



LAS PIZARRAS PROJECT

3rd Monitoring Report

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Prepared by	Empresa Eléctrica Río Doble S.A.: Giobany Cuavoy

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Las Pizarras Project (hereafter referred to as the “Project”) is a run-of-river hydroelectric power project located at approx. 1,078 m.a.s.l, on the high basin of the Chancay river, in the district of Santa Cruz and Sexi, province of Santa Cruz, region of Cajamarca, in Peru. The total installed capacity of the Project consists of 19.992 MW, with an electricity generation potential of 106.598 GWh per year¹. The Project was implemented by “Empresa Eléctrica Río Doble S.A.” (hereafter referred to as “Río Doble”).

The Project generates renewable electricity by using water from the Chancay river and supply this energy to the National Interconnected Electric Grid (SEIN). The aim of the project is to displace energy generated by fossil fuels from the electricity system (SEIN) through renewable energy generation. The spatial extent of the Project boundary is the SEIN. The plant is connected to the national grid SEIN through 138 kV transmission line to the Espina Colorada sub-station, with a total length of approx. 14.43 km.

As can be seen in Table 1, the construction of the power plant starts with the construction of the access road on April 14th, 2011. Purchase of main equipment happened on July 12th, 2012, when the two Indar generators were bought. The Generation Concession of the hydroelectric plant, which states that it was complied with the affidavit of compliance with environmental standards, was obtained on November 18th, 2008, and on September 9th, 2009, the transfer of ABR Ingenieros in favour of Empresa Eléctrica Río Doble S.A. was approved. Commercial operation started on April 30th, 2013.

The Project was originally registered as a CDM program under UNFCCC on October 19th, 2012, with reference 6967 “Las Pizarras Project”.

The relevant implementation dates of the Las Pizarras Project, are set out in the following table:

Table 1. Relevant implementation dates of the Project activity

Date	Key Events	Document
18/11/2008	Environmental authorization	(RM) Concesión Definitiva de Generación RER. publicación El Peruano (RM) Cambio Titular Concesión Definitiva Generación RER. publicación El Peruano

¹ Socoin (2011). Proyecto Básico Las Pizarras (Basic Project Las Pizarras), p. 15.

Date	Key Events	Document
04/04/2011	Temporary license	20110404_Resolución de la Alcaldía
14/04/2011	Start of Works / Date of construction	Acta de Recepción
01/08/2011	Construction license	20110801 Licencia construcción Santa Cruz
12/07/2012	Purchase of main equipment	Factura Indar - Invoice for purchase of the two Indar generators
30/04/2013	Commissioning date	20130430 Aprobación de puesta en operación comercial – Carta COES
30/04/2013	Starting date of the crediting period	VCS Homepage: Home / Verified Carbon Standard / Project 1348 ²

The power plant has an expected operating lifetime of 40 years and it was estimated that it would avoid the emission of 68,132 tons of carbon dioxide equivalent (t CO₂e) per year, which would amount to 681,320 t CO₂e for the first crediting period (30/04/2013 - 29/04/2023) of 10 years, generating the equivalent amount of greenhouse gas (GHG) emissions reductions (ERs). The greenhouse gas (GHG) emissions of the Project activity are negligible, thus there is no need to monitor them, and this is not taken into account when calculating ERs.

As a result of displacement of the electricity generated in fossil fuel power plants of the grid, the emissions reductions of the different monitoring periods of the first crediting period are collected below:

Table 2. Total amount of emission reductions for the first crediting period

	Emission Reductions
1st Monitoring Period (30/04/2013 to 30/09/2015)	107,925 t CO ₂ e
2nd Monitoring Period (01/10/2015 to 30/09/2021)	333,741 t CO ₂ e
3rd Monitoring Period (01/10/2021 to 29/04/2023)	103,182 t CO ₂ e
TOTAL	544,848 t CO ₂ e

² Las Pizarras Project, VCS registry home page: <https://registry.verra.org/app/projectDetail/VCS/1348>

As can be seen, in this last monitoring period, the total amount of the emission reduction is 103,182 tCO₂e, and the Project has operated satisfactorily.

1.2 Audit History

In this third monitoring period of Las Pizarras Project, the verification process is developed by SustainCERT S.A. as VVB (see table below).

The audit history of the project is included in the following table:

Audit type	Period	Program	Validation/verification body name	Number of years
Validation (CDM)	19-October-2012	CDM program (UNFCCC)	Swiss Association for Quality and Management Systems	Seven years
Validation (VERRA)	09-September-2014	VCS program (VERRA)	AENOR International S.A.U.	Ten years
Verification (1 st Monitoring Period)	30-April-2013 – 30-September-2015	VCS program (VERRA)	AENOR International S.A.U.	Two years and five months
Verification (2 nd Monitoring Period)	01-October-2015 – 30-September-2021	VCS program (VERRA)	Applus+ Certification	Six years
Verification (3 rd Monitoring Period)	01-October-2021–29-April-2023	VCS program (VERRA)	SustainCERT S.A.	One year and seven months
Total	19-October-2012 – 29-April-2023	-	-	Ten years

1.3 Sectoral Scope and Project Type

Sectoral scope ³	1.Energy (renewable/non-renewable)
Project activity type	Hydroelectric

1.4 Project Proponent

Organization name	Empresa Eléctrica Río Doble S. A.
Contact person	Giobany Cuavoy

³ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

Title	Apoderado General
Address	Calle Tomas Ramsey N° 930, Of. 804 Magdalena del Mar – Lima. Código Postal N° 15076
Telephone	(511) 992765301
Email	gcuavoy@riodoble.com

Empresa Eléctrica Río Doble, S.A (ERD), Project Participant of Las Pizarras project, has full ownership of the carbon credits generated by the project.

1.5 Other Entities Involved in the Project

Organization name	SMARTENER
Role in the project	The function of SMARTENER in Las Pizarras Project is the responsibility of controlling, organizing, and monitoring the operation, maintenance, and performance results. During the power plant construction phase, Río Doble obtained a contract with the Spanish company ALARDE SOCIEDAD DE ENERGIA SA, which provided financing and made the construction possible. As part of this agreement, ALARDE SOCIEDAD DE ENERGIA SA would be responsible for project development and managing the operation⁴. In December 2016, Alarde's rights were transferred to SMARTENER, and the contract has remained in effect until today. Its validity is renewed annually⁵.
Contact person	Alberto Gandara
Title	Exploitation Responsible
Address	Paseo de la Castellana, 140, Planta 6C, Chamartín, 28046, Madrid
Telephone	+34 917 45 49 68
Email	agandarar@smartener.es

⁴ Evidence "20110701 Contrato servicios ALARDE-ERD".

⁵ Evidence "20231228 Adenda 10 Contrato de Servicios SMT-ERD 2024".

Organization name	NTT DATA
Role in the project	SMARTENER, as responsible of operation management, has hired the services of NTT DATA to develop the work related to the verification process. NTT DATA's Climate Change Team has extensive experience in advising on CDM and VCS projects, having a large portfolio of projects successfully executed. Rio Doble (PP) and SMARTENER has provided to NTT DATA all the information necessary for the report development and calculations, as well as the evidence on which all the data is based, in a transparent manner.
Contact person	Alfonso Medrano Gutiérrez
Title	Climate Change, Nature and Sustainability Director
Address	Camino de la Fuente de la Mora, 1, Hortaleza, 28050, Madrid
Telephone	+34 917 49 03 00
Email	alfonso.medrano.gutierrez@emeal.nttdata.com

1.6 Project Start Date

Project start date	30-April-2013
Justification	The start date of the project activity was the moment on which the project began generating GHG emission reductions supplying renewable energy to the national electricity grid (commissioning date).

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	30-April-2013 to 29-April-2023 (Renewable at most twice)

The first crediting period started on April 30th, 2013, and according to the PD registered, the last VCS crediting period will end at the date when the last CDM crediting period of the project activity will expire as per paragraph 3.8.3 of the VCS Standard version 3.4, version applicable to the project in the moment of registry. This means, VCS crediting period will end on December 31st, 2033.

1.8 Project Location

The Project is located in the northern part of Peru, within the District of Santa Cruz and Sexi, Province of Santa Cruz, and Department of Cajamarca. The powerhouse is placed along the right margin of the Chancay River.

According to the Project's license to undertake studies for electricity generation, granted by the Institute of Natural Resources (INRENA) and then ratified by the water authority (Autoridad Nacional del Agua - ANA), the coordinates for the intake and discharge are the following:

Table 3. Intake and discharge coordinates of the Project activity

Intake Coordinates			
UTM Coordinates	X (East): 721.737	Y (North): 9267.716	PSAD 56
Geographical Coordinates	Longitude: -78.99442485	Latitude: -6.620835649	
Discharge Coordinates			
UTM Coordinates	X (East): 714.470	Y (North): 9263.575	PSAD 56
Geographical Coordinates	Longitude: -79.05998099	Latitude: -6.658534724	

The location of the Project can be seen in the following figures:

