334*	*0*	*3,210,234*	*18,480*
Renewable LCMR	*22,133,651*	*38,282,944*	*46,177,166*	*53,158,224*	*58,907,024*
TOTAL LCMR	*49,943,972*	*52,172,278*	*46,177,166*	*56,368,457*	*58,925,504*
Total SEN generation MWh	*74,714,121*	*78,399,065*	*80,422,150*	*81,341,399*	*83,335,205*
Share$_{LCMR}$	***66.8%***	***66.5%***	***57.4%***	***69.3%***	***70.7%***

Table 14: OM method selection Share$_{LCMR}$

According to approach 1:

$$Share_{LCMR} = average\frac{EG_{LCMR,y-4}}{EG_{total,y-4}}; \ldots; \frac{EG_{LCMR,y}}{EG_{total,y}} = 66.2\%$$

- *The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three year is less than the average of the lowest annual system loads (LASL) in the grid of the same three years (i.e. average of LASLy, LASLy-1, LASLy-2).*

	2022	2023	2024	Average
LASL	7,076	7,418	6,909	7,134
LCMR output	46,177,166	56,368,457	58,925,504	53,823,709
LCMR load	5,271	6,435	6,708	6,138

Table 15: OM method selection Load supplied by LCMR vs LASL

Then:

$$Average(LCMR_y; LCMR_{y-1}; LCMR_{y-2}) < Average(LASL_y; LASL_{y-1}; LASL_{y-2})$$

$$6{,}138 < 7{,}134 \rightarrow OM\ simple\ method\ is\ selected$$

This shows that the option b) of paragraph 40, TOOL 07, is satisfied and therefore the simple OM method can be applied.

Step 4: Calculate the Operating Margin emission factor according to the selected method

In order to calculate the simple OM option A was chosen, using equation 3 of TOOL07 (Version 7.0). The Operating Margin calculation is shown below:

Year 2024 OM:

$$EF_{OM,grid,2024} = \frac{17{,}426{,}832\ tCO_2}{24{,}409{,}701\ MWh} = 0{,}714\ \frac{tCO_2}{MWh}$$

Year 2023 OM:

$$EF_{OM,grid,2023} = \frac{17{,}281{,}919\ tCO_2}{26{,}037{,}645\ MWh} = 0{,}664\ \frac{tCO_2}{MWh}$$

Year 2022 OM:

$$EF_{OM,grid,2022} = \frac{26{,}355{,}623\ tCO_2}{34{,}964{,}942\ MWh} = 0{,}754\ \frac{tCO_2}{MWh}$$

In this case, the Project Participant uses section 6.3, paragraph 38 (a) to calculate the Operating Margin: Simple OM, after checking that it is possible to demonstrate the

compliance of at least one requirement describes in TOOL07, par.40 using the available electricity Chilean grid data.

In addition, the Project Participant chooses the option in 6.3, paragraph 42 a), which corresponds to the ex-ante calculation option of the OM grid emission factor. Under this option, the OM is calculated as a 3-year generation-weighted average OM, using the most recent data available at the time of submission of this PDD to revalidation. In the case of Andes Solar IV photovoltaic power plant with BESS the most recent information available at the time of validation, corresponds to year-data of 2024, 2023 and 2022. According to the above, the ex-ante OM is calculated using the following equation:

$$OM_{ex-ante} = \frac{EF_{grid,OMsimple,y} \times Gen_y + EF_{grid,OMsimple,y-1} \times Gen_{y-1} + EF_{grid,OMsimple,y-2} \times Gen_{y-2}}{Gen_y + Gen_{y-1} + Gen_{y-2}}$$

$$OM_{ex-ante} = 0.710 \ \frac{tCO_2}{MWh}$$

For more details about the parameter values used for calculating the OM, please see file "ERC_Andes Solar IV 250908.xlsx".

Step 5: Calculate the Build Margin (BM) emission factor

According to equation 15 of TOOL07 (Version 7.0), the Build Margin calculation is shown below:

$$EF_{grid,BM,2024} = \frac{6{,}497 \ tCO_2}{16{,}698{,}527 \ MWh} = 0.0004 \ \frac{tCO_2}{MWh}$$

For more details about the parameter values used for calculating the BM, see file "EF grid 2024.xlsx".

Step 6: Calculate the Combined Margin emissions factor

According to TOOL07 (Version 7.0), the Combined Margin is calculated using equation 16, as follows:

$$EF_y = w_{OM} \times OM_{ex-ante} + w_{BM} \times EF_{grid,BM,2024}$$

$$EF_y = 0.75 \times 0.710 + 0.25 \times 0.0004 = 0.533 \frac{tCO_2}{MWh}$$

The next table summarizes the results for the OM emission factor of 0.710 tCO2e/MWh and BM emission factor of 0.0004 tCO2e/MWh. These values are used to obtain an estimation of the CM emission factor of 0.533 tCO2/MWh and considering that the project activity expects to displace an average of 536,927 MWh of electricity per year, the emission reductions come approximately up to 286,103 tCO2e per year.

Variable	Unit	Value
OM Emissions Factor ($EF_{grid,OMsimple,y}$)	tonnes CO_2e/MWh	0.710
BM Emissions Factor ($EF_{grid,BM,y}$)	tonnes CO_2e/MWh	0.0004
CM Emissions Factor ($EF_{grid,CM,y}$)	tonnes CO_2e/MWh	0.533
Electricity Generated by the project	MWh/year	536,927
Emissions Reduction (ER_y)	tonnes CO_2e/year	286,103

Table 16: Emissions Reductions estimation data

3.7.4 GHG project emissions

For most renewable power generation project activities, there are no emission sources and greenhouse gases involved. However, some project activities may involve project emissions that can be significant. The project emissions for the Andes Solar IV photovoltaic power plant with BESS project shall be accounted using the following equation:

$$PE_y = PE_{BESS,y} = EG_{BESS,y} \times EF_{grid,y} \qquad \text{Equation 1, ACM0002 version 22}$$

Where:

PE_y	Project emissions in year y (tCO2e/y).
$PE_{BESS,y}$	Project emissions from charging of a BESS using electricity from the grid or from fossil fuel electricity generators (t CO2e/yr)
$EC_{BESS,y}$	Electricity used exceptionally charged the BESS using grid electricity (MWh).
$EF_{grid,y}$	CO2 emission factor for grid connected power generation in year y (t CO2/MWh) determined as per the Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the TOOL07: "Tool to calculate the emission factor for an electricity system" (tCO2/MWh) of the CDM.

