



**Project design document form
(Version 11.0)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title of the project activity	Providencia I: 1.8MW Small Hydro Power Generation Plant
Scale of the project activity	<input type="checkbox"/> Large-scale <input checked="" type="checkbox"/> Small-scale
Version number of the PDD	Version 7
Completion date of the PDD	21/12/2020
Project participants	Mineros Aluvial S.A.S BIC (private entity) The Andean Center for Economics in the Environment – CAEMA – ACEE
Host Party	Colombia
Applied methodologies and standardized baselines	Methodology: AMS – I.F - Renewable electricity generation for captive use and mini- grid. (Version 3, EB 81).
Sectoral scopes	Sectoral Scope: 01. Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	6,391 tons of CO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The Providencia I project consists of the installation of a new generation unit (Unit 5), a capacity addition, to the existing Providencia Small Hydropower Generation Plant, located in the municipality of Anorí, in the Department of Antioquia, Colombia.

Providencia is a run-of-the-river plant operating since 1938 and has nowadays an installed capacity of 7,460 kW generated by four, Pelton double jet and horizontal turbines. The new generator unit, Unit 5, will have a net head of 205 m and design flow of 1.0m³/s. Water for power generation is collected from the Anorí River at the site called “Algibes” and discharged into the same river at an elevation of 732.5masl through individual channels for each unit. The Providencia I Small Hydropower plant base load power of the generator is 1,895kWe. The nominal generation capacity of the Providencia Small Hydropower plant, after implementation of the capacity addition net installed capacity, shall be 9,355¹ kW.

The main characteristics of Unit 5 to be installed at Providencia SHP plant are described in the following table:

Characteristics of the new Unit 5	
Number of units:	1
Turbine:	Pelton horizontal axis
Generator:	Synchronous
Flow rate for design:	1.0m ³ /s
Plant operation factor:	86%
Height:	205m
Power output for transformer terminal (kVA)	2,369
Installed power in kW transformer exit (kW)	1,895kW
Energy to be generated:	16,600,200 kWh/y

The project will reduce emissions of greenhouse gas (GHG) through the operation of the new Unit 5, which will displace electricity purchases from the national electricity grid that serves a local privately owned network comprised of:

- The other 4 hydroelectric units located in Providencia with a total installed capacity of 7,460 kW.
- backup electricity diesel power plants with a total installed capacity 6,220kWe used in approximately 1% of the time for additional consumption and in cases of blackouts due to guerrilla attacks, connection to the National power grid supplied by Empresas Públicas de Medellín (EPM)^{2,3} at the Bijagual Substation, which currently supplies electricity to the areas of mining of precious minerals.

The project activity will principally reduce the purchasing of electricity from the national electricity grid and displace the generation of electricity by means of fossil fuels according to on-going mining expansion plans of Mineros Aluvial S.A.S. BIC.

¹ Calculated value=7,460kW (actual installed power)+1,895kW(power to be installed) Both in turbine shaft.

² Empresas Públicas de Medellín (EPM) is one of the national producers and distributors of electricity. EPM currently provides and distributes electricity to the local small electricity grid owned by MINEROS S.A. at the Substation named “Bijagual”.

³ According to the one line diagram presented in Appendix 3 Section 2, the power substation named “CACERI” is part of the connection between the Mineros S.A. small grid and the national grid supplied by EPM. Electricity is transferred at 44kV.

The chosen crediting period for the Providencia I project activity is 7 years. First crediting period was set between Feb.17, 2013 through Feb.16, 2020. Second crediting period, after approval of this renewal of the crediting period, will last during Feb.17, 2020 through Feb. 16, 2026. This project is renewable twice. Total and average emissions reductions during the crediting period are presented in the table below:

Year	Estimation of annual emission reductions in tonnes of CO₂e
Feb.17 - Dec.31 2020	5,586
Jan.1 - Dec.31 2021	6,391
Jan.1 - Dec.31 2022	6,391
Jan.1 - Dec.31 2023	6,391
Jan.1 - Dec.31 2024	6,391
Jan.1 - Dec.31 2025	6,391
Jan.1 2025 - Feb.16 2026	7,197
Total estimated reductions (tonnes of CO₂e)	44,738
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period	6,391

This project significantly contributes to the development of the region for the following reasons:

- It promotes local economic growth by creating employment and offering training to the communities directly related with the project. In this way, reducing poverty in areas where there exists a great influence by irregular armed groups (guerilla and paramilitary forces).
- It provides the municipality of Anorí additional revenue from royalties established by law, empowering the Anorí municipality to increase social and environmental investments.
- The use of renewable energy prevents the generation of electricity from GHG emitting fossil fuels by diesel captive power plants, which affects global warming, as well as other gases that pollute local air.
- The capacity addition seeks principally to green electricity consumption from MINEROS ALUVIAL S.A.S. dredgers, mining and gold refining activities by reducing purchases of electricity from the national electricity grid, according to on-going mining expansion plans of Mineros Aluvial S.A.S. BIC.
- By strengthening electricity generation in this region, stable sources of electricity are expanded to municipalities at the edge of the national electricity grid. This will allow the increase of coverage in rural areas. Therefore, the communities directly linked to the project will have the opportunity to access reliable electricity supply during 24 hours a day.
- It stimulates the transfer of clean technologies and renewable energy generation, thus promoting a greater development into the region by capacity building of workers of the new facility and long term positions for those operating the new Unit 5.

- Reduced environmental impacts due to the run-of-the-river design, so, no water reservoirs and no major civil works are required, reducing the environmental impact of the Unit 5 project at the Providencia Small Hydropower Plant.
- The project ensures that, in the section of the river where water is channelled to the power plant, the sufficient ecological flow will be maintained to meet the water needs of the communities that are supplied from this source and will also meet the needs of the surrounding flora and fauna.
- To develop the project, roads and bridges must be adapted to enable transport generating equipment and materials. This initial investment and the maintenance of these roads and bridges are an additional contribution of this project to the surrounding community.
- Small scale project activity. Project type I.

A.2. Location of project activity

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Colombia

Department of Antioquia

Municipality of Anorí, areas of Providencia, Toná and Usurá; and the human settlement named El Charcón.

The geographic coordinates of the Providencia I CDM project activity are the following:

Place	Decimal Geographic coordinates
Powerhouse ⁴ :	Latitude: 7.316809°; Longitude: -75.054998°

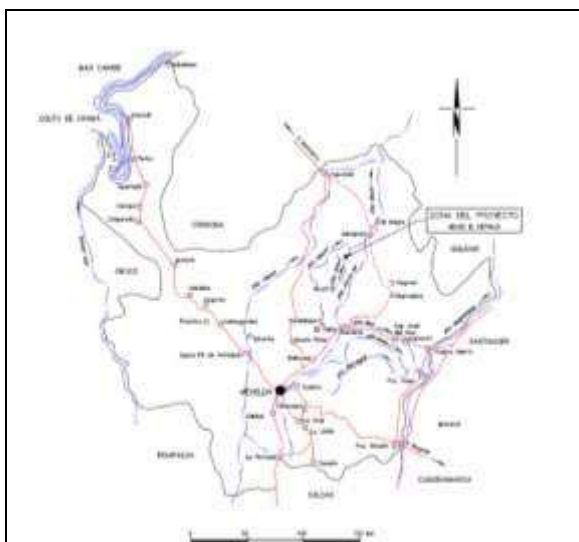


Figure 1: Location of the project within the department.



Figure 2: Detail of project area.

⁴ UTM coordinates were calculated using following link: <http://www.asturnatura.com/sinflac/calculadora-conversiones-coordenadas.php>

A.3. Technologies/measures

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Small Scale Project Activity

Type: Type I – Renewable Energy Projects

Category: I.F. generation for captive use and mini-grid

Unit 5 to be installed in the *Providencia* SHP plant consists of a horizontal axis Pelton turbine with a synchronous generator. The addition will have a net head design of 205m and a design flow of 1.0m³/s. The installed capacity of Unit 5 is to be 1,895kWe.

No modification to the water inlet structure of the *Providencia* SHP plant will be required for the addition of *Unit 5*. The civil works are summarized in the expansion of the powerhouse, a section of pipeline that channels water to the new unit, maintenance of existing networks, and gate and equipment changes without modification of the existing structures. The viability of the conduction system of the *Providencia I* power plant was based on the analysis of the design capability of the structures that compose it, basically, the water inlet capture site at Aljibes and the pipeline.

The maximum generating capacity is achieved by capturing one additional cubic meter (1m³) from the water run-off of the Anorí River. The maximum flow captured for generation in the *Providencia I* SHP plant will be of 6.25m³/s. Water will be directly discharged into the Anorí River at an altitude of 732.5masl through individual channels per each unit.

The expansion of the powerhouse will make use of the adjacent areas shown in Figure 3 and Figure 4. The available area beside and parallel to the flow direction is 17.5m long and 4.5m wide, and an additional area adjacent to the substation grounds would be available, as shown in Figure 4.

The layout of the unit starts from the main pressure line, where the feed line branches out towards the new unit, entering through the available adjacent area and feeding the two-jet, horizontal axis Pelton turbine by coupling through a safety butterfly valve. The turbine will be coupled to a 2.369kVA, 600.0 rpm synchronous generator, which will connect to the existing processing system alongside the machine room, and the dispatch will be done through the existing transmission line towards El Bagre.