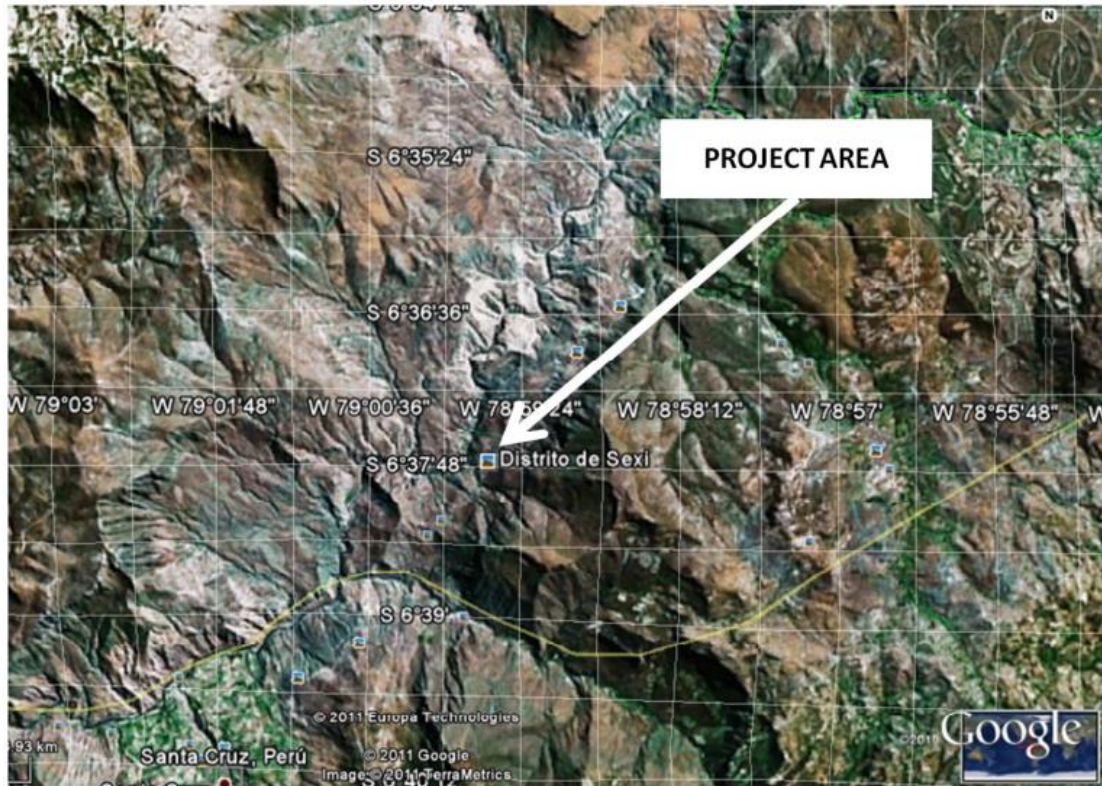


Figure 1. Project Location

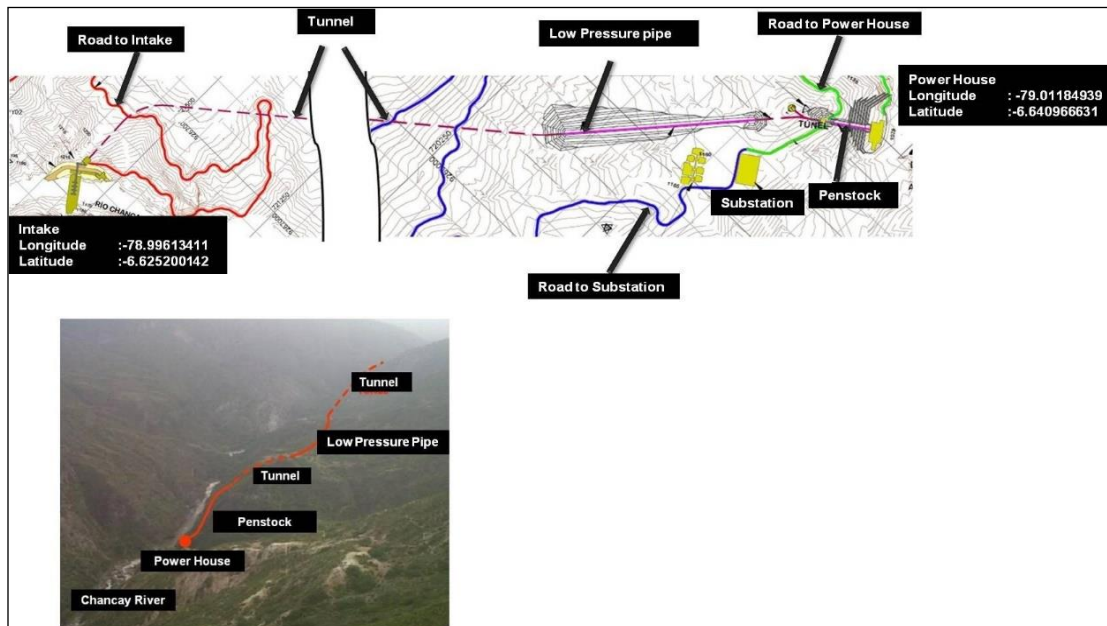


Figure 2. Detailed Project Location

1.9 Title and Reference of Methodology

The Project uses the UNFCCC approved consolidated baseline and monitoring methodology ACM0002, and uses the following UNFCCC tools, also referred in the methodology:

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Consolidated baseline methodology for grid-connected electricity generation from renewable sources	12.3.0
Tool	07	Tool to calculate the emission factor for an electricity system	02.2.0
Tool	01	Tool for the demonstration and assessment of additionality	06.0.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

No GHG credits have been claimed under other GHG programs.

1.10.2 Registration in Other GHG Programs

Was the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

The Project was initially registered under UNFCCC CDM scheme on October 19th, 2012 (reference 6967 “Las Pizarras Project”⁶). Since the change of Standard, the status of the Project is “withdraw” from UNFCCC and no GHG credits have been claimed under other GHG programs.

⁶ Project under CDM, UNFCCC - Project 6967: Las Pizarras Project:
<https://cdm.unfccc.int/Projects/DB/SQS1344589168.03/view>

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the VCS Program Definitions for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

The Project does not reduce GHG emissions from activities that are included in an emission-trading program or any other mechanism that includes GHG allowance trading. There is no national program or cap, applicable to this project. The Project doesn't use and will not use its GHG emission reductions and removals for compliance under any such programs or mechanisms.

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the VCS Program Definitions for definition of GHG-related environmental credit system.

☐ Yes ☒ No

Peru is not an Annex I country of the Kyoto protocol, so it is not participating in the Assigned Amount Unit (AAU) markets. Also, the country has not implemented a national emission rights market. Peru is preparing a national registry for GHG mitigation measures that will collect, register, monitor and manage information whose main purpose is to help monitor the NDC at the national level.

The Project is a renewable energy generation project. It discharges no emission during the operation period; thus, the Project doesn't fall into categories that create GHG emissions primarily for its subsequent removal or destruction.

The Project has not created or has not sought or received another form of environmental credit, including renewable energy certificates, now or in the future.

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

The project does not directly impact emissions associated with any good or service other than the electricity supplied to the national grid. Therefore, no double counting within scope 3 should be generated in the supply chain.

1.12 Sustainable Development Contributions

In line with the Sustainable Development Goals and the 2030 Agenda for Sustainable Development, the Project contributes to sustainable development by contributing to several of its environmental, social, economic and technological objectives, both directly and indirectly, such as the ones recorded in Table 4 below.

This project contributes with different actions to 5 of the 17 Sustainable Development Goals. Directly, it strengthens Goals 7 and 13 with the generation of clean energy and therefore the reduction of GHG emissions. It promotes equal opportunities also in the gender and social spheres, ensuring the participation of women in managerial positions (Goal 5) and recruiting staff from different regions of the country (Goal 10). Moreover, it is committed to strengthening health-care services by contributing to the acquisition of a medical oxygen plant for the population of the province of Santa Cruz and providing fuel for the transport units of the hospitals for mobilization of health personnel to remote places and the transfer of people who require specialized medical care (Goal 3).

Table 4: Sustainable Development Contributions

ARow number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	3.8	Amount of money contributed to the collective fund of the province of Santa Cruz for the purchase of a medical oxygen plant	Implemented activities to increase	Due to the problems generated by the COVID-19 pandemic, the authorities and population of the province of Santa Cruz organised a fund-raising campaign for the purchase of a medical oxygen plant to serve the population in August 2021. The acquisition of the equipment was the responsibility of a non-profit Religious Civil Association.	Contribution of twenty-five thousand soles (S/ 25,000.00) to the collective fund for the acquisition of a medical oxygen plant.
2)	3	Amount of fuel provided to Medical Institution to move people from remote places that needs medical care.	Implemented activities to increase	Río Doble offers support for the mobilization of health personnel to remote places and the transfer of people who require specialized medical care, providing fuel for the transport units of the health centers in the towns of Santa Cruz and Catache for transport to remote places (hamlets and small communities) as well as for transporting seriously ill patients to the city of Chiclayo where specialized care can be provided.	In 2023, Río Doble provided 150 gallons of fuel for the ambulances.

3)	4.7	Number of visitors received in form of organized school excursions and other academic groups	Implemented activities to increase	Visits are organized from different schools or academic centers around the different facilities of the hydroelectric plant to explain its main components, the positive impact that renewable sourced energy has over the environment and how it contributes to fight climate change. No educational centers and schools have requested to visit the power plant during the current monitoring period (from 01/10/2021 to 29/04/2023).	18 students in 5th year from the Oscar Demetrio Urraca Orrego Secondary School of the Centro Poblado Puchudén, district of Yauyucán, province of Santa Cruz.
4)	4.7	Number of attendees at informative talks on renewable electricity generation	Implemented activities to increase	Informative talks are given in educational centers, in which printed material on the company's electricity generation activity in the area is handed out. No educational centers and schools have requested to visit the power plant during the current monitoring period (from 01/10/2021 to 29/04/2023).	8 students in the 5th year from the Antonio Dávila Educational Institution in the district of Sexi, province of Santa Cruz.

5)	4.a	Number of materials provided to improve the conditions of learning centers	Implemented activities to increase	Collaboration with educational centers to provide different kind of materials (books, sport equipment, etc.) during visits to these centers. No educational centers have requested for materials during the current monitoring period (from 01/10/2021 to 29/04/2023). It is delivered when the centers express that need.	3 balls of various sports (football, volleyball) and nets for volleyball and football.
6)	5.5	Number of women in managerial positions within the plant	Implemented activities to increase	Ensure women's full and effective participation and equal opportunities for leadership. There are two management positions in the plant and one of them is occupied by a woman (head of operations). 3 women are currently employed by the Project.	3 women have been employed over the project lifetime.