According to ACM0002 version 22, paragraph 51, the charging using the grid or using fossil fuel electricity generator should not amount to more than 2% of the electricity generated by

the project renewable energy plant during a monitoring period. During the periods where the BESS consumes more than 2% of the electricity for charging, the project holder shall not be entitled to issuance of the certified emission reductions for the period concerned. Furthermore, the project holder should compensate in full, any negative emissions reductions which may arise from power consumption from the grid by the BESS, including for monitoring periods for which no emission reductions can be claimed.

3.7.5 GHG leakages.

According to methodology ACM0002 version 22, the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport, etc) so, these emissions sources are neglected. No leakage emissions are anticipated under this methodology.

$$LE_y = 0 \qquad \text{(Par.71. ACM0002 version22)}$$

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \qquad \text{(Equation 17, ACM002 version 22)}$$

Where:

ERy	*Emission reductions for the year y (tCO2).*
BEy	*Baseline emissions for the year y (tCO2).*
PEy	*Project emissions for the year y (tCO2).*

Year	GHG emission reductions/removals in the baseline scenario (tCO2e)	GHG emission reductions/removals in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG Reduction/Removals (tCO_{2e})
2024	73,681	0	0	**73,681**
2025	286,103	0	0	**286,103**
2026	286,103	0	0	**286,103**
2027	286,103	0	0	**286,103**
2028	286,103	0	0	**286,103**
2029	286,103	0	0	**286,103**
2030	286,103	0	0	**286,103**
2031	212,422	0	0	**212,422**
Total	**2,002,721**	**0**	**0**	**2,002,721**
Average	**286,103**	**0**	**0**	**286,103**

4 Compliance with Laws, Statutes and Other Regulatory Frameworks

Every electrical project developed in Chile must be designed, built and operated in strict compliance with the applicable national and international regulatory framework. This includes the General Law on Electrical Services and its associated regulations; the Environmental Impact Assessment System (Law 19,300 and associated regulations); the Water Code; electrical and industrial safety regulations; labor and risk prevention legislation; and the rules on consultation and protection of the rights of indigenous peoples (Law 19,253 and associated supreme decrees).

According to Art. 3 from S.D. №40 / 2012 (Environmental Impact Assessment System Regulation), transmission lines with a voltage higher than 23 kV and generation plants with a capacity higher than 3 MW must be registered at SEIA. For Andes Solar IV photovoltaic power plant with BESS, in accordance with the provisions of articles 8 and following of Law 19,300 on General Bases of the Environment, the project activity submitted the SEIA project

files[17]*, all of which can be publicly accessed through Environmental Assessment System website at www.e-seia.cl containing all project details and the official environmental qualification.*

As a result, the statement mentioned was qualified as favorable, in compliance with the applicable environmental regulations, and the requirements contained in the sectoral environmental permits. The project activity has satisfied all the requirements for implementation of the Andes Solar IV project received the permits through Resolutions N° 0183 of Regional Environmental Commission of Antofagasta, Antofagasta Region[18].

Additionally, the project must incorporate obligations derived from international instruments ratified by Chile, such as ILO Convention 169, the UN Guiding Principles on Business and Human Rights, and the United Nations Declaration on the Rights of Indigenous Peoples, which guarantee free, prior and informed consent, respect for the environment, health and the fundamental rights of all affected individuals and communities.

The following table presents laws, statutes and regulatory frameworks that the project must comply:

	Regulation	Description
Electric Power Sector	*D.F.L. No. 1 of 1982, General Law on Electric Services (amended by D.F.L. No. 4 of 2006).*	*Regulates authorization, construction, and operation of electric power plants, transmission lines, and substations.*
	Law No. 20,571 of 2012, Promotion of Non-Conventional Renewable Energies.	*Establishes incentives and technical requirements for renewable energy projects larger than 3 MW.*
Environment and Water	*Law No. 19,300 on Environmental Framework*	*Creates the Environmental Impact Assessment System (SEIA). Solar projects over 3 MW in the Andes must enter as an Environmental Impact Declaration or Environmental Impact Study*
	Supreme Decree No. 40/2012 (and its	*SEIA regulation: project classification, requirement for indigenous consultation*

17 https://seia.sea.gob.cl/archivos/2020/01/17/DIA_Ampliacion_Parque_Fotovoltaico_Los_Andes__Fase_III_y_IV.pdf

18 https://firma.sea.gob.cl/publicaciones/40/cc/2147593388.pdf

	amendments, e.g., SD No. 30/2023)	*(art. 22-bis), and mechanisms for public participation.*
	Water Code (D.F.L. No. 3,630 of 1981)	*Concessions for surface and groundwater, necessary for panel-cleaning systems or cooling systems.*
Electrical and Industrial Safety	*Supreme Decree No. 8 of 2020, Regulation on Safety of Energy Consumption Installations (formerly NCh 4)*	*Design, construction, and safe-operation standards for medium- and high-voltage installations.*
	Supreme Decree No. 594 of 1999, Safety Regulation for Construction Works	*Health and safety requirements for assembly of structures, towers, and associated civil works.*
	Law No. 16,744 on Work Accidents and Occupational Diseases	*Prevention, coverage, and sanction system for labor incidents during construction and maintenance.*
Labor Rights	*Labor Code*	*Basic rights: maximum work hours, breaks, hygiene, and safety.*
	Supreme Decree No. 40 of 1969, Regulation on Occupational Health and Safety	*General risk-prevention standards and authority of the health authority and safety mutual.*
Indigenous Peoples' Rights and Prior Consultation	*Law No. 19,253 (Indigenous Law)*	*Recognizes collective rights of indigenous communities and establishes the obligation of prior consultation for projects affecting their territories.*
	Supreme Decree No. 66 of 2016, Regulation on Coastal and Marine Areas of Preferential Use for Indigenous Peoples (ECMPO)	*Protects territories and ancestral passage zones, applicable if solar PV installations or access roads intersect high-mountain ecosystems relevant to Aymara and Atacameño communities.*
Main International	*Human Rights and Indigenous Peoples*	*ILO Convention 169 on Indigenous and Tribal Peoples (ratified in 2008). Requires*

Reference Instruments		*consultation and agreement with communities before initiating works.* *UN Declaration on the Rights of Indigenous Peoples (UNDRIP, 2007). Defines standards for free, prior, and informed consent and protection of culture and territory.*
	Labor Rights and Safety	• *ILO Convention 155 on Occupational Safety and Health. Principles of prevention, consultation, and worker participation in occupational health matters.* • *ILO Conventions 87 and 98 (freedom of association and collective bargaining). Guarantee association and participation of workers in the enterprise.*
	Corporate Human Rights Principles	*UN Guiding Principles on Business and Human Rights. Framework for companies to identify, prevent, and remedy human rights impacts in energy projects.*

The main national regulations affecting the electric power sector that include provisions for the protection of human rights and indigenous peoples, along with their links to the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and ILO Convention 169, are summarized in the following table:

Foundational Framework Laws	*Law No. 19,253 (Indigenous Law)*	*Legally recognizes Chilean indigenous peoples, establishes policies for cultural and territorial development, and guarantees equal opportunities. It provides the basis for requiring indigenous consultation and participation in all infrastructure projects, including those in the electric power industry. This law directly implements Chile's ratification of ILO Convention 169, which is binding in the country.*
	Law No. 19,300 (Environmental Framework Law)	*Establishes the Environmental Impact Assessment System (SEIA). It mandates impact studies for power plants, transmission lines, and substations, and incorporates public*

		participation mechanisms along with protection of cultural and territorial rights. Its regulations include prior consultation requirements aligned with ILO Convention 169, UNDRIP principles, and the UN Guiding Principles on Business and Human Rights.
SEIA Regulations with Indigenous Consultation	*Supreme Decree No. 40/2012 (SEIA Regulation)*	*Introduces Article 22-bis, obligating project proponents in the electric power sector to carry out a free, prior, and informed consultation process with affected indigenous communities in accordance with Article 6 of ILO Convention 169.*
	Supreme Decree No. 66/2016 (Regulation on Coastal and Marine Areas for Indigenous Peoples, ECMPO)	*Not applicable in this project activity. Establishes and delimits coastal and marine zones for preferential use by indigenous peoples. It protects territories where offshore wind farms or coastal transmission infrastructure may be sited and is enforceable through the environmental review of power projects. It upholds territorial rights recognized in Article 14 of Convention 169 and Article 26 of UNDRIP.*
Incorporation of International Instruments	*ILO Convention 169 on Indigenous and Tribal People*	*Ratified by Chile on September 15, 2008, this convention is integrated into domestic law. It mandates the consultation of indigenous peoples on any administrative or legislative measures that may affect their rights, including power generation and transmission projects on their territories.*
	UN Declaration on the Rights of Indigenous Peoples (UNDRIP)	*Although non-binding, UNDRIP has been adopted as a best-practice standard in sectoral guides and policies (for example, the Ministry of Energy's "Guide on Indigenous Peoples and Energy"). It reinforces principles of self-determination, free and informed consent, and cultural and territorial protection in energy projects.*
Sectoral Guides and Policies	*"Indigenous Peoples and Energy" Guide*	*Provides guidance for companies and authorities on applying international standards (ILO 169, UNDRIP, and the UN Guiding Principles on Business and Human*

	(Ministry of Energy, 2017)	*Rights) during the design, construction, and operation of power projects. It recommends strengthening local capacities, respecting indigenous worldviews, and establishing continuous participation mechanisms throughout the project lifecycle.*

It should be noted that, as is declared in the Environmental Impact Assessment (EIA), Chapter 3, section 3.12, page 3-32[19], according to the Integrated Information System of the National Indigenous Development Corporation, CONADI (2019), there are no indigenous and/or local communities in the project site area. Likewise, there are no lands with indigenous status (Merced Titles), nor are there any others in the process of restitution through the Indigenous Lands and Waters Fund.

As well as in section 3.7 "Human Environment," page 3-30, based on the studied carried out in the EIA, it is ruled out that the positioning and execution of the project will imply any difficulty or impediment to the exercise or manifestation of traditions, culture, or community interests that may affect the human groups that operate there, and no site of cultural significance to the people of Antofagasta will be affected in a way that could cause an impact or reduction in their cultural and traditional activities. Furthermore, no cultural expressions are carried out at the project site that will be affected or impeded by the project's positioning.

19 https://seia.sea.gob.cl/archivos/2020/01/17/Capitulo_3._Antecedentes_que_justifican_ecc_del_art_11.pdf

5 Carbon ownership and rights

5.1 Project holder

Provide contact information for the GHG Project holder.

Individual or organization	**Aes Andes S.A**
Contact person	Roberto Rodríguez
Job position	Commercial Specialist
Address:	Los conquistadores 1730, Piso 10, comuna de providencia, Santiago
Phone number	+56 9 2377 0452
Email	Roberto.rodriguez@aes .com

5.2 Other project participants

Not applicable in this case.

Individual or organization	
Contact person	
Job position	
Address	

Phone number
Email

5.3 Agreements related to carbon rights

AES ANDES S.A. is the majority owner of the Andes Solar IV SpA project activity, consequently, the associated carbon rights. The Project Holder holds full land-use rights for the area in which the solar power plant is located[20]*. Additionally, National Electric Coordinator (CEN) provided the authorization to Andes Solar IV SpA for the commercial operation of the Andes Solar IV power plant*[21]*.*

To ensure transparency and compliance with legal frameworks, AES ANDES S.A. has verified that no indigenous or local traditional communities reside in or have territorial claims within the project area. Additionally, the company has confirmed that no legal requirement for prior consultation was necessary, as no communities were identified within the area of influence[22]*.*

5.4 Land tenure (Projects in the AFOLU sector)

Not applicable to this project activity.

6 Climate change adaptation

AES Andes S.A, one of the largest generation companies in Chile in terms of installed capacity and a relevant energy solutions provider as well, is committed to the sustainable development of South America through a diverse portfolio of energy generation facilities.

[20] Land Lease Agreement, file "Decreto-82-EXENTO_23-FEB-2021.pdf", available also at: https://www.bcn.cl/leychile/navegar?i=1156192
[21] Commercial Authorization, file "COD ASIV.pdf"
[22] See Environmental Impact Assessment, file "Anexo 3.8 Línea de Base de Medio Humano.pdf"

Considering the global commitment to face climate change, AES Andes S.A. is always attentive to the rapid evolution of the technological innovation in the energy sector. Through Greentegra strategy, launched in 2018, the company spearheads this transformation which includes sustainability into all operations. Under the Greentegra strategy, AES Andes pursues three strategic objectives to create stakeholder value by effectively managing present and future risks and opportunities: Decarbonizing its existing portfolio, expanding its renewables business and fostering local development and social value in operating communities.

Given the staggering effects of climate change, in 2023 the company continued the Climate Risk Committee, which aims to identify and mitigate risks associated with hydrology, wind and solar radiation and their impact on AES Andes' assets. The succession of Climate Risk Committees held in recent years has enabled the company to generate a database in 2023 that allows them to estimate the volatility of our portfolio generation and to understand the impact of the technological and geographic diversification of their assets.

In addition, the Environmental Policy established by the Project Holder embraces the principles and foundations of its Environmental Management System (EMS) based on strong corporate governance led by its Board of Directors' Governance Committee. This committee oversees AES companies' compliance with environmental regulations and is responsible for periodically reviewing and monitoring practices related to climate change. The company is committed to responsible environmental practices and strict compliance with the laws and regulations of each country in which it operates, as well as international standards, where applicable.