Figure 3: Area beside machine room grounds



Figure 4: Area on the current substation grounds

The technical features of *Unit 5* are shown below:

Quantity	1
Capacity (KVA)	2,369
Velocity [rpm] (Number of poles)	600.0 (12)
Power factor	0.8
Level of security	IP – 21
Number of bearings	2
Voltage	2,3 kV
Frequency	60 Hz
Cooling	Self-ventilated in an open circuit with air
Voltage regulator	Digital
Excitation	Static, brushless
Neutral grounding	By resistor
Type of insulation	F
Assembly	Horizontal
Temperature sensors	PT 100 type (3 per phase and 2 per bearing)
Service rating	S1
Bearing type	Sliding
Generator weight (tons)	7
Average lifetime	30 years according to manufacturer specifications
Net installed capacity	1,895kW
Load Factor	86.00%
Monitoring equipment	2 high precision electricity meters located at the Providencia Substation
Yearly average electricity generation	16,600,200 kWh/y

The project activity stimulates the transfer of clean technologies and renewable energy generation, in Colombian underdeveloped zones, thus promoting a greater development into the region by capacity building of workers of the new facility and long term positions for those operating the new Unit 5.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Colombia (host)	Mineros Aluvial S.A.S. BIC (private entity) The Andean Center for Economics in the Environment – CAEMA – ACEE (private entity)	No.

A.5. Public funding of project activity

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The project will not receive any public funding and is not a diversion of ODA

A.6. History of project activity

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- a) The Providencia I project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);
- (b) The Providencia I project activity is not a project activity that has been deregistered.
- (c) The Providencia I project activity was not a CPA that has been excluded from a registered CDM PoA;
- (d) The **Providencia I** project activity was **not** CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

A.7. Debundling

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According to the Methodological tool: Assessment of debundling for SSC project activities V.4 (Tool 20), debundling is defined as the fragmentation of a large project activity into smaller parts. A proposed small- scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

Following the above Guidelines on assessment of debundling for SSC project activities, this project is not a fragmentation of a larger CDM project activity nor this project have applied before to be registered as part of another small scale project activity.

SECTION B. Application of methodologies and standardized baselines**B.1. References to methodologies and standardized baselines**

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Methodology: AMS – I.F - Renewable electricity generation for captive use and mini-grid. (Version 3).

Tools:

- Tool 03 - Tool to calculate project or leakage CO2 emissions from fossil fuel combustion. Version 3.
- Tool 05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation Following Resolution No. 180947 issued on 4 June 2010 by National Energy and Mining Planning Unit (UPME) as part of the Ministry of Mines and Energy the “Tool to calculate the emission factor for an electricity system” version 7 EB 100 was used to calculate a combined margin (CM) grid emissions factor

for the National Interconnected Electricity System in Colombia, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed. This project activity takes the UPME calculated emissions factor being UPME the national institution commissioned of doing such calculations by the designated national authority (DNA) for the CDM.

- UPME (Mining and Power Planning Unit – as per its acronym in Spanish) resolutions for setting the yearly Colombian Grid emissions factor. Reference to yearly billed resolution can be found on section B.7.1 in section describing the ex post monitoring variables following Tool 07 “Tool to calculate the emission factor for an electricity system” simple adjusted method”.
- Tool 19 Demonstration of additionality of Microscale project activities version 9.
- Tool 11 v3.01 “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period

B.2. Applicability of methodologies and standardized baselines

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The choice of the selected methodology is justified by showing that the project activity meets applicability conditions of Methodology AMS – I.F.v.3. as follows:

APLICABILITY CONDITIONS (as per §3-11 in AMS-I.F Small-scale Methodology for crediting emission reductions from “renewable electricity generation for captive use and mini-grid”. Version 03.0. Sectoral scope: 01)	Explanation of compliance by Project Participant
1 Illustration of respective situations under which each of the methodology (AMS-I.D., AMS-I.F. and AMS-I. ⁵) applies is included in Table 3.	Under Project Type 2 of Table 3 in AMS-I.F it is possible to include projects that “displace grid electricity consumption [...] (excess electricity may be supplied to a grid)”.
2 Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:	N/A
(a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir;	This is a Run-off-the River project activity that includes an existing very small cleaning reservoir for removing sediments that may harm the Francis turbine. Water is brought back downstream to the river once it overpasses the SHP plant’s turbine.
(b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m ² ;	N/A
(c) The project activity results in new	

⁵ “AMS-I.D.: Grid connected renewable electricity generation”, “AMS-I.F.: Renewable electricity generation for captive use and mini-grid” and “AMS-I.A: Electricity generation by the user”.

reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m ² .	N/A
3 This methodology is applicable for project activities that:	
(a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant)	N/A
(b) Involve a capacity addition ⁶	AMS-I.F v.3 allows capacity addition for the increase in the installed power generation capacity of an existing power plant through the installation of a new power plant beside the existing power plant/units. The existing generation units (Units 1 through 4) will continue operating after the implementation of the project activity. Photo of machine's plate is presented in Annex 3 item 4.
(c) Involve a retrofit ⁷ of (an) existing plant(s).	N/A
(d) Involve a replacement ⁸ of (an) existing plant(s).	N/A
4 In the case of project activities that involve the capacity addition of renewable energy power generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct ⁹ from the existing units.	In this case, unit 5 (also called "Providencia I" project) is a capacity addition to the Providencia Small Hydro power plant of 1,895kW to the Mineros Aluvial S.A.S. BIC privately owned small grid. Eventually, excess electricity might be delivered to the National Interconnected Grid. Total capacity of the former 4 generation along with unit 5 totla 9,355kW. Unit 5 capacity additions can operate independently from the older 4

⁶ A capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) The installation of a new power plant beside the existing power plant/units; or (ii) The installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity.

⁷ Retrofit (or rehabilitation or refurbishment). A retrofit is an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

⁸ Replacement. Investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The new power plant or unit has the same or a higher power generation capacity than the plant or unit that was replaced.

⁹ Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

	units. Annex 3 Item 2 depicts the Mineros minigrid.	
5	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW	N/A
6	If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, ¹⁰ the capacity of the entire unit shall not exceed the limit of 15 MW.	N/A
7	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	N/A

APPLICABILITY CONDITIONS (as per Tool 7 v7 Tool to calculate the emissions factor for an electricity system)		Explanation of compliance by Project Participant
1	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 capacity addition to the Providencia SHP plant substitutes grid electricity consumption supplying electricity to the Mineros S.A.S. BIC minigrid. Therefore, it uses the TOOL07 to estimate the OM, BM and/or CM to calculate its baseline emissions.
2	The emission factor for the project electricity system can be calculated for grid power plants.	Emission factor used in this document is the summary of emissions from power plants bound to the National Interconnected System and calculated using Simple Adjusted Method
3	tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	This project is fully located in a non Annex I Country.
4	Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	Biofuels emissions factor was assumed as zero (0) for the calculation of the National grid emissions factor.

APPLICABILITY CONDITIONS (as per Tool 11 v3.01 Assessment of the validity of the original/current	Explanation of compliance by Project Participant
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¹⁰ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justification are provided.

baseline and update of the baseline at the renewal of the crediting period)		
1	This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) ¹¹ of the modalities and procedures of the clean development mechanism.	This document applies tool 11 for the renewal of the second crediting period

The Providencia Power plant is located near the Anorí River which forms part of the lower Cauca river basin in the Department of Antioquia, Colombia. In the absence of the project activity it is expected that expansion of power capacity by Mineros Aluvial S.A.S. BIC will be built by means of diesel based power generators or otherwise excess demand will be supplied by the grid.

No further capacity additions to the Providencia power station are envisioned. Electricity will be dispatched to the Mineros Aluvial S.A.S. privately owned small grid that supplies electricity to Mineros Aluvial S.A.S. gold mining activity including offices, dredgers and refineries. Electricity generated under this project activity will displace electricity consumption from the grid. If available, in cases of a temporary reduction in electricity demand by the Mineros Aluvial S.A.S. privately owned small grid, small amounts of excess electricity might be sent to the National Interconnected Grid.

Demonstrate that the project activity qualifies as Type I, II, and/or III during every year of the crediting period in accordance with applicable provisions for project activity eligibility in the Project standard.

According to paragraph 2 in AMS-I.F v.3, this project activity comprises the installation of one “renewable energy generation unit(s), such as [...] hydro [...] that supplies electricity to user(s) (in this case the MINEROS ALUVIAL S.A.S. regional minigrid for supplying electricity to mining activities). The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit; i.e. in the absence of the project activity, the users would have been supplied electricity from [...] A national or a regional grid [and] Fossil fuel fired captive power plant[s] (in the footnote: Where the users of the captive electricity are also connected to the grid in the project site)”. The measures quoted above are in accordance with those defined for AMS.I-F/Version 03. In addition, the capacity of the capacity addition equipment is lower than 15 MW. Therefore this small-scale CDM project category was selected to be applied for the present project activity. As per Appendix B of the simplified modalities and procedures for small-scale project activities, the project activity falls under type I.F categories. The average annual estimated emission reductions of this project activity will not exceed 60 ktCO₂e in any year of the crediting period (see section A.4.3) and the installed capacity of the equipment is lower than 15 MWe (see section A.4.2). The project activity comprises measures that limit the amount of grid electricity purchases from the grid; therefore, the project activity reduces GHG emissions associated with fossil fuel