7)	10.2	Percentage of employees from different provinces and districts	Implemented activities to increase	Ensure equal opportunities for employees regardless of their origin and residence. 61.54% of the permanent staff are natives and of the province and district of Santa Cruz, being the support and sustenance of their families. 38.46% of the staff are technicians who come from various provinces in the north of Peru and ERD is their first job placement, all of them with a job continuity of between 8 years. 14 people are currently employed by the project.	The company have maintained 14 positions in its organizational structure in this period. The amount of people that have been employed over the project lifetime are 24 employees. 10 of them left the company in a voluntary way in the past, hiring Rio Doble new employees for those positions.
8)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The main activity of the project is based on the production of clean energy that increases the percentage of renewable energy from the energy mix, displacing fossil fuels in the country's electrical system. From October 2021, the Project has injected 187,737.45 MWh of renewable energy into the country's electricity grid.	The amount of renewable energy generated over the project's lifetime is 986,465.40 MWh: - 1st Monitoring Period: 200,781.21 MWh - 2nd Monitoring Period: 597,946.74 MWh - 3rd Monitoring Period: 187,737.45 MWh

9)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to decrease	Using renewable energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. During this monitoring period (from October 2021 to April 2023), the Project has reduced 103,182 tons of CO₂ emissions.	The amount of CO₂ reductions over the project's lifetime is 544,848 tCO₂e: - 1st Monitoring Period: 107,925 tCO₂e - 2nd Monitoring Period: 333,741 tCO₂e - 3rd Monitoring Period: 103,182 tCO₂e
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1.13 Commercially Sensitive Information

Not applicable. This project does not have any commercially sensitive information such as “trade secrets, financial, commercial, scientific, technical or other information whose disclosure could reasonably be expected to result in a material financial loss or gain, prejudice the outcome of contractual or other negotiations or otherwise damage or enrich the person or entity to which the information relates” according to VCS Program Definitions, v4.5.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification

Stakeholders were not identified at verification. The stakeholders from the nearest towns are the same that were identified before the validation process.

According to the registered PD, the National Environmental Fund (FONAM) was mandated to undertake a local consultation process with the objective of matching the interests of the Project sponsor with those of the local community. Hence, Río Doble and FONAM held meetings to explain the objectives, scope and commitments of the Project with respect to the local stakeholders’ livelihoods and with the environment.

To establish the Project’s zone of influence FONAM set a radius of 6 km. around the Project with the use of maps and geographical coordinates of strategic locations, such as the main square of the district of Santa Cruz and the hydropower plant of the Project. Once this zone of influence was established, the communities inside it were located through interviews and a site visit where the access routes around the Project were visited, as well as the nearby district of Catache.

The main actors or representatives of the communities were also identified, and FONAM proceeded to interview the local authorities of the communities and the district, as

	well as survey the local population on their living conditions, their knowledge on environmental issues (local and global), and their knowledge on the Project. List the stakeholders identified in the interaction zone: - Governor - Provincial Municipality of Santa Cruz - Catache District Municipality - Santa Cruz Health Center - Indoamericano Educational Institute - Juan Ugaz Educational Center - Citizens
Legal or customary tenure/access rights	In the area of Las Pizarras CH Project there are no farmers or native communities, therefore, the rights to the land have been negotiated directly with the owners and holders of the land. In addition, in terms of the necessary resources (water), the rights and licenses of the Peruvian State.
Stakeholder diversity and changes over time	The district of Santa Cruz (interaction zone) has a population of around 10,000 inhabitants, which is equivalent to 25% of the total population of the province of Santa Cruz, with a decreasing growth rate (-0,41%). It registers a percentage of urban population of 54.79%, being rural population the 45.21%. In terms of female population, there are 3% more women than men in the district. There are a total of 28 educational centers, with the primary level being the one with the highest percentage of spaces, 50% of which have adequate infrastructure, except for the initial non-schooling institutions (PRONOEIS) that are located in the peri-urban areas of the city, since these are not structurally adequate (private homes, communal premises). These places lack the necessary educational equipment to serve their students.

	There is an illiteracy rate of 15.38%, which is equivalent to 1,423 people (2017 census). Among the main customs and traditions of Santa Cruz, its dances, gastronomy, craft, and traditional festivals stand out. These customs have their origin in pre-Hispanic indigenism.
Expected changes in well-being	The main expected changes in well-being are the generation of direct and indirect formal jobs through the contracting of goods and services in the project area.
Location of stakeholders	The stakeholders are located mainly in the towns of Santa Cruz and Sexi, both towns are capitals of the districts that have the same name and belong to the province of Santa Cruz, department of Cajamarca. These stakeholders located in the project area are not farmers or native communities. This process was part of the Peruvian DNA's requirements for the Letter of Approval for the Project's CDM process. All the details of the process were presented to the DOE by request during the first validation process for the first crediting period.
Location of resources	All parties have free access to the Chancay River. In addition, the use of the water resource must adhere to the scope of the Water Resources Law and the government entity that manages and regulates the resource (ANA, National Water Authority).

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	The way to received or have an ongoing communication that Río Doble provide is a mailbox available to the public where anyone can access for complain, comment and/or suggest since the project start date. On the other hand, Río Doble have a close contact with the authorities and stakeholders, having a direct communication with them. People or institutions send their communications in writing to the Plant Manager in the
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	town of Santa Cruz or they contact with the office in Lima by telephone, from where requests are forwarded to the power plant.
Date(s) of stakeholder consultation	There have not been receive any consultation during the monitoring period using the mailbox provided by Río Doble for complaints, comments or suggestions.
Communication of monitored results	Despite not having received complaints, comments or suggestions about the project activity during the monitoring period, Río Doble has direct contact with interested parties and is involved in the cultural celebrations and needs of the towns of Santa Cruz and Sexi, providing financial or material support for the development of the requested activities. These communications are received in the form of a letter of support, provided as evidence to the DOE.
Consultation records	There is a minute book ⁷ that compiles all the queries received or contacts with stakeholders since the beginning of the project. In addition, Río Doble staff compiles all the letters delivered by Río Doble in response to social aid.
Stakeholder input	Once a request is received, the legal scope is analyzed and, if applicable, a direct meeting is called or, if the contact by call or meeting is impossible, a written response is provided. In the aid consultations in which the company can participate, it presents a formal letter indicating the reason for the consultation, the way in which it will provide support, the contact information and, where applicable, the financial amount of the aid, being delivered for signature by both parties.

2.1.3 Free, Prior, and Informed Consent

Consent	In the moment of stakeholder consultation process of the first validation (prior to the execution of the project), it was concluded that the population accepted the development of the “Las Pizaras” project, even considering it beneficial
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⁷ “ACTAS CMV.pdf” provided as evidence.

	for more than 60% of the population for the development of the local communities. Since then, Rio Doble has been open to dialogue regarding any claim that may arise, and active with the local population, contributing and attending to their needs, beyond its responsibilities derived from the project activity. There have been no conflicts or incidents from the beginning of the project to the present.
Outcome of FPIC	The entire consultation process is included in a report prepared by the National Environment Fund - Peru (FONAM), which transparently demonstrates the entire process of communication about the project and transmission of knowledge of climate change, images of interviews and workshops with the different main local groups and actors, as well as the final results of all consultations. This process demonstrates that it is not about encroached on land, relocated people without consent, and forced physical or economic displacement. The project is and was developed legally and with the necessary permits and authorizations from the competent administration, and always considering the possibility of social impacts to the population and their customs.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
Not Applicable. No grievances have occurred during monitoring period.	Río Doble has a mailbox available to the general public for complaints, comments and/or suggestions. All complaints or contacts with Rio Doble are and will be attended to and resolved. This method is considered an easily procedure, accessible to stakeholders for ongoing consultation. Once a request is received, the legal scope is analyzed and, if applicable, a direct meeting is called or, if the contact by call or meeting is impossible, a written response is provided.

2.1.5 Public Comments

Summary of comments received	Actions taken
No comments received.	Rio Doble complied with its commitments and what was agreed upon in the initial project meetings with stakeholders, and no additional comments were received since the initial information sessions. Even so, Rio Doble continues carrying out actions to help schools and health care institutions in the area when they request it.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The team responsible for the operation and management of Empresa Eléctrica Rio Doble S.A. (ERD) is made up of professionals from various specialties with more than 15 years of experience. Specifically, the management team has remained in ERD since its construction stage (2011-2012) and throughout the commercial operation stage (2013), accumulating knowledge and experience in the implementation of the various ERD activities and programs and in the relationship with the local community.

In addition, the management team has participated in the planning and development of various energy projects in Peru, such as Potrero 20 MW Hydroelectric Plant (Cajamarca), Langui 6.2 MW Hydroelectric Plant (Cusco), Manta 19 MW Hydroelectric Plant (Ancash) Project San Lorenzo 3MW Hydroelectric Power Plant (Cajamarca), generating greater experience in the development of activities and relationships with communities around energy projects.

It is important to highlight that all the necessary knowledge on other topics such as environmental matters are contracted to specialist companies, which act as external advisors.

2.2.2 Risk assessment

	Risk identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	Floods.	There is no risk to stakeholders associated to the project because of the human activity. However, as it is a river whose flow is closely related to rainfall, so overflow events and flooding of the river course may

		occur that affect the stakeholders and Rio Doble facilities.
Risks to stakeholder participation	No risk identified.	The project has carried out a consultation process with stakeholders where prevention measures/of occupational hazards had been implemented during participation events, so that no risks are identified.
Working conditions	No risk identified.	All Project activities ensure safe working conditions for employees.
Safety of women and girls	No risk identified.	The Project does not involve harm to women and girls in the local community.
Safety of minority and marginalized groups, including children	No risk identified.	The Project doesn't involve risks in the protection of children and minority and marginalized groups from harm in the local community.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified.	As it is a run-of-river hydroelectric power plant, no pollutants risks associated with Project activities are identified. To guarantee that there is no impact on the environment, Río Doble carries out quarterly monitoring of noise, electromagnetic radiation, air quality and water quality (biannual).

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified ⁸	Mitigation or preventative measure(s) taken
Discrimination	No risk identified.	There have been no complaints about discrimination cases and there is no evidence that there has been any case.
Sexual harassment	No risk identified.	There have been no complaints about sexual harassment cases and there is no evidence that there has been any case.

⁸ The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

Gender equity in labor and work	No risk identified.	The Project provides equal opportunities in the context of gender equity and remuneration of labor and work as there are two managerial positions in the plant and one of them is occupied by a woman, there are workers native and of the province and district of Santa Cruz as well as technicians who come from various provinces in the north of Peru and Río Doble is their first job placement, all of them with a job continuity for 4 – 6 years.
Forced labor	No risk identified.	Rio Doble workers are declared on a way that is supervised by government authorities, using legal contracts, who ensure that there is no infringement their labor rights. In the same way, there are no hiring or labor exploitation of minors.
Child labor	No risk identified.	
Human trafficking	No risk identified.	