The EMS, applicable to the project activity and to all projects carried out by the company, is based on the principles of ISO 14001, which specifies the requirements for an environmental management system that an organization can use to improve its environmental performance, as well as the requirements for establishing the functions, responsibilities, and authority to effectively implement and maintain the EMS. Some of these requirements are described below:

- *Prevention and Containment*
- *Waste*
- *Chemical and Raw Material Management*
- *PCB Management*
- *AES Compliance Data Quality Assurance and Reporting*
- *Environmental Incident Management*
- *Environmentally Related Financial Disclosure*
- *Contractor Environmental Risk Management Standard*

- *Managing Potential Contractor Environmental Impacts*
- *General Environmental Requirements*
- *Biodiversity Assessment and Protection*
- *Internal and external EHS Audit Standard*

Environmental impacts must be identified and assessed in accordance with the EMS Risk Assessment methodology. An action plan should be created to address significant environmental aspects, associated risks and opportunities, and compliance obligations. This assessment must be updated biennially or when major changes occur.

The Renewable Energy Construction Projects Environmental, Health, Safety, and Security Plans outline expectations for the construction phase, including the required measures for contractors. Compliance with these standards is monitored through both internal and external audits. Construction sites undergo annual audits, while operating businesses are audited every three years. For each audit finding, a corrective action plan is formulated, and the overall audit performance is regularly reported to executive leadership.

The Project Holder is committed to ensuring grid stability, achieving a responsible energy transition and supporting the objectives of the Paris Agreement to limit the average rise in global temperatures to well below 2°C above preindustrial levels and to pursue efforts to limit it to 1.5°C. In 2021 the company set ambitions based on its plan to transition out of coal, the expected renewable growth of its portfolio, and the feasibility of multiple possible asset scenarios, which is expected to be reviewed during 2025.

The different measures considered in the environmental management plan for the project activity are possible to observe in detail in its Environmental Impact Assessment approved by the Chilean national authority (Reference: Chapter 10_Summary.pdf, also available at https://seia.sea.gob.cl/archivos/2020/01/17/Capitulo_10._Ficha_Resumen.pdf).

7 Risk management

The energy sector is exposed to various external factors, including weather conditions, international prices, and macroeconomic variables. In this respect, the company's approach to risk is guided by its corporate values, with "Safety first" being a core principle that involves identifying potential risks to people, contractors, customers, partners, and communities.

In order to monitor these factors and minimize their impact on projects, the project owner considers applying its Environmental, Social and Governance (ESG) strategy in order to address and manage the environmental, financial, and social risks associated with all its operations. The ESG strategy enables the company to anticipate situations in which there

could be a deviation from the expected outcome of projects, managing them responsibly, efficiently, and effectively toward growth and value creation for our stakeholders, both in normal and exceptional circumstances.

Risk management is also integrated into the company's governance structure and policies, using a dual materiality assessment to identify issues with both financial implications and "impact" (non-financial) significance. This process helps pinpoint risks across the entire value chain:

- *The Board of Directors and the Committee of Directors review financial and other matters, demonstrating their role in risk oversight.*
- *An environmental policy is in place to assess and identify environmental hazards and risks.*
- *The company has policies to prevent harassment and discrimination, and to ensure free competition, which serve to manage legal and reputational risks.*

The identified key-risks that are specific to the project activity, and the proposed mitigation measures are shown in the table below, which follows a structure based on the risk classification from the BCR "Permanence and Risk Management" Tool v1.1.

Risk Category	*Identified Risks*	*Approach/Management*
Environmental	*Climate Change Risk*	*The behavior of electric power plants demand is influenced by the effects of climate change. AES Andes has a Climate Risk Committee to manage and measure this risk*
	Natural Disaster Risk	*To protect against natural disasters like earthquakes and operational disruptions, the company acquires insurance policies and meticulously manages its generation portfolio.*
Financial	*Risks related to interest rates and exchange rates.*	*Interest rate risk is managed by maintaining debt at a fixed rate or through interest rate swaps, while exchange rate risk is managed with a strategy involving derivative contracts*
	Technological Risk	*The development of new technologies could reduce sales prices. To mitigate this, In some cases, AES Andes uses long-term Power Purchase Agreements (PPAs) to ensure a stable income flow.*

Social	*Regulatory Risk*	*The company operates in an industry subject to changing regulations, particularly regarding decarbonization. It mitigates this by closely monitoring and participating in legislative processes.*

Source: Aes Integrated Annual Report 2023. https://www.aesandes.com/sites/aesvault.com/files/2024-06/AES%20Andes%20Integrated%20Annual%20Report%202023%206-2024.pdf

In addition, as is explained in section 4, there are no indigenous and/or local communities in the project site area, therefor, there are very low possibilities of risks associated with the participation of indigenous people, or local communities and stakeholders in the activities proposed by the project holder in the medium and short term.