¹¹ §49(a) of the CDM modalities and procedures states: “Project participants shall select a crediting period for a proposed project activity from one of the following alternative approaches: (a) A maximum of seven years which may be renewed at most two times, provided that, for each renewal, a designated operational entity determines and informs the Executive Board that the original project baseline is still valid or has been updated taking account of new data where applicable.

based electricity generation into the national grid, and also avoids the use of fossil fuels used for generation purposes into the MINEROS ALUVIAL S.A.S. BIC small privately owned grid (Captive user). Therefore this small-scale CDM project category was selected to be applied for the present project activity.

Summarizing, the capacity addition at Providencia SHP plant project qualifies under this project category as:

- The project activity is a hydroelectric power plant
- It will supply electricity to the Mineros Aluvial S.A.S. privately owned small grid.
- Involve a net capacity addition of 1,895kW for a total net generation in the SHP plant *Providencia* equal to 9,355kWe. A capacity addition is an increase in the installed power generation capacity of an existing power plant through the installation of new power units, additional to the existing power units. The existing power units continue to operate after the implementation of the project activity.
- It is a run-of-the-river power plant.

B.3. Project boundary, sources and greenhouse gases (GHGs)

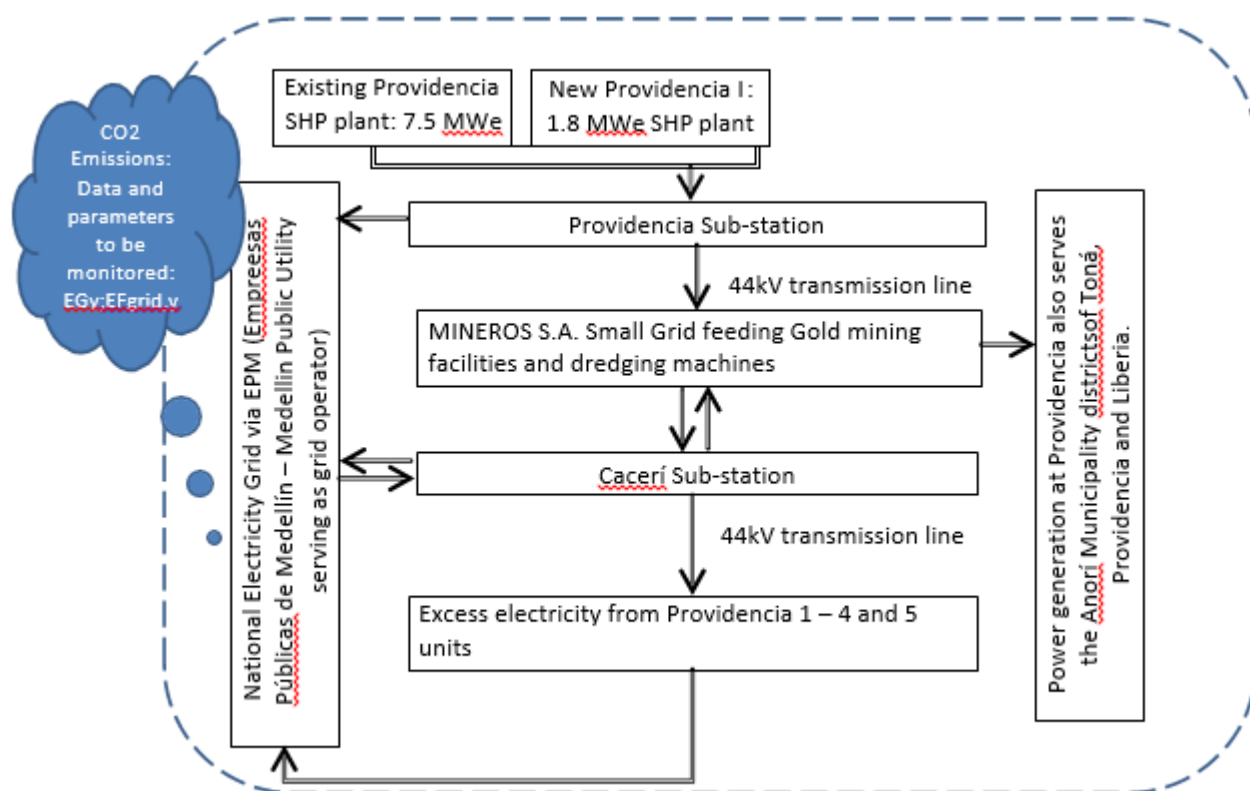
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The spatial extent of the project boundary is the national electricity grid. As mentioned before, MINEROS ALUVIAL S.A.S. dredgers and mining and gold refining activities use electricity from the national grid that feeds a small grid owned by MINEROS ALUVIAL S.A.S. The regional small grid also comprises generation of hydropower and fossil fuel based power. The additional power sources include the Providencia SHP plant 7,460 kWe, and 6,620 kWe in distributed Diesel plants into the small grid.