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	Rio Doble hires local staff and represents a great influence on the surrounding area. In addition, they are part of the management team. Guaranteeing them all the benefits or requirements of the law and conditions of the international human rights law, it demonstrates the commitment to respecting the right to work. In addition, the cultural events of the area are supported since they are part of the traditional celebrations of the area. There are no indigenous towns, tribal peoples, or peasant/farmers communities in the Project area.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified.	Rio Doble has supported and participated in the traditional celebrations of local populations, spaces in which art, dance and tourism are promoted in the areas involved.

In addition, there are no indigenous populations or peasant communities in the project area.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	Río Doble signed 20 contracts⁹ for the transmission line with all the landowners identified in the project area. These contracts were recorded by notary in a public deed and indicate the permanent land use rights for the transmission line. In addition, in the Project area there are no indigenous populations or peasant communities holding property rights..

2.3.5 Benefit Sharing

There are no property rights as is said the section 2.3.4 above, so doesn't apply the description of the project's benefit sharing agreement.

2.4 Ecosystem Health

In 2023, Río Doble developed the Detailed Environmental Plan (PAD), which establishes the reference baseline of the project's area of influence and an environmental management plan, as well as citizen participation mechanisms. This Plan is delivered to the competent authority and is subsequently approved under *Decreto Supremo No. 014-2019*, "Regulation for the Environmental Protection of Electrical Activities". In this way, the interest in knowledge of environmental baseline and the development of a new action plan, Río Doble continues showing commitment with the environment and its relationships with stakeholders.

	Risk identified	Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified.	At the time of the project's implementation, Río Doble was not required to conduct a study on the impact of its activities on fish or other aquatic life. However, Río Doble conducts voluntary quarterly monitoring of noise, electromagnetic radiation, air quality and

⁹ Contracts provided to the VVB as evidence.

		water quality (biannual). The results show that the electricity generation activities do not affect or impact biodiversity or ecosystems. In addition, Río Doble has voluntarily developed the Detailed Environmental Plan (PAD), an instrument that provides a legal environmental framework in Peru for operations. In this PAD, once approved by the competent authority, Río Doble commits to conducting hydrobiological monitoring.
Soil degradation and soil erosion	No risk identified.	Not applicable. The project activity does not affect the soils.
Water consumption and stress	No risk identified.	The project activity does not produce water stress neither water consumption with its main activity since it is a run-of-river hydroelectric power plant. However, the alteration of the amount of water may be affected by the development of the operating sub activity of the collection components for the operation of the Las Pizarras HPP, but always respecting the ecological flow limits for the conservation aquatic flora and fauna.

2.4.1 Rare, Threatened, and Endangered species

As all electricity generation activities, it has a transmission line with a larger area of influence for which an environmental impact study was carried out. In this study the presence of some threatened species was identified.

Species or habitat	Las Pizarras, due to its type of activity, does not present relevant risks or impacts to species, beyond the turbine action, nor is there any damage to ecological connectivity identified as it is a run-of-the-river hydroelectric plant. However, although the project activity does not present relevant impacts on the species and their ecosystems, EIA studies were carried out for the transmission line.
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The procedure defined in the EIA for identifying threatened species was as follows: first, using secondary information and cartography from SERNARP, areas with potential presence of vulnerable or threatened species were identified. Then, fieldwork was conducted, 100-meter radius were established around the transmission towers located in the species presence area and the adjacent towers, and field searches were conducted to confirm their presence, but no specimens of the species mentioned in the cartography from SERNARP found.

Based on sources from the Ministry of the Environment of Peru, SERNANP and IUCN, some threatened species were identified in the area of influence of the transmission line:

Birds:

- *Penelope barbata*: “Vulnerable” (UICN), “Endangered” (Decreto Supremo N°034-2004-AG)

Rio Doble, according to EIA, carried out periodic environmental monitoring during the first year (2013-2014) in which bird mortality due to collision with the transmission line was monitored. Since no bird mortality was observed, further monitoring was not required.

- Flora: *Kageneckia lanceolata* (Endangered). Identified in the EIA, through SERNARP cartography. However, it was not found during field works.
- *Loxopterygium huasango* (Endangered). Confirm during field works.
- *Polylepis racemosa* (Endangered). Confirm during field works.
- *Tabebuia* sp. (Endangered). Confirm during field works.

These species are not affected by the project activity as the flora is not in interaction with the transmission line.

There are no threatened mammals, amphibians, reptiles or fish. However, there is an identified amphibian, *Hyloxalus elachyhistus*, that are not categorized as threatened in IUCN Red List but appears as *Near Threatened* on Perú DS N° 034-2004-AG. This species is not affected by the transmission line.

Areas needed for habitat connectivity	There are no relevant connectivity areas that are affected by the operation of the project, as it is a run-of-the-river hydroelectric plant.
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	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	There is only potential risk to birds due to the existence of the electrical transmission line.	The line was evaluated in EIA, and possible damage to birds is monitored and subsequently reported. As a mitigation measure, “bird guards” are installed on the longest transmission lines.
Areas for habitat connectivity	No risk identified.	The operation of the plant does not affect the connectivity of the habitats as it is a run-of-the-river hydroelectric plant that does not generate physical barriers. In addition, noise and water quality and quantity monitoring is carried out preventively to ensure the integrity of the ecosystem.

2.4.2 Introduction of species

The Project doesn't involve the introduction of species, so this section is not required. In addition, no invasive species have been identified.

2.4.3 Ecosystem conversion

The Project doesn't involve ecosystem conversion, so this section is not required.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Las Pizarras Project started its commercial operations on April 30th, 2013. Hence, the carbon crediting period and therefore the monitoring starts on April 30th, 2013, when the plant commenced electricity generation. At the time of starting the commercial operations, the Project was fully operational.

During the third monitoring period (01-October-2021 to 29-April-2023), the Project has operated continuously and satisfactorily. There have only been regular maintenance stoppages and some isolated forced shutdowns events that have been satisfactorily resolved and that have not compromised clean generation production. The longest duration events that occurred during the monitoring period and the reason are listed below.

Table 5. Relevant stoppages of the Project activity

Date	Unit	Start time	End time	Total downtime (minutes)	Details
25/03/2022 – 26/03/2022	G2	18:18	11:30	1,032	Internal incident: Triggering due to rupture of flexible pressure relief pipe seal
28/03/2022 – 31/03/2022	G2	12:51	20:00	4,749	Internal incident: Triggering due to rupture of flexible pressure relief pipe seal
29/01/2023 – 30/01/2023	G1	0:30	9:13	2,013 (1,208' + 805')	External incident: ENSA & Greenergy Programmed Maintenance (100MVA transformer replacement - Carhuaquero¹⁰) [29/01 00:30h – 29/01 20:38h] Internal incident: connection failure in valve after the Programmed Stoppage (transformer

¹⁰ Informe EDI N°-039

Date	Unit	Start time	End time	Total downtime (minutes)	Details
					replacement) [29/01 20:38h – 30/01 9:13h ¹¹]
29/01/2023 – 30/01/2023	G2	0:31	9:13	2,012 (1,207'+ 805')	External incident: ENSA & Greenergy Programmed Maintenance (100MVA transformer replacement - Carhuaquero¹⁰) [29/01 00:31h – 29/01 20:38h] Internal incident: connection failure in valve after the Programed Stoppage (transformer replacement) [29/01 20:38h – 30/01 9:13h¹¹]

The amount of energy generated has been continuously measured by one main meter (M1) installed at Espina Colorada substation. The backup meters (M2 and M3) installed in the same substation have not been used during this monitoring period. These measurements equipment is certified and calibrated complying IEC standards.

3.2 Deviations

3.2.1 Methodology Deviations

This project does not have methodology deviations, so this section is not required.

3.2.2 Project Description Deviations

There is not occur deviations in this monitoring period.

Deviations reported in previous monitoring reports:

There was a change on the turbines and total installed capacity of the Project, recorded in the first monitoring period. It was stated in the PD that the project would employ two new Francis turbines with horizontal shafts of 9 MW each and the total capacity this would be of 18 MW, with an electricity generation potential of 103.32 GW-h per year.

In reality, two generators of 9,996 MW each were employed, the total installed capacity is now 19.992 MW, and the total electricity generation potential is 106.598 GW-h per year.

¹¹ Informe Evento 20230129

Given that the PDD redaction was carried out during the project phase, this change occurred during the construction phase when it was detected a mistake in the river daily flow, could produce a reduction on the estimated energy production. In order to get the estimated energy production, it was decided to change the turbines previously considered and increment the total installed capacity up to 19.992 MW.

Considering that this increase of +3.1% in the electricity generation potential is far from the +38% variation established for the energy sales parameter that would be necessary to reach the benchmark of 12% included in the PDD, it is considered that this project deviation does not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario. Furthermore, this change in the installed capacity was already approved in the previous monitoring reports.

The difference in production is mainly due to two factors with opposing effects:

For once, calculation was revised when it was found out that the river daily flow would yield an income of about 3% lower than originally planned. Which led to a subsequent detailed study by the engineering department of the manufacturer, allowing the PP to work with the distributor of the turbine to change it, which meant a greater flow path and therefore greater peak power and higher output (but only in those moments where the plant is at full load). With which fortunately it was able to counteract the above factor.

The following table shows the differences between the estimated initial data, considered in the registered PD, and the real data of the final installed equipment:

Table 6. Estimated and real data of the equipment installed

	Turbinable flow rate	Rated net head	Turbine installed capacity	Generator installed capacity	Maximum theoretic production
Initial estimate data	22.1 m ³ / sec	95.67 m	9.1125 MW (10.125 KVA)	9 MW	103,902 MWh / year
Final data	23.2 m ³ / sec	105.35 m	10.023 MW	9.996 MW	106,598 MWh / year

In addition, the initial monitoring plan described in the Project Description Document of the CDM project was revised during the first Monitoring Period in order to remove redundant meters and implement a more simply and realistic system.