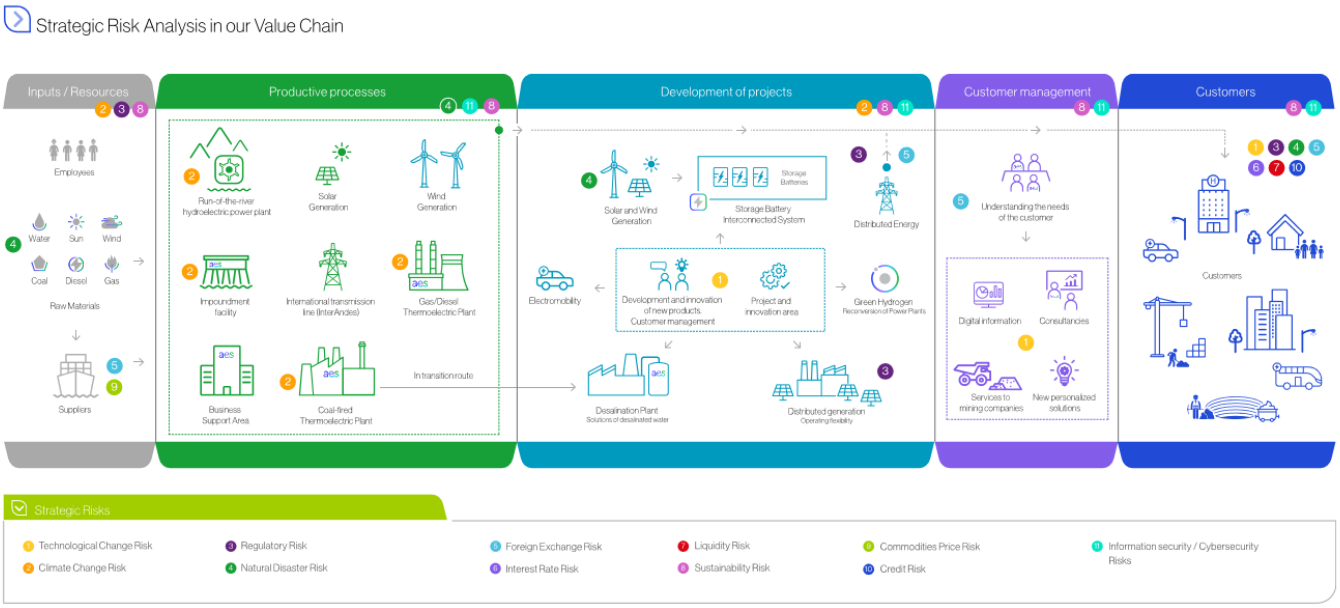

Figure 4: Strategic Risk Analysis in Aes Andes Value Chain

It's important to note that safety is a core value of the company. In recent years, cybersecurity in the electricity sector has emerged as a significant concern due to the exponential increase in cyberattacks worldwide. The energy sector, particularly the electricity sector, has become a prime target for cybercriminals due to its strategic importance and interconnection with other critical infrastructure.

Risk management in the electricity sector is a vital component of cybersecurity. The key is to identify and assess the potential risks associated with cyber threats and then implement

appropriate mitigation measures. This includes industrial control system protection, grid security, data protection, and incident response. In addition, it is critical to stay updated on the latest cybersecurity trends and threats and adapt risk management strategies accordingly. Finally, risk management must be a continuous effort, as the cyber threat landscape is constantly evolving.

7.1 Reversal Risk

As Project Holder, AES Andes S.A businesses face possible risks and scenarios that can impact both their operations and the service it provides. Safe, fast and effective power restoration following emergency events is essential to the reliability of electric power generation and distribution systems and the well-being of the services and people that depend on these systems.

As provider of essential services, the company has diverse programs in place to ensure that the operations are prepared to manage unplanned disruptions. The management approach includes a set of emergency preparedness standards describing requirements for the development, review and implementation of Business Continuity Plans (BCP). These plans also consider local regulations and include preparation for:

- *operational emergencies.*
- *off-site emergencies that will have a significant impact on operations or staff.*
- *physical security measures, including evacuation of our employees in case of unrest.*
- *emergencies involving nature, e.g., severe weather, floods, earthquakes, tsunamis, etc.*

Stakeholder collaboration and engagement are also an important part of this program. The emergency procedures include clear and frequent communications and collaboration with customers, neighboring communities, the media, contractors and government officials. To create awareness with key stakeholders, businesses also can share information with surrounding communities about safety and how to act during an emergency, extremely bad weather conditions, or floods, among others.

In conclusion, the Safety Management System and the Global Safety Standard on Emergency Preparedness describes minimum requirements for emergency preparedness plans that address the risk associated with operational activities, man-made emergencies, natural disasters and anticipated industry hazards.

7.1.1 Loss Event Report

This section is not applicable at this stage of the project activity. However, the project owner undertakes to submit a report within a maximum period of one year from the date of

occurrence if an event affecting the project occurs through the loss or reduction of the VCCs issued and registered on the registration platform.

8 Sustainable development safeguards (SDSs)

Due to the characteristics of the project activity and complying with the Chilean environmental regulations, it is not mandatory the execution of an Environmental Impact Study. This condition is defined according to the Regulation of the Environmental Impact Assessment System (RSEIA 40/2013 MMA), which in its article 4 states that, "the owner of a Project or activity that is submitted to the Environmental Impact Assessment System, will do so by submitting an Environmental Impact Statement, unless such Project or activity generates or presents any effects, characteristics or circumstances referred to the Article 11 of the Law". According to Chilean environmental regulation.

In accordance with the analysis of the effects, characteristics, and/or circumstances listed the mentioned article, it is possible to state that:

- *The quantity and quality of the effluents, emissions and/or waste generated by the Project Activity will not produce any health risks to the population.*

- *The Project will not generate significant negative impacts on renewable resources, including soil, water, and air.*

- *The Project will not resettle human communities or significantly disrupt their way of life and customs.*

- *The Project is not located in or near to protected areas, natural resources areas, conservation priority sites, wetlands and/or glaciers, and will not modify the environmental value of the territory in which it will be located.*

- *The Project will not significantly alter, in terms of magnitude or duration, the scenic or tourism value of the area.*

- *The Project will not affect monuments, sites with anthropological, archaeological, or historical value and, in general, those belonging to the cultural heritage.*

Therefore, the project must enter the Environmental Impact Service Evaluation (SEIA, Spanish acronym) through an Environmental Impact Statement (DIA, Spanish acronym) since the project does not generate or present any of the effects, characteristics or circumstances indicated in Article 11 of Law N°19.300 or those listed in Articles 5 to 10 of D.S. N°40/2012 RSEIA.

The Project Activity's DIA is a public document that is possible to consult in the following web site link: https://seia.sea.gob.cl/expediente/ficha/fichaPrincipal.php?modo=normal&id_expediente=2145470944, where it is possible to find further details that justify that the project construction, implementation and operation cause no net harm to the environment and society[23].

9 Stakeholder engagement and consultation

The stakeholder consultation is a fundamental part of the environmental evaluation of a project developed in Chilean territory, allowing all interested parties to obtain a well-founded response to their consultations and/or observations.

The Public services, Citizen organization or groups of natural persons, provides relevant information to the environmental evaluation and gives transparency and reliability to the review of the Environmental Impact Assessment (EIA) and final authorities' approvement.

The Chilean law on General Bases of the Environment No. 19.300 establishes the following points in the framework of citizen participation:

a) The regional environmental Chilean authority may call for a community participation process (to be developed for twenty days) for projects that present an EIA process and generates environmental impacts for nearby communities. At least two citizen organizations with legal status, through their representatives, or at least ten natural persons directly affected, must submit a written request within 10 days from the project publication in the Official communication media. In this context, the Project Owner extended an open invitation to all the localities neighboring the project and the Municipality of Antofagasta through the publication of the public consulting process in the Chilean Official Gazette[24]. Additionally, an open radio invitation[25] was made through local radio stations between February 04, 2020, and February 10, 2020.

23 https://seia.sea.gob.cl/archivos/2020/01/17/Capitulo_3._Antecedentes_que_justifican_ecc_del_art_11.pdf

24 https://seia.sea.gob.cl/archivos/2020/02/03/Diario_Oficial.pdf

25 https://seia.sea.gob.cl/documentos/documento.php?idDocumento=2145737370

b) The public consulting process took place between February 3, 2020, and March 13, 2020 (30 working days from the publication in the Official Gazette) during which the participants were able to learn about the contents of the EIA and submit their comments in writing to the environmental authority.

c) The observations presented by the community will be answered and notified by the environmental authority to those who have made observations.