The one line diagram for the project boundary is presented in Appendix 3: BASELINE INFORMATION; Section 2: In place electricity connections from the PROVIDENCIA SHP plant to the small MINEROS ALUVIAL S.A.S. grid and to the national electricity grid. In order to provide a concise summary of the electricity topology diagram in Appendix 3, the schematic below presents the project's boundary.

An overview of all emission sources included in or excluded is depicted in the following table:

Source		GHG	Included ?	Justification / Explanation
Baseline	Emission from combustion of fossil fuel in power plant for electricity generation	CO2	Included	This consists of the major source of Greenhouse gas emission from combustion of fossil fuel into the national electricity grid and captive fossil fuel based generation sources.
		CH4	Excluded	Excluded as they are negligible emission sources
		N2O	Excluded	Excluded as they are negligible emission sources
Project activity	Electricity Generation from Renewable sources	CO2	Included	Project emissions from generation of Hydropower are considered to be 0.
		CH4	Excluded	Power generation utilizing hydropower without reservoir results in zero emissions.
		N2O	Excluded	Power generation utilizing hydropower without reservoir results in zero GHG emissions.



B.4. Establishment and description of baseline scenario

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Following the Tool 11 stepwise approach for the “assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)”

STEP 1.: Assess the validity of the current baseline for the next crediting Period

STEP 1.1.: Assess the compliance of the current baseline with relevant mandatory and or sectoral policies.

MINEROS ALUVIAL S.A.S. uses electricity to run dredging machines for gold mining activities and to run refining and administrative facilities. All activities take place in the lower Cauca River region at the Anorí municipality; administrative facilities are located near El Bagre city and dredging vessels are located on the run of the Nechí, Anorí and Cauca rivers.

SITUATION IN THE FIRST CREDITING PERIOD:

MINEROS ALUVIAL S.A.S. owns a small grid that includes 7.5MWe installed capacity of hydropower generation and 6.62MWe of diesel based generation. During the period comprised between 2009 and 2013, excess electricity demand was purchased from the grid. Registries of the last three years are presented in Appendix 3 under section 1: Electricity consumption of administrative facilities and dredging machines at Mineros Aluvial S.A.S. BIC. A diagram representing the current electricity connexions from the Providencia SHP plant to the small MINEROS ALUVIAL S.A.S. BIC grid and to the National electricity grid is presented in Appendix 3 under section 2.

MINEROS ALUVIAL S.A.S BIC. performs preventive maintenance for the generation equipment. As per the Providencia SHP plant, retrofitting of the Pelton turbines and generators was performed on the period 1997-2003¹². In addition, the MINEROS ALUVIAL S.A.S. BIC Energy Division performs a complete maintenance on the start-up, shut down and delivery of electricity activities seeking to secure the longest lifetime of the four generation units. The attached file named "Maintenance records on Providencia units 1-4 – Energy division.xlsx" includes a list of the retrofitting and maintenance activities performed in the period 2000- 2011.

FUTURE SITUATION:

MINEROS ALUVIAL S.A.S. will increase demand in the medium to long term.

According to the expansion plan of Mineros Aluvial S.A.S. BIC, the number of dredging machines are increasing in time and, as a result, electricity consumption is going to increase. Mineros Aluvial S.A.S. estimations of future needed capacity expansion is presented in **Figure 5**. This forecast was made in 2010 and represents the best case scenario for gold mining production. Acquisition of dredging machines is in place.

As presented in Appendix 3 section 1, the use of diesel for electricity generation has increased in recent years. Diesel generation was implemented in Mineros Aluvial S.A.S. looking to prevent temporary failures in electricity supply at the Bijagual substation, point of connection with EPM (the electricity provider), and blackouts due to bombing attacks to the electricity transmission lines by the illegal armed forces. However, given the expansion of gold mining activities as of May 2009, diesel generation was considered as a part of the base load of electricity for the small Mineros Aluvial S.A.S. privately owned grid instead of being a backup source of electricity as initially planned. The cost of generating electricity by means of diesel is also increasing given the rise in the international oil price. Therefore, Mineros Aluvial S.A.S. is willing to rely on more stable prices for electricity coming from renewable sources.