It was stated in the PD a tentative meters location as per the following figure:

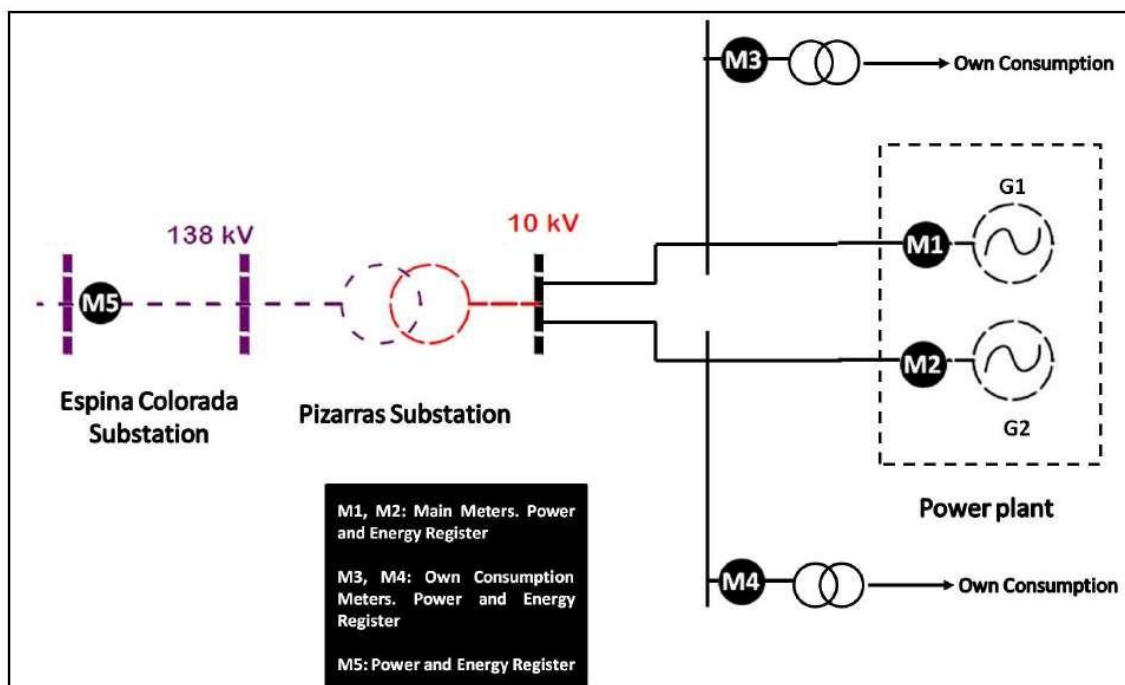


Figure 3. Initial meters location

Meters M1 and M2 (main meters) were considered redundant, so these were unified at M1. In the other hand, M4 and M3 were not considered useful since the current meters were bidirectional, and these measure the value of net electricity to the grid. M5 was substitute by two backup meters (M2 and M3) as it is shown in Figure 5 (Section 4.3).

The values obtained from the main meter (M1) would be cross check with the invoices issue to the SEIN.

This new plan was carried out from the beginning of the commercial operation of the plant, and it does not affect to the conservative calculation of the emission reduction, since there were not substantial changes, but only redundant meters were removed.

This new monitoring plan was developed in compliance with the applicable methodology and didn't involve any impacts on the additionality, methodology nor the appropriateness of the baseline scenario of the project as the only change was to remove redundant meters, only used for internal control of the project participant. Further details of the new monitoring plan are available in section 4.3.

In the other hand, in the registered PDD, the General Manager was in charge of:

- Compile and analyze all the monthly monitoring reports every year.
- Elaborate an estimate of emission reductions in an Emission Reduction Monitoring Report.
- Calculate the Combined Margin and recalculate the Grid Emission Factor every year.

- Compile and analyze all the calibration reports in a Maintenance Report Status every year.
- Manage and supervise all monitoring activities under the generation project.
- Ensure that all data is recorded accurately.
- Supervise the maintenance and operation departments.
- Ensure that the operators from the maintenance and operations departments are appropriately trained for monitoring/checking the different parameters/meters with training sessions and an instruction manual.
- Draft the Emission Reduction Monitoring Report with all its attachments, which will be verified by the DOE.

As explain in section 4.3. (Organizational structure), some tasks were assigned to the Plant Manager. This change doesn't impact the conservativeness of the quantification of GHG emission reduction.

In addition, during the second monitoring report another deviation was identified. In the registered PD, parameter $EFCO_{2,i,y}$ and $EFCO_{2,m,i,y}$ was listed both as validation and monitoring parameter (ex-ante and ex-post). In both cases, possible updates of the IPCC emission factor values were considered. Therefore, parameter $EFCO_{2,i,y}$ and $EFCO_{2,m,i,y}$ has been remove from section 4.2 because it was registered as an ex-ante parameter, under conformance with ACM0002 version 12.3.0.

In addition, there were two fuel emission factors that were not included at the time of registration: Other Primary Solid Biomass and Landfill Gas. For this reason, the value description of parameter $EFCO_{2,i,y}$ and $EFCO_{2,m,i,y}$ of section 4.1 was extended adding these two fuel emission factors needed for EFOM calculation, thus substituting the previous information:

Data / Parameter:	$EF_{CO_{2,i,y}}$ and $EF_{CO_{2,m,i,y}}$
Data unit:	tCO ₂ /GJ
Description:	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i> .
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 <i>IPCC Guidelines on National GHG Inventories</i> .
Value applied:	Diesel Oil = 72,600 Residual Fuel Oil = 75,500 Natural Gas = 54,300 Coal = 87,300
Justification of the choice of data:	The CO ₂ emission factor is used to calculate the CO ₂ emission coefficients of the power plants in the grid. This is a step necessary to find the baseline CO ₂ emission of the grid.
Any comment:	None.

Figure 4. Value applied information for $EFCO_{2,i,y}$ and $EFCO_{2,m,i,y}$ parameter in the registered PDD

The reason to addition these two types of fuel is the fact that at the time of project registration, Peru's electricity grid did not contain power plants with these technologies, so it has been necessary to incorporate the new types of fuel to consider all the plants in EFOM ex-post calculations. This project deviation does not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario according to section 3.21.2 of the VCS Standard v4.7.

On the other hand, in the registered PD, the parameter $EFCO_{2,grid,y} = EF_{grid,CM,y}$ was only included in section 4.2 as a monitoring parameter, where a description of the $EF_{grid,OM-DD,y}$ (ex-post calculation) and $EF_{grid,BM,y}$ parameters was included. However, $EF_{grid,BM,y}$ should have been specifically indicated in section 4.1, as it is an ex ante parameter that is maintained as a fixed value for the entire crediting period. For this reason, and according to TOOL07 “Tool to calculate the emission factor for an electricity system”, parameter $EF_{grid,BM,y}$ has been included in section 4.1, where it can be seen the fixed value 0.56934 tCO₂/MWh applicable to this Monitoring Period. This project deviation does not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario according to VCS Standard v4.7 because $EF_{grid,BM,y}$ is a parameter that was considered for the project, since it is an essential parameter to obtain the $EF_{grid,CM,y}$ value, but it was not included in the structure of the PD as an ex-ante parameter according to the methodology and tool in the time of registration.

Finally, according to the previous verification and the VCS Standard version 4.7 document (section 3.21.4), the identified deviations will be reflected in subsequent verifications.

3.3 Grouped Projects

Not applicable. The proposed project activity is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes

☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{CO2,i,y} and EF _{CO2,m,i,y}
Data unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fossil fuel type i in year y.
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied	Diesel Oil = 72,600 Residual Fuel Oil = 75,500 Natural Gas = 54,300 Coal = 87,300 Other Primary Solid Biomass = 84,700 Landfill Gas = 46,200
Justification of choice of data or description of measurement methods and procedures applied	The CO ₂ emission factor is used to calculate the CO ₂ emission coefficients of the power plants in the grid. This is a step necessary to find the baseline CO ₂ emission of the grid.
Purpose of data	Calculation of baseline emissions.
Comments	None.

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of the grid connected power generation in year y, calculated using the “Tool to calculate the emission factor for an electricity system”.
Source of data	COES records.
Value applied	0.56934 tCO ₂ /MWh, as indicated in the registered PDD.
Justification of choice of data or description of measurement methods and procedures applied	Built Margin, as a component of the Combined Margin (CM) emission factor of the grid, is calculated as a fixed value for the entire crediting period, according to the procedures described in the “Tool to calculate the Emission Factor for an electricity system”. The Combined Margin Emission Factor, consisting in the combination of operating margin (OM) and build margin (BM) emission factors, is calculated every year as a monitoring parameter since its other component (OM Emission Factor), is recorded in the PDD as an ex-post parameter.
Purpose of data	Calculation of baseline emissions.
Comments	None.

Data / Parameter	EF _{EL,m,y}
Data unit	tCO ₂ /MWh
Description	CO ₂ emission factor of power unit m in year y.
Source of data	COES Annual Statistics report ¹² and IPCC default values for CO ₂ emission factor of fossil fuel type ¹³ .
Value applied	All Thermal Plants Emission Factors.
Justification of choice of data or description of measurement methods and procedures applied	CO ₂ emission factor of power unit $EE_{EL,m,y} = (EF_{CO2,m,y,i} * 3.6) / n_{m,y}$ The EF _{EL,m,y} will be calculated as per the guidance for the simple OM, using the option A2.
Purpose of data	Calculation of baseline emissions.
Comments	None.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,h} and EG _{PJ,y}						
Data unit	MWh						
Description	Electricity displaced by the project activity in hour h of year y.						
Source of data	Empresa Eléctrica Río Doble S.A., based on electricity meters explained below.						
Description of measurement methods and procedures to be applied	This data will be measured and recorded every 15 minutes. The proportion of data monitored is 100% and the data is archived electronically.						
Frequency of monitoring/recording	Hourly or yearly, as applicable.						
Value monitored	<table border="1"> <tr> <td>EGPJ,2021 (from October)</td><td>38,708.57 MWh</td></tr> <tr> <td>EGPJ,2022</td><td>98,940.41 MWh</td></tr> <tr> <td>EGPJ,2023 (to April 29th)</td><td>50,088.47 MWh</td></tr> </table> EGPJ,h is recorded every 15 minutes per month in “201XXX ION Pos 103 Pizarras”, provided as evidence. These data is used to quantify annual generation (EGPJ,y), and then, to cross-check annual meter records and annual COES data:	EGPJ,2021 (from October)	38,708.57 MWh	EGPJ,2022	98,940.41 MWh	EGPJ,2023 (to April 29th)	50,088.47 MWh
EGPJ,2021 (from October)	38,708.57 MWh						
EGPJ,2022	98,940.41 MWh						
EGPJ,2023 (to April 29th)	50,088.47 MWh						

¹² COES Annual Statistics reports. Folder No. 5. Thermoelectric production and fuel consumption: <https://www.coes.org.pe/Portal/Publicaciones/Estadisticas/>