The activities related with the community participation process are detailed in section D.1 of the current document as well the public information that support them is possible to check in the following link: https://seia.sea.gob.cl/expediente/expedientesEvaluacion.php?modo=ficha&id_expediente=214547 0944#-1

9.1 Summary of comments received

There were no comments received during the stakeholders consultation process. The public services invited to participate had withdrawn their invitation to participate (as is possible to observe in the projects' environmental expedient). In addition, there were no consultations or comments from citizen organizations and/or natural persons.

9.2 Consideration of comments received

As indicated in Section 9.1, no comments were received during the local stakeholder consultation. If any comments or observations were raised during the process, they should have been considered in the EIA report, proposing corresponding precautionary measures and corrective actions (if any) to ensure that all issues during construction and operation of the project were properly addressed in accordance with Chilean environmental regulations.

10 Sustainable Development Goals (SDGs)

The contributions of the project activity to the UN Sustainable Development Goals are reported according to the BioCarbon´s Tool for Determining the Contributions of GHG Projects to Achieving the Sustainable Development Goals (SDGs).

Project specific SDG contributions are expected to be:

- *SDG 7: Project wants to contribute to target 7.2. By 2030, increase renewable energies participation at the energetic world pool. Using the SDG indicator 7.2.1. "Total electricity produced by non-conventional renewable sources". The initiative also strengthens transmission-system stability and service quality for end users. Deploying battery energy*

storage systems introduces operational flexibility to manage output fluctuations from intermittent generation sources. This enhanced resilience reduces the risk of curtailment and improves overall grid reliability. As a result, the adoption of storage technology will further mitigate stability challenges associated with variable renewable generation.

- *SDG 8: SDG indicator 8.2.1. Project The project promotes the development and dissemination of local expertise in large-scale battery energy storage technology. Building this know-how is expected to encourage other power producers to incorporate storage solutions into their new generation assets. The project is accelerating the national adoption of electricity storage and amplifying the environmental benefits of renewable integration. In turn, this capacity building will foster technological innovation and economic growth within the energy sector.*

- *SDG 13: SDG indicator 13.2.1 will be used "Amount of GHG emissions avoided or sequestered". Project will contribute to reducing GHG emissions Energy will be continuously monitored by project proponent. The project seeks to supply clean, carbon-neutral electricity to the SEN network, thereby displacing carbon-intensive fossil-fuel generation. By integrating battery energy storage systems with intermittent renewables such as wind and solar, it enhances the share of low-carbon power in the national electricity mix. This increased penetration of renewable technologies is indispensable for meeting the country's greenhouse gas reduction commitments under the Paris Agreement.*

11 REDD+ Safeguards (For REDD+ projects)

Not applicable to this project activity.

12 Special categories, related to co-benefits (optional)

Not applicable for this project activity.

13 Grouped projects (if applicable)

Not applicable to this project activity.

14 Other GHG program

The project is not registered and has not previously been registered under any other GHG program. However, the Project Holder has transparently stated that a percentage of the energy generated by the project is committed under I-REC certification.

To avoid any possibility of double counting, the PH has proposed a deviation from the methodology so that energy certified under I-REC is not counted in the project's emissions reduction calculation. For more details, please refer to section 3.1.2.

15 Double counting avoidance

According to the "Avoiding Double Counting" Tool of the BCR standard (from now on, ADC Tool), section defines a set of requirements and principles to avoid the double counting of emission reductions or removals. In this context, the project holder confirms that:

a) The project activity has not been registered in any other GHG crediting program.

b) The project activity location is not overlapped with other project activities.

c) The Environmental Impact Assessment (EIA) of the project is approved by the National Authority, and its operation is authorized by the National Electric Coordinator (CEN) demonstrating its compliance with the applicable national legal framework. All relevant rules and procedures established by the Biocarbon Program will be duly observed in its Project Document for its proper compliance.

d) The "Framework Contract signed between the Biocarbon's Registry and Project Holders" addresses this topic by prohibiting, in its Seventh clause, Double Accounting and the double issuance of VCC. By signing the binding contract between Biocarbon program and the project owner, the Project Holder commits to complying with the BCR Standard Operating Procedures and all other official documents that form part of the Biocarbon program.

According to the above, the ADC Tool are met in this project activity, aligned with the scope of the ADC Tool that prohibits the accounting, issuance and retirement of GHG mitigation results that meet any of those four scenarios/conditions described by the ADC Tool.

Regarding the provisions in place to avoid the double issuance of VCC, it is worth noting that this grouped project has not been included or registered in any other GHG program and that the emission reductions accounted for (in the form of avoided tons of CO2e) will be issued for the first and only time as Verified Carbon Credits (VCC) under the BCR Standard.

16 Monitoring plan

16.1 Description of the monitoring plan

The monitoring plan to be applied is based on the net electric energy to be delivered by the project activity to the National Electric System (SEN).

1. Monitoring organization

Andes Solar IV SpA is a subsidiary of AES Andes S.A. one of the most important power generation companies in Chile, in terms of installed capacity. The company has different types of power plants and provides energy to the National Electric System (SEN), so it has extensive experience in measuring, monitoring, and recording the electrical energy generated and supplied to the grid.

Andes Solar IV SpA's monitoring organization for the Andes Solar IV project activity will be based on the current functions and responsibilities of the Company's Operations Department, in charge of collecting data from each Andes Solar IV SpA power plant, which is automatically recorded every hour. The Operations Department is also in charge of ensuring that the meters comply with the accuracy and quality national requirements during the monitoring period and of coordinating the maintenance or replacement of meters with an external company.

The Plant Supervisor will be in charge of coordinating the correct operation of the power plant and will be in constant communication with the Operations Department, reporting any situation that occurs in the plant, such as equipment failures, stoppages, etc. Additionally, it will be designated a person in charge of the GHG Emission reductions (GER) project will be designated of ensuring that all the information required by the defined monitoring plan is carried out in accordance with the applicable methodology and will also be responsible for ensuring that the members of the operational staff are duly trained in the Biocarbon project issues.

The GER Manager (based in the city of Santiago) will verify the values of the net electrical energy generated, cross checking the information with the company's sales receipts, and perform the emission reduction calculations.

The Biocarbon project training will include at least:

- *Biocarbon project cycle, including stages and responsibilities.*
- *Baseline description, emission factor, ERs, etc.*

- *Andes Solar IV monitoring plan.*

All the actors involved in the project activity Monitoring Plan will be in constant communication, as can be seen in the following diagram.