¹² According to the energy division: Unit 4 has a complete retrofitting in 2001; Unit 3 on 2003; and, Unit 2 and Unit 1 on 1997

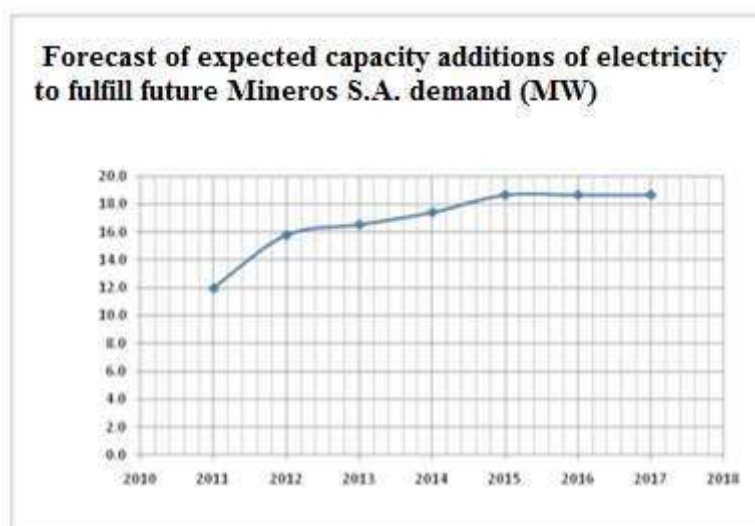


Figure 5: Forecast of expected capacity additions of electricity to fulfil future Mineros Aluvial S.A.S. demand. Source: Mineros Aluvial S.A.S. energy division.

SCENARIOS TO SATISFY FUTURE ELECTRICITY DEMAND.

Scenario 1: **Electricity supply from the grid is increased.** EPM already supplies electricity to Mineros Aluvial S.A.S., both companies are still looking for a binding agreement to avoid fluctuations and blackouts and improve quality of the service in general terms.

Scenario 2: **Electricity supply from diesel based generation is increased.** Diesel based electricity has proven to be effective, already in place, reliable, easy to install and cheaper than other sources of electricity but the Colombian Electricity grid which is fed by Hydro Power principally. However, falling prices of diesel would bring diesel power an opportunity to compete with hydropower.

Scenario 3: **Electricity supply from new hydropower developments is increased.** Depending on own hydropower sources will result in the lesser emissions from these scenarios. However, sources of financing may result elusive due to the complexities of the endeavour in a very underdeveloped region where an armed conflict is ongoing.

Due to variability in fuel prices, increase capacity by means of diesel based generation Scenario 2 is not attractive. Scenario 3 is preferred on top of other scenarios since it solves problems of variability in the supply of electricity at the edge of the grid. For raising capacity, MINEROS ALUVIAL S.A.S. BIC followed all policy directives for the Colombian electricity sector for the construction and turnkey of the Providencia I SHP plant.

	Substantive difference with regulation in baseline?	Validity during second crediting period?
Laws 142/143 of 1994 Set procedures for the generation, interconnection, transmission, distribution, and commercialization of electricity	No	Yes
Resolution 055 of 1994 - Electricity market conditions	No	Yes

Resolution 086 of 1996 - Power generation activities regulation	No	Yes
Resolution 039 of 2001 - Establish complementary conditions	No	Yes
Law 697 of 2001 - Promotes the development and use of rational and efficient sources of energy	No	Yes
Law 1715 of 2014 Controls the integration of nonconventional renewable energies into the National Energy System.	No	Yes

Also, during operation phase, the National Dispatch Centre overlooks operation of Providencia I and other Providencia generation units to secure compliance of all regulation applicable to the feeding of electricity activity day after day; therefore, operation follows national and sectoral regulations.

In conclusion, as it was demonstrated in validation of this project activity and during operation until present, the Providencia I SHP plant project fulfils all national and sectoral Policy.

STEP 1.2.: Assess the impact of circumstances

Original baseline for this project activity is increased consumption of electricity due to expansion of mining activities. Alternatives were:

- 1) Increase grid electricity consumption;
- 2) Increase of fossil fuel based electricity consumption; and,
- 3) Raise new capacity to fulfil inner demand.

Additional circumstances include:

- 1) the Mineros mini-grid is the last consumer for the region fed by the National grid electricity system and, therefore, supply is fluctuating, though, during years the grid has been the only supplier to satisfy electricity demand, hence, investment in stability of the supply may come in the future;
- 2) in the mean time (while investment in supply stability come) Mineros Aluvial S.A.S. BIC would invest in new capacity either fossil based or renewable;
- 3) In case of renewable, first step should be use the maximum ability from the Providencia small hydropower station.