¹³ 2006 IPCC Guidelines on National GHG Inventories. IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy): https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Monitoring equipment	The equipment used to monitor the parameters is the main meter M1 and backup meters M2 and M3. The three meters are class 0.2 (as currently required by COES) and monitor the energy supplied to SEIN.
QA/QC procedures to be applied	The monthly measurement results recorded are used to cross check with reports of active energy transfers (VTEA)¹⁴ provided by COES to ensure consistency. Conservative values have been used for calculation of emission reductions. The PD stated that calibration would be done at appropriate intervals according to manufacturer specifications, but at least once in three years. Given that the manufacturer doesn't specify any appropriate interval, the calibration is being carried out at least once in three years according to the PD. All the calibrations were carried out by Peruvian Enterprise Service SAC. The last calibration of the previous monitoring period was performed in 14/01/2021 for M1, M2 and M3 meters, considering this date as reference for the moments of calibration for this monitoring period. Below are the details and characteristics of the different electricity meters as well as their calibration dates: Meter M1 (Main meter) - PosPizaras: • Manufacturer: Schneider Electric • Type: ION8650 • Accuracy class: 0.2S • Serial number: MW- 1211A328-01 • Calibration frequency: At least once every three years • Calibration date: ○ 29/01/2022 ○ 30/11/2022 ○ 03/12/2023 Meter M2 (Back up) - PosCutervo: • Manufacturer: Schneider Electric • Type: ION8650 • Accuracy class: 0.2S • Serial number: MW- 1211A330-01 • Calibration frequency: At least once every three years • Calibration date: ○ 29/01/2022 ○ 30/11/2022 ○ 03/12/2023 Meter M3 (Back up) - PosCarhuaquero: • Manufacturer: Schneider Electric • Type: ION8650

¹⁴ Valorización de Transferencia de Energía Activa (VTEA) COES reports (2021 – 2023):

<https://www.coes.org.pe/Portal/PostOperacion/ValorizacionTransferencias/ValorizacionTransferenciaEP> > “Select year” > “Select month” > VALORIZACIONES > INFORMES > VTEA report

Valorización de Transferencia de Energía Activa (VTEA) COES reports (2021 – 2023):

<https://www.coes.org.pe/Portal/mercadomayorista/liquidaciones> > Informes de liquidaciones > “Select year” > “Select month” > VTEA report

	• Accuracy class: 0.2S • Serial number: MW- 1205A219-01 • Calibration frequency: At least once every three years • Calibration date: ○ 29/01/2022 ○ 30/11/2022 ○ 03/12/2023 The generation records of the monitoring period were made with the main meter M1 (S/N MW- 1211A328-01). The backup meters M2 and M3 were not used during the monitoring period.
Purpose of the data	Calculation of baseline emissions.
Calculation method	In case of failure or maintenance of the main meter M1, the Plant Manager will request the electricity supplied by the project to the Coordinator of the grid node Carhuaquero, who will develop an energy balance with the rest of electricity meters of the system.
Comments	The three meters could be configured to work either in a unidirectional or bi-directional way, but for the project purposes they have been configured to work in a bidirectional way. The electric energy displaced by the project activity is the net energy delivered to the grid. This net energy considers the self-consumption of the auxiliary systems.

Data / Parameter	$EF_{CO2,grid,y} = EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh per year
Description	CO ₂ emission factor of the grid electricity in year y.
Source of data	COES records and Río Doble.
Description of measurement methods and procedures to be applied	The Emission Factor has been calculated following the “Tool to calculate the emission factor for an electricity system”, version 02.2.0. Based on the tool, the Combined Margin Emission Factor ($EF_{grid,CM,y}$) has been calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM}. $EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$ For hydroelectric projects: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period.
Frequency of monitoring/recording	As per the Tool to calculate the emission factor for an electricity system. For the calculation of the dispatch data analysis (OM), the project developer shall use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring. However, if the data to calculate the combined emission factor in a certain period of time is not available during the monitoring, then the most recent data available should be used.

	For the calculation of the BM the option 1 was chosen, therefore the BM does not require monitoring during the crediting period, and it should be calculated as per the Tool to calculate the emission factor for an electricity system: for the first crediting period, ex-ante based on the most recent information available on units already built (sample group m) at the time of CDM-PDD submission to the DOE for validation. Therefore, a fixed value for EF _{grid,BM,y} is used accordingly to the CDM tool mentioned above. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.			
Value monitored		EF _{grid,OM-DD,y} (tCO ₂ /MWh)	EF _{grid,BM,y} (tCO ₂ /MWh)	EF _{grid,CM,y} (tCO ₂ /MWh)
	2021 (from 01/10)	0.541	0.56934	0.555
	2022	0.557		0.563
	2023 (to 29/04)	0.470		0.519
Monitoring equipment	None.			
QA/QC procedures to be applied	Any consideration or recalculation undertaken by the IPCC would be considered in the ex-post calculations.			
Purpose of the data	Calculation of baseline emissions.			
Calculation method	As per the 02.2.0 version of the “Tool to calculate the emission factor for an electricity system”.			
Comments	None.			

Data / Parameter	EG _{m,y} and EG _{n,y}
Data unit	MWh
Description	Net electricity generated and delivered to the grid by power plant / unit m or n in year y or hour h. m: Power units included in the build margin. n: Grid power units in the top of the dispatch.
Source of data	COES Generation Meters records ¹⁵
Description of measurement methods and procedures to be applied	Data is directly measured based on the information provided by COES. This data is measured and recorded every 15 minutes. The proportion of data monitored is 100% and the data is archived electronically.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording. Dispatch data OM: Hourly.

¹⁵ COES Generation Meters records. Monthly generation data every 15 minutes of Active Power (MW) for the years 2021-2023: <https://www.coes.org.pe/Portal/mediciones/medidoresgeneracion>

	BM: Fixed for the first crediting period.
Value monitored	COES Generation Meters records.
Monitoring equipment	None.
QA/QC procedures to be applied	None, the data would be provided by the COES.
Purpose of the data	Calculation of baseline emissions.
Calculation method	None.
Comments	None.

Data / Parameter	$\eta_{m,y}$
Data unit	%
Description	Average net energy conversion efficiency of power unit m in year y.
Source of data	COES Annual Statistics Report ¹⁶
Description of measurement methods and procedures to be applied	Data is directly measured based on the information provided by COES.
Frequency of monitoring/recording	Annually. Every year this data will be checked with the latest available Annual Statistics report of the COES.
Value monitored	COES Annual Statistics Report
Monitoring equipment	None.
QA/QC procedures to be applied	If the data used is significantly lower than the default value of the applicable technology, project proponents should assess the reliability of the values and provide appropriate justification if deemed reliable. Otherwise, the default values shall be used.
Purpose of the data	Calculation of baseline emissions.
Calculation method	None.
Comments	None.

4.3 Monitoring Plan

The Monitoring Plan is developed in accordance with the approved consolidated baselines and monitoring methodology for grid-connected electricity generation from renewable sources – ACM0002, version 12.3.0, and sets out the procedures for metering, monitoring and calculating the ERs generated through the net electricity supplied to the SEIN by the project activity.

¹⁶ COES Annual Statistics reports YEAR X. Folder No.5 or 6. Thermoelectric production and fuel consumption. (Table 5.8. or 6.8. CV of COES thermoelectric power plants): <https://www.coes.org.pe/Portal/Publicaciones/Estadisticas/>

Monitoring equipment

The 100% of electricity delivered to the grid by the project is continuously measured through the main meter M1 installed at Espina Colorada Substation. In order to ensure maximum availability of monitoring data and quality controls, after the main meter have been installed two backup meters, M2 and M3.

If problems which can affect the quality of data occur, the Plant Manager will initiate and supervise the implementation of corrective actions by the Maintenance Provider. In these situations, the Plant Manager will request the electricity supplied by the project to the Coordinator of the grid node Carhuaquero, who will develop an energy balance with the rest of electricity meters of the system.

The following grid connection diagram indicates the principles of positioning of metering instruments that have been used in the monitoring of the emission reductions:

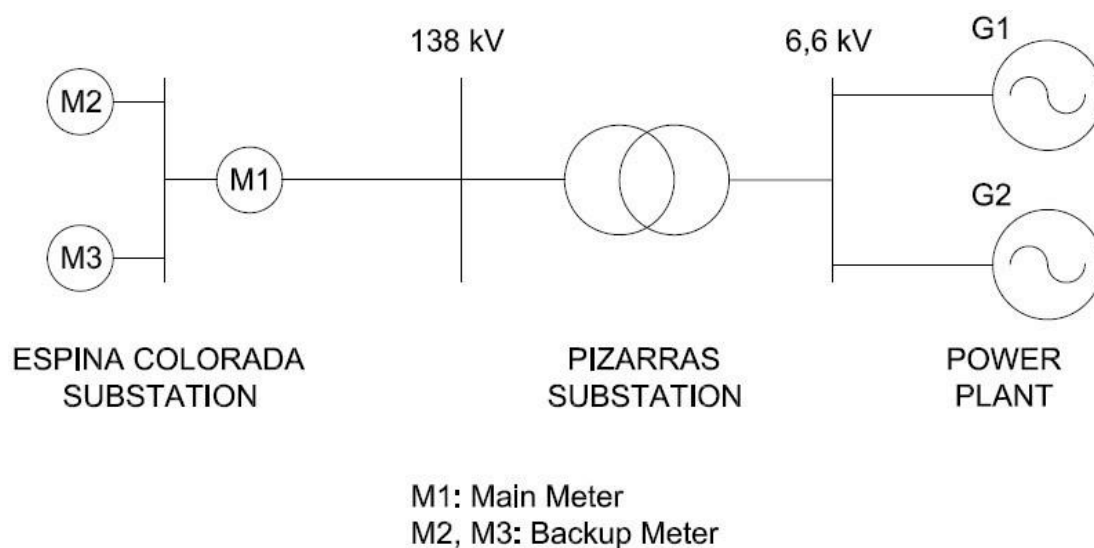


Figure 5. Positioning of metering instruments

Before the project initial commercial operation, calibration of the meters was carried out by Peruvian Enterprise Service SAC according to IEC standards to ensure the accuracy of the measurements. The main specifications are the followings:

Table 7. Meters specifications

Meter	Manufacturer	Type	Serial number	Accuracy	Calibration date	Carried out by
M1 Main meter - PosPizarras	Schneider Electric	ION 8650	MW-1211A328-01	0.2	29/01/2022 30/11/2022 03/12/2023	Peruvian Enterprise Service SAC
M2 Backup meter - PosCutervo	Schneider Electric	ION 8650	MW-1211A330-01	0.2	29/01/2022 30/11/2022	Peruvian Enterprise Service SAC

					03/12/2023	
M3 Backup meter - PosCarhuaquero	Schneider Electric	ION 8650	MW-1205A219-01	0.2	29/01/2022 30/11/2022 03/12/2023	Peruvian Enterprise Service SAC

The meters comply with the specifications set up in the PPA as the measurement equipment are electronic type class 0.2, available to connect through telephone and with capacity for 35 days of recorded information in order to invoice. Also, the three meters could be configured to work either in a unidirectional or bi-directional way, but for the project purposes they have been configured to work in a bidirectional way.