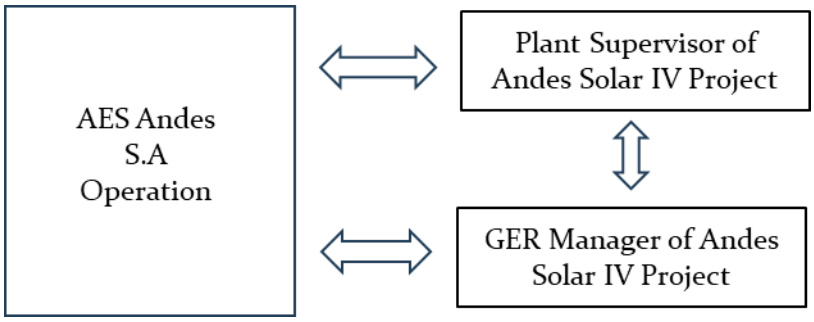

Figure 5: Organization for project Monitoring Plan

The main electrical meter for the measurement of electrical energy supplied to the grid will be installed at the high voltage point that connects the project to the SEN grid.

In accordance with the technical document: " SISTEMAS DE MEDIDAS DE ENERGÍA"/ Norma Técnica de Seguridad y Calidad de Servicio/Anexo Técnico "Sistemas de Medidas para Transferencias Económicas[26], the coordinated companies must comply with the technical requirements according to IEC 62053-22 standard, which establishes the type requirements for static active energy meters in alternating current (AC), specifically for accuracy classes 0.1S, 0.2S, and 0.5S, which are the most accurate. This international standard focuses on the testing and technical specifications of these meters to ensure their correct and accurate measurement of electrical energy. The frequency of the verification of the measurement equipment that participates in the economic transfers, which must be carried out by a body authorized by the SEC, it will be defined according to the manufacturer recommendations.

It is important to highlight that if the national regulation changes, the equipment verification procedures must be updated to comply accordingly with the requirements.

[26] See file "DocTec_Sistema-Medidas-Energia_2021.pdf" also availbale at: https://medidas.coordinador.cl/public/DOCUMENTACION/NORMATIVA/Documento%20T%C3%A9cnico%20Sistema%20de%20Medidas%20de%20Energ%C3%ADa%202021.pdf

The measured data will be crosschecked with the records of sold electricity and in cases where differences are detected, the lower value of both will be considered conservative.

2. Data recording procedure

a) Metering Electricity delivered to the Grid

- *The electrical energy delivered to the grid will be measured following the guidelines established in the Technical Document "Energy Measurement Systems".*

- *The photovoltaic power plant will use a bidirectional meter located at the project site to continuously measure the electricity exported to the grid and imported from the grid in case of force majeure.*

- *The net electricity generation data, $EG_{PJ,y}$, is received electronically and will be collected and recorded each month and saved for Biocarbon verification.*

- *Meter data will be read by software and electronically archived and kept for at least two years after the end of the last crediting period or the last ER issuance for this project activity, whichever is later.*

b) Data Availability Factor

In accordance with Article 12 (Information availability factor) of the Technical Annex: "Measuring Systems for economic transfers", the coordinated companies must guarantee an availability of information greater than or equal to 97%, measured in a moving window of 12 months, including in the calculation the availability of electric meters (EMs).

Data Integrity represents the success rate in the completeness of the daily information each time the EM is asked for data.

The CEN platform will deliver this information, relating the amount of data received in the Reception Platform for Economic Transfers Measures (PRMTE) and the amount of data recorded in the EM in the daily period evaluated. Thus, in a 24-hour period, the PRMTE must receive 96 continuous hourly energy records. In case of not receiving them, or receiving them poorly, the record will be qualified as "incomplete data".

c) Deadlines to normalize failures in measuring equipment and communication

In accordance with Article 16 (Deadlines to normalize measuring equipment failures and communication) of the Technical Annex: "Measurement systems for economic transfers", the period to normalize EM and communication failures, that is, the recovery of the

registration activity and reading capability, must not exceed three days, from the date that the Electric Toll Department (DP) detects and notifies said irregularity in the measurement or integration of the "coordinated" energy flows.

n the event that there are abnormalities or failures that are not resolved before the use of the EM records in the economic transfer processes, the DP will proceed to estimate the energy profile in a conservative way, considering the history that the PRMTE has about the affected measurement point.

d) Electricity meter failure

In case the electricity meters are found to be beyond the permissible error, then the error encountered will be discounted to all meter readings since the last verification of equipment accuracy was performed as a conservative approach. Nevertheless, the meter will be replaced as soon as possible once the error is detected.

In case of meter failure or signal loss, the CEN procedure "Norma Técnica de Seguridad y Calidad de Servicio. Anexo Técnico "Sistemas de Medidas para Transferencias Económicas" will be used, which presents criteria to be applied in different cases.

e) Missing electricity data

If electricity generation data of Andes Solar IV project activity is missing, the public information of SEN Energy Generation which is made by CEN will be considered. The accuracy and thoroughness of this procedure is backed by the CEN and by all companies operating in the system who review and validate the information. Therefore, the amount of energy injected to the grid shall be obtained by comparing the lowest value between the invoice report and the public information of CEN Energy Generation, which can be found in the website: https://www.coordinador.cl/operacion/graficos/operacion-real/generacion-real/.

The emission factor of the grid, fixed ex-ante for each crediting period, will use public data for it calculation: Electricity generation for each power plant connected to the national grid (CEN), Emission Factors for every thermal power plant that operates in the SEN system, Fuel Specific Consumption for every power plant: (biannual CNE Node Price Report and/or other official sources), Calorific Content of every Fuel (CNE National Energy Balance), Fuel Carbon Content (IPCC Guidelines), Combustion Efficiency (IPCC Guidelines).

16.2 Data and parameters determined at registration and not monitored during the quantification period, including default values and factors

Data / Parameter	*$EF_{CM,grid,y}$*
Data unit	*tCO_2/MWh*
Description	*Combined margin CO_2 emission factor of the grid connected power generation in year y.*
Source of data used	*Calculated once at validation renewal stage according to last available version of methodological TOOL07 Tool to calculate the emission factor for an electricity system.*
Value (s)	*0.533*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Justification of choice of data or description of measurement methods and procedures applied	*Calculation procedures according to methodological TOOL07 "Tool to calculate the emission factor for an electricity system" (Version 07.0). Combined Margin is fixed for the second crediting period and calculated using the OM weight average for the last three available years and the BM of the last available year.*
Additional comments	*--*

Data / Parameter	*$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$*
Data unit	*tCO_2/TJ*
Description	*CO_2 emission factor of fossil fuel type i used in power unit m in year y*
Source of data used	*IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual, Volume 2 (2006), chapter 1. Table 1.4. (IPCC, 2006). IPCC default values at the lower limit of the uncertainty at a 95% confidence interval.*
Value (s)	*Fuel / Value / Unit / Source* *Coal / 92,800 / kgCO2/TJ / IPCC, 2006* *Natural Gas / 54,300 / kgCO2/TJ / IPCC, 2006* *Diesel / 72,600 / kgCO2/TJ / IPCC, 2006*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculations.*

Justification of choice of data or description of measurement methods and procedures applied	*Since country specific emission factors for fuels are not available IPCC default figures were used.*
Additional comments	*--*

Data / Parameter	$NCV_{i,y}$
Data unit	*GJ/t*
Description	*Net calorific value (energy content) of fossil fuel type i used in the power unit m in year y*
Source of data used	*IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual, Volume 2 (2006), chapter 1. Table 1.2. (IPCC, 2006). IPCC default values at the lower limit of the uncertainty at a 95% confidence interval.*
Value (s)	*Fuel* / *Value* / *Unit* / *Source* *Coal (sb)* / *18.9* / *TJ/Gg* / *IPCC, 2006* *Natural Gas* / *44.2* / *TJ/Gg* / *IPCC, 2006* *Diesel* / *43.3* / *TJ/Gg* / *IPCC, 2006*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculations.*
Justification of choice of data or description of measurement methods and procedures applied	*Since country specific NCVs for fuels are not available IPCC default figures were used*
Additional comments	*--*

16.3 Data and parameters monitored

Data / Parameter	$EG_{Facility,y}$
Data unit	*MWh/yr*
Description	*Quantity of net electricity generation that is produced and fed into the grid replacing grid power as a result of the implementation of project activity in project year y in a greenfield project activity.*

Measured /Calculated /Default:	*Measured.*
Source of data	*The electricity exported by the project activity to the grid will be continuously measured by a bi-directional meter and recorded monthly and an accuracy class according to national regulation requirements.*
Value(s) applied	*613,210.46*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emissions calculations.*
Monitoring frequency	*Continuously.*
Measuring/ Reading/ Recording frequency	*Aggregated and recorded at least once a month.*
Measurement/Calculation method (if applicable)	*Not applicable.*
QA/QC procedures applied	*The calibration of all the meters will be carried out in-line with the National standard. The meters will be of accuracy class 0.2s.* *Parameter is cross checked with the internal plant energy balance.* *In case the electricity meters are found to be beyond permissible error then, the detected error will be discounted to all data since the last verification of the equipment.* *If electricity generation is missing, there will be considered the public information of SEN Energy Generation which is collected and checked by CEN.* *In case of failure the meter will be duly replaced as soon as possible once the error is detected.*

Data / Parameter	$EG_{IRECs,y}$
Data unit	*MWh/yr*
Description	*Quantity of net electricity generation supplied by the project plant/unit to the grid used in the generation of IRECs in year y (MWh/yr).*
Measured /Calculated /Default:	*Calculated.*
Source of data	*The electricity exported by the project activity to the grid will be continuously measured by a bi-directional meter and recorded*

	monthly and an accuracy class according to national regulation requirements.
Value(s) applied	*76,283.38*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emissions calculations.*
Monitoring frequency	*Continuously.*
Measuring/ Reading/ Recording frequency	*Aggregated and recorded once the monitored year has ended and IREC certification has been obtained.*
Measurement/Calculation method (if applicable)	*Not applicable.*
QA/QC procedures applied	*The energy to obtain the quantity of the energy to be certificated is measured by electric meters with an accuracy class 0.2s.* *Parameter is cross checked with the internal plant energy balance.* *In case the electricity meters are found to be beyond permissible error then, the detected error will be discounted to all data since the last verification of the equipment.*

Data / Parameter	$EC_{BESS,y}$
Data unit	*MWh/yr*
Description	*Electricity used exceptionally charged the BESS using grid electricity.*
Measured /Calculated /Default:	*Measured*
Source of data	*The electricity imported from the grid will be continuously measured by a bi-directional meter and recorded monthly with an accuracy class according to national regulation requirements.*
Value(s) applied	*0*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Project emission calculations.*
Monitoring frequency	*Continuously*

Measuring/ Reading/ Recording frequency	*Aggregated and recorded at least once a month.*
Measurement/Calculation method (if applicable)	*Not applicable.*
QA/QC procedures applied	*The calibration of all the meters will be carried out in-line with the National standard. The meters will be of accuracy class 0.2s.* *Parameter is cross checked with the internal plant energy balance.* *In case the electricity meters are found to be beyond permissible error then, the detected error will be discounted to all data since the last verification of the equipment.* *If electricity generation is missing, there will be considered the public information of SEN Energy Generation which is collected and checked by CEN.* *In case of failure the meter will be duly replaced as soon as possible once the error is detected.*

Data / Parameter	$EF_{CM,charge,y}$
Data unit	tCO_2/MWh
Description	*Combined margin CO2 emission factor of the grid connected power generation in year y.*
Measured /Calculated /Default:	*Calculated*
Source of data	*The electricity exported by the project activity to the grid will be continuously measured by a bi-directional meter and recorded monthly and an accuracy class according to national regulation requirements.*
Value(s) applied	*0*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Project emission calculations*
Monitoring frequency	*Once a year in case of* $EC_{BESS,y}$*>0 and < 2% of* $EG_{Facility,y}$
Measuring/ Reading/ Recording frequency	*Once a year.*
Measurement/Calculation method (if applicable)	*Calculation procedures according to methodological TOOL07 "Tool to calculate the emission factor for an electricity system" (Version 07.0).*

	Combined Margin is fixed for the second crediting period and calculated using the OM weight average for the last three available years and the BM of the last available year.
QA/QC procedures applied	*The grid emission factor calculation is supported by public data collected by the Chilean Electric Coordinator (CEN www.coordinador.cl) and the National Energy Commission (CNE https://www.cne.cl/en/). Both organizations guarantee the quality, continuity, transparency, and availability of the information required to calculate both the charge and discharge grid emission factors.*

Appendix 1. Post-registration changes summary.

Provide a concise overview of the post-registration modifications proposed in this version of the GHG Project Document, and, where applicable, a chronological record of all post-registration changes to the project activity that have been approved by the BCR Technical Committee following its registration. For all post-registration changes, include justifications, the impact of the changes on relevant BCR requirements, and any supplementary information pertaining to the modifications.

All post-registration changes shall follow the provision in section 14.5 of the BCR Standard Operating Procedures.

NOTE: This Project Document (PD) shall be completed following the instructions included. However, it is important to highlight that these instructions are complementary to the BCR STANDARD, and the Methodology applied by the project holder, in which more information on each section can be found.