The electricity generated has been continuously measured and recorded every 15 minutes as well as recorded on monthly monitoring reports by Technical Operators. Due to the complexity of the invoice system of the Peruvian grid, the monthly recorded electricity has been cross checked with the monthly reports of active energy transfers provided by COES, where state the income and outcome energy by the project. Conservative values are being used for calculation of emission reductions.

Procedures for maintenance and installation of equipment, as well as calibration, have been performed according to manufacturer specifications and will follow applicable requirements of the Electricity General Direction of the Peruvian Energy and Mines Ministry (these requirements are currently under development by the Ministry).

Organizational structure

The following figure outlines the operational and management structure that the project proponent has implemented to monitor the emission reductions generated by the project activity. The responsible person for the monitoring of the entire data required is the Operations Manager that for the present monitoring period has been Giobany Cuavoy.

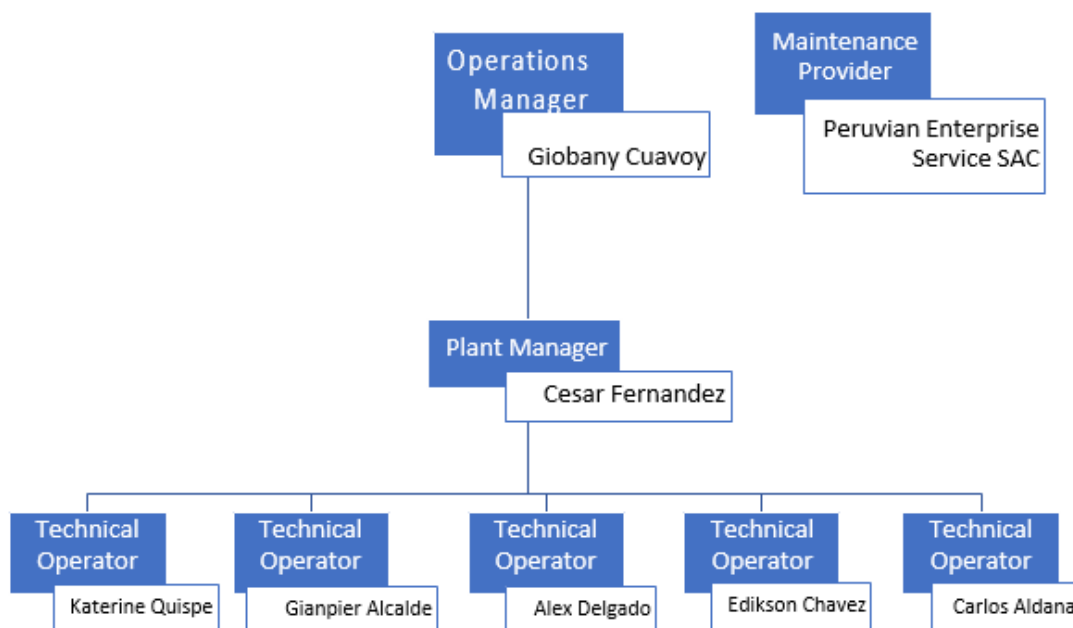


Figure 6. General management structure

Technical Operators

The monitoring performance of the project requires the fulfilment of operational data collection and processing obligations by the Technical Operators. The Technical Operators are obligated to ensure that sufficient and accurate information is available to calculate ERs in a transparent manner, and that adequate information is collected and maintained to facilitate successful verification of accounted ERs.

The Technical Operators are responsible for:

- Monitoring the following parameters:
 - Energy and power supplied by the project activity to the national grid.
 - The installed capacity of the hydro power plant.
- Record and store data from the main and back up meters.
- Control the accurate operation of any meters or equipment needed for monitoring, and preliminarily determine the needs for maintenance or repair work.
- Elaborate monthly monitoring report and send them to Plant Manager.

The Maintenance Provider

Maintenance and calibrations of the measuring equipments have been developed by the company Peruvian Enterprise Service SAC following the applicable requirements of be Electricity

General Direction of the Peruvian MINEM (these requirements are currently under development by the Ministry), as well as manufacturer's specifications. Calibration certificates of the accredited calibration agency, and the relevant calibration document, have been collected by the Operations Manager and will be archived for at least 2 years after the last crediting period.

Plant Manager

The Plant Manager supervises the Technical Operators and is responsible for:

- Compile and analyze all the monthly monitoring reports.
- Compile all the calibration certifications.
- Ensure that the Technical Operators are appropriately trained for monitoring/checking the different parameters/meters with training sessions and an instruction manual.

Operations Manager

The Operations Manager has final responsibility for all aspects related to data measurements and the monitoring of data recordings. Mainly:

- Manage and supervise all monitoring activities under the generation project.
- Ensure that all data is recorded accurately.
- Supervise the Maintenance Provider and Plant Manager.
- Elaborate the draft Monitoring Report with all its attachments, which will be verified by the VVB.
- Elaborate an estimate of emission reductions in the Emission Reduction Monitoring Report.
- Calculate the Combined Margin and recalculate the Grid Emission Factor every year.

For the present monitoring period, the calculation of the Combined Margin to recalculate the annually Grid Emission Factor.

The CO₂ Emission Factor for the electricity grid has been based on latest available data from the Official COES website and following the most recent version of the "Tool to calculate the emission factor for an electricity system".

Data Collection and Integration

Below is summary the data gathering that has been carried out during the monitoring period:

- Net electricity dispatched to SEIN: The three meters measure one hundred per cent of the electricity in a continuous way. This measured energy has been recorded electronically each 15 minutes of every hour, day and month according with COES requirements.

- Calibration certificates of the accredited calibration agency, and the relevant calibration document.
- Monthly monitoring reports
- Spreadsheet of calculation the Combined Margin
- Spreadsheet of calculation the Emission Reductions
- Monitoring Report.

All data gathering has been archived electronically and will be kept at least for 2 years after the end of the last crediting period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emission is calculated as the product of electrical energy baseline EG(PJ,y) expressed in MWh, produced by the renewable generating unit and multiplied by the grid emission factor:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y: Baseline Emission in year y (tCO₂).

EG_{PJ,y}: Q Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM 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 the latest version of the Tool to calculate the emission factor for an electricity system (tCO₂/MWh).

Calculation of EG_{PJ,y}

The calculation of EG_{PJ,y} is different for (a) Greenfield plants, (b) retrofits and replacements, and (c) capacity additions.

Since the project involves the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity (Case (a) Greenfield plant), then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

EG_{PJ,y}: Quantity of net electricity generation that is produced and fed into 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).

The net electricity generation as a result of the project activity to the grid is calculated based on monthly records from meter M1 measurements.

COES establish an energy loss factor for each year that was multiplied to meters measurements to obtain the values of net electricity generation. These values are around 0.998, as can be verified on COES site¹⁷. This energy loss factor values are applied to the fifteen-minute net generation results obtained from the meters in sheets “20XXXX ION Pos 103 Pizarras”, provided as evidence of energy generated and supply to the National grid.

The results are presented in the following table:

Table 8. Net electricity generation during the monitoring period

Year	Month	Net electricity generation (MWh)
2021	October	12,404.52
	November	12,551.05
	December	13,753.00
2022	January	12,844.34
	February	11,813.09
	March	11,240.36
	April	10,971.56
	May	11,625.86
	June	10,938.23
	July	5,863.28
	August	4,630.53
	September	3,931.10
	October	7,060.31
	November	3,402.83
	December	4,618.92
2023	January	11,628.86
	February	12,138.59
	March	13,612.79

¹⁷ COES Energy Loss Factor access at <https://www.coes.org.pe/Portal/mercadomayorista/liquidaciones>: *Liquidaciones del MME>01 Mercado de Corto Plazo>Liquidaciones VTEA>2021-2023>00_Factores de Pérdidas Medias - Entregas*

	April (to 29/04)	12,708.23
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The total electricity supplied by the project during the monitoring period is 187,737.45 MW·h

$$EG_{(PJ,2021)} = EG_{(facility,2021)} = 38,708.57 \text{ MW·h}$$

$$EG_{(PJ,2022)} = EG_{(facility,2022)} = 98,940.41 \text{ MW·h}$$

$$EG_{(PJ,2023)} = EG_{(facility,2023)} = 50,088.47 \text{ MW·h}$$

The Crosscheck has been prepared with the data from the meter (M1) against the monthly VTEA reports of the COES, where the generation of all the SEIN plants appears. For 2023, to obtain $EG_{(PJ,2023)}$ until April 29th (end date of the crediting and monitoring period), the generation recorded by the meter on 30/04 has been subtracted. Please, see *Emission Reduction MR3-VCS Las Pizarras_v2* spreadsheet for more details.

Relevant differences in the recorded generation (Table 8) can be seen during the monitoring period. The reason of these significant decrease on generation between is because the generation depends on the meteorological situation and the conditions of the hydrographic basin.

The hydrology of the Chancay river is a curve that shows a flow growth between the months of November - April (rainy season in the area) and a decrease between the months of May - October (dry season), naturally there have been some monthly periods with behaviors different from the usual ones, mainly due to phenomena such as El Niño or La Niña, and other climatic peaks. In this monitoring period, the months between October and December 2021 and 2022 show spring 2022 as a dry period.

The official entity *Servicio Nacional de Meteorología e Hidrología del Perú* (SENAMHI)¹⁸ provide graphics that shows these variations in the hydrological conditions. The hydrological station located above Pizarras hydroelectric power plant is called Puente Amban.

Calculation of the emission factor (EF) of the national electricity grid

The Tool to calculate the emission factor for an electricity system determines the CO₂ emission factor for the displacement of electricity generated by power plants in an electricity system by calculating the “operating margin”, “build margin” and “combined margin” through the following 6 steps:

Step 1: Identify the relevant electric power system.

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

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

Step 4: Calculate the operating margin emission factor according to the selected method.

¹⁸ Graphics from Servicio Nacional de Meteorología e Hidrología del Perú (SENAMHI): <https://www.senamhi.gob.pe/?p=monitoreo-hidrologico>

Step 5: Calculate the build margin (BM) emission factor.

Step 6: Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electric power system

The electricity generation will be supplied to the SEIN, therefore the project displaces consumption of energy from Peru's SEIN.

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

There are 2 options in the Tool to choose from:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

Because the data from grid connected power plants is available, Option I is chosen for the calculation of the grid emission factor.

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

Out of four options for the OM, the Dispatch Data Analysis OM (OM-DD) was selected. The Simple OM method cannot be used since low cost, must-run resources constitute more than 50% of total grid generation in Peru. Also, it was not necessary to use either the Simple Adjusted OM approach or the Average OM approach because detailed dispatch data is available.

Step 4: Calculate the operating margin emission factor according to the selected method

For this calculation the hourly generation in 2021 (from October), 2022 and 2023 (to April) was used, as it was the most recent data available. The formula used for the OM-DD emission factor ($EF_{grid,OM-DD,y}$) was provided by the Tool as follows:

$$EF_{grid,OM-DD,y} = (\sum_h EG_{PJ,h} \times EF_{EL,DD,h}) / EG_{PJ,y}$$

Where:

$EF_{grid,OM-DD,y}$: Dispatch data analysis operating margin CO₂ emission factor in year y (tCO₂/MWh).

$EG_{PJ,h}$: Electricity displaced by the project activity in hour h of year y (MWh).

$EF_{EL,DD,h}$: CO₂ emission factor for grid power units in the top of the dispatch order in hour h in year y (tCO₂/MWh).

$EG_{PJ,y}$: Total electricity displaced by the project activity in year y (MWh).

h: Hours in year y in which the project activity is displacing grid electricity.

y: Year in which the project activity is displacing grid electricity.

The hourly emissions factor is calculated based on the energy efficiency of the grid power unit and the fuel type used, as follows:

$$EF_{EL,DD,h} = (\sum_n EG_{n,h} \times EF_{EL,n,y}) / \sum_n EG_{n,h}$$

Where:

$EF_{EL,DD,h}$: CO₂ emission factor for power units in the top of the dispatch order in hour h in year y (tCO₂/MWh).

$\sum_n EG_{n,h}$: Net quantity of electricity generated and delivered to the grid by power unit n, in hour h (MWh).

$EF_{EL,n,y}$: CO₂ emission factor of power unit n, in year y (tCO₂/MWh).

n: Power units at the top of the dispatch order.

h: Hours in year y in which the project activity is displacing grid electricity.

To determine the set of grid power units n that are at the top of the dispatch order at each hour h, the power units were stacked using the merit order. The group of power units n in the dispatch margin includes the units at the top X% of total electricity dispatched in the hour h, where x% is equal to the greater of either:

a) 10%, or

b) The quantity of electricity displaced by the project activity during hour h divided by the total electricity generations by grid power plants during that hour h.

The greater of them has been chosen, being the one corresponding to the 10%, as option A defined: if 10 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation.

The CO₂ emission factor of the power unit ($EF_{EL,n,y}$) is calculated as per the guidance for the simple OM, using the option A2.

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}$$

Where:

$EF_{EL,m,y}$: CO₂ emission factor of power unit n in year y (tCO₂/MWh).

$EF_{CO_2, n, i, y}$: Average CO₂ emission factor of fuel type i used in power unit n in year y (tCO₂/GJ).

$\eta_{n, y}$: Average net energy conversion efficiency of power unit n in year y (ratio).

m : All power units serving the grid in year y except low-cost/must-run power units.

y : Applicable year during monitoring (ex-post option).

The information on the hourly generation of all plants in the SEIN and their associated emission factors was entered using excel software and organized in columns where the position of the columns was determined by the monthly grid dispatch merit order. This organization helped identify the plants that fall within the $x\%$ of grid dispatch order each hour of the year.

The resulting DDA-OM emission factor was calculated as follows:

Table 9. Values of Operating Margin Emission Factor applied to this monitoring period

Year	$EF_{grid, OM-DD, y}$
2021 (from October)	0.541 tCO ₂ /MWh
2022	0.557 tCO ₂ /MWh
2023 (to April 29)	0.470 tCO ₂ /MWh

Step 5: Calculate the build margin (BM) emission factor

The build margin emission factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid, BM, y} = (\sum_m EG_{m, y} \times EF_{EL, m, y}) / \sum_m EG_{m, y}$$

Where:

$EF_{grid, BM, y}$: Build margin CO₂ emission factor in year y (tCO₂/MWh).

$EG_{m, y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh).

$EF_{EL, m, y}$: CO₂ emission factor of power unit m in year y (tCO₂/MWh).

m : Power units included in the build margin.

y : Most recent historical year for which power generation data is available.

According to the “Tool to calculate the emission factor for an electricity system” Version 02.2.0. the $EF_{grid,BM,y}$ was calculated ex-ante for the first crediting period:

$$EF_{grid,BM,y} = 0.56934 \text{ tCO}_2/\text{MWh}$$

Step 6: Calculate the combined margin (CM) emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

- (a) Weighted average CM; or
- (b) Simplified CM.

The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

The weighted average CM method (option a) shall be used as the preferred option:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

w_{OM} : Weighting of OM emission factor (%).

w_{BM} : Weighting of BM emission factor (%).

For the proposed project, the following default values are used: $w_{OM} = 0.5$ and $w_{BM} = 0.5$

	$EF_{grid,OM-DD,y}$ (tCO ₂ /MWh)	$EF_{grid,BM,y}$ (tCO ₂ /MWh)	$EF_{grid,CM,y}^*$ (tCO ₂ /MWh)
2021	0.541	0.56934	0.555
2022	0.557		0.563
2023	0.470		0.519

$$*w_{OM} = 0.5 \quad w_{BM} = 0.5$$

Net generation and Emission Factor data is available in the attached Spreadsheet *Emission Reduction MR3-VCS Las Pizarras_v2* and there have been used to calculate the Baseline Emissions calculation.

Calculation of Baseline Emissions

As it has explained above, Baseline Emissions are calculated according to the following formula:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/y).

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/y).

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using version 02.2.0 of the “Tool to calculate the emissions factor for an electricity system” (tCO₂/MWh).

The baseline emissions are the product of the electricity generated and supplied by the project power plant to the grid in the period year ($EG_{PJ,y}$) and the grid emission factor ($EF_{grid,CM,y}$).

Therefore, as said before, the combined margin CO₂ emission factor of 0.56934 tCO₂/MWh was calculated ex-ante for the duration of the first crediting period as per “Tool to calculate the emission factor for an electricity system, (version 02.2.0)” and the energy generation is measured through the monitoring period in accordance with “ACM0002 version 12.3.0”. Then, baseline emissions of the project are:

Period	Net Generation (MWh)	BE _y (tCO _{2e})
2021 (from October)	38,708.57	21,483.26
2022	98,940.41	55,703.45
2023 (to April 29 th)	50,088.47	25,995.91
TOTAL	187,737.45	103,182

Emission factor calculation is detailed in the Project Description Document and meters data is compiled in the attached spreadsheet “*Emission Reduction MR3-VCS Las Pizarras_v2*”.

5.2 Project Emissions

For most renewable energy project activities, the project emissions are neglected. Following the methodology, as the project is a run-of-the-river project, it does not lead to any GHG emissions and therefore project emissions are considered equal to zero.

PE_y = 0 tCO_{2e} / year

5.3 Leakage Emissions

Following the applied methodology, no leakage emissions are considered. 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, and transportation). These emissions sources are neglected.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

The net GHG emission reduction is calculated following the guidance of the methodology ACM0002, as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y: Emission reduction in year y (tCO₂)

BE_y: Baseline Emission in year y (tCO₂)

PE_y: Project emission in year y (tCO₂)

According to methodology, ER_y = BE_y – 0, the emission reductions are equal to the baseline emissions, as it can be seen in the table below.

The Emission Reduction results can be found on the attached spreadsheet *Emission Reduction MR3-VCS Las Pizarras_v2*.

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-Oct-2021 to 31-Dec-2021	21,483.26	0	0	21,483.26	0	21,483.26
01-Jan-2022 to 31-Dec-2022	55,703.45	0	0	55,703.45	0	55,703.45
01-Jan-2023 to 29-Apr-2023	25,995.91	0	0	25,995.91	0	25,995.91
Total	103,182	0	0	103,182	0	103,182

At the time of project registration, an ex-ante emission reduction of 68,132 tCO₂e per year was estimated, which is equivalent to 107,517 tCO₂e for this monitoring period. After the verification of the data, in this monitoring period Las Pizarras Project has been finally reduced 103,182 tCO₂e, which is 96% of the ex-ante estimation. The data and the justification for the difference are shown in the following table.

Then, the estimated ex-ante GHG emissions reductions and carbon dioxide removals and the achieved reductions and removals for this monitoring period are:

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
01-Oct-2021 to 31-Dec-2021	17,173	21,483.26	25%	As this is a case of a run-of-river hydroelectric power plant, it is closely linked to the hydrological conditions of the river, which in turn depend on climatic variables and drought situations. Peru experienced in 2022 the effects of the “La Niña” Phenomenon, which entails a scarcity of rainfall. On the other hand, 2021 had an important rainy season as can be seen in hydrological graphics provided as evidence. It is important to highlight that the ex-ante estimated reductions consider an average value for the whole year. However, there is a significant difference between the rainy season (November–April) and the dry season (May–October), with monthly variations in hydrological conditions influenced by meteorological factors.
01-Jan-2022 to 31-Dec-2022	68,132	55,703.45	-18%	
01-Jan-2023 to 29-Apr-2023	22,214	25,995.91	17%	
Total	107,517	103,182	-4%	