This set of circumstances have not changed since the validation of the project activity. Construction of Providencia I SHP plant project still considers the above set of decisions every time Mineros envisions increases in electricity demand.

STEP 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

Again, baseline for this project activity is increase in electricity demand due to expansion of dredging and refining of gold activities which are the Mineros Aluvial S.A.S. core businesses.

The Providencia power started operations in 1938 with four generators. As of today, Providencia generators have been working for 80 years; last complete overhaul for units 1 and 2 was performed in 1997, for unit 3 in 2004 and unit 4 in 2001. It is common practice in Colombia to extend lifetime of generators. The Providencia I SHP project (Unit 5) is

expected to work for a period longer than the crediting period of this project activity. So far, no new investments in addition of capacity to the Providencia I power station are envisioned due to end of technical lifetime.

Solar and biomass power are new sources participating in the Colombian grid. They started receiving same conditions for feeding the grid as other existing power plants feeding the grid. As it is seen by experts, renewable sources of electricity other than hydro will not limit or displace significantly the use of existing hydro power stations. Specially, due to the characteristics of power demand within the Mineros Aluvial S.A.S. BIC minigrid, it is not expected that biomass or solar power limit the use of the existing baseline equipments during the second crediting period of the Providencia I project activity.

Thus, the most likely scenario for the second crediting period is the continuation of use of the current baseline equipments or new technologies introduced in the Colombian electricity market (including the new unit 5) without undertaking new investments due to end of technical lifetime during the second crediting period.

STEP 1.4.: Assessment of the validity of the data and parameters

This project activity has no parameters fixed ex-ante. However, at the time of first verification, it was amended what it seemed to be an editorial error leaving the possibility that the emissions factor would either be fixed at 2008 quantity or rather be variable during the crediting period in conformance of the yearly billed resolutions of UPME¹³. This controversy was clarified in the validation of Post Registration Changes to the PDD allowing the emissions factor to be variable in accordance to UPME resolutions.

The Project activity supplies renewable energy to the MINEROS ALUVIAL S.A.S.'s small privately owned internal grid. Power will be mostly used to attend electricity consumption from MINEROS ALUVIAL S.A.S. gold mining activities (captive user). Along with MINEROS ALUVIAL S.A.S. consumption, the project will strengthen electricity reliability at the edge of the national electricity grid benefiting the mining activity of MINEROS ALUVIAL S.A.S. Determination of baseline emissions follows the guidance in paragraph 22 in AMS-I.F v3.

Installed capacity of Providencia I SHP plant project changed from the initially stated 1,808kWe to 1,895kWe, i.e change is negligible (4.5%) in contrast to the decision of increasing power generation to meet MINEROS ALUVIAL S.A.S. BIC electricity demand.

Relevant data, for the calculation of the operating and built margin emissions factor to obtain the final combined margin emission factor, were updated for the second crediting period according to the latest Tool 07 (Tool to calculate the emission factor for an electricity system - version 7.0.) This update is based on the latest UPME resolution 385/2020 that recalculates the operating and built margin emissions factor involving all values and parameters used in its calculation (fossil fuel emission factors, most recent three historical years for which Colombian grid national generation data is available, among other), see section B.6.

Application of Steps 1.1, 1.2, 1.3 and 1.4 above, confirmed that the current baseline remains valid for the second crediting period; even though, some data needed to be updated due to changes presented above. In this context step 2 is assessed below..

¹³ UPME stands as the Energy and Mining Planning Unit as its acronym in Spanish who by means of Resolution MME 91304/2014 (art.3) was imposed with the function of updating the yearly GHG emissions factor for the Colombian Electricity Grid.

STEP 2.: Update the current baseline and the data and parameters

As said in step 1.4 above, the parameters regarding the grid emission factor calculation have been updated for this third crediting period using TOOL07 - Tool to calculate the emission factor for an electricity system - version 7.0.

STEP 2.1: Update the current baseline

Baseline emissions for the second crediting period has been updated in accordance to the stated above in step 1.4., without reassessing the current baseline, based on the latest approved version of the methodology AMS-I.F. This update was applied in the context of the sectoral policies and circumstances that are applicable at the time of requesting for renewal of the crediting period, which have not changed as to affect the project generation nor the need for additional investment prior to the end of the requested crediting period.

STEP 2.2.: Update the data and parameters

As said in step 1.4, data for the calculation of the 2020 national grid's emission factor has been updated for this third crediting period using TOOL07 - Tool to calculate the emission factor for an electricity system - version 7.0. More details can be seen in section B.6 and B.7 (updated monitoring parameters).

B.5. Demonstration of additionality

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According to Tool 19, Methodological tool for demonstration of additionality of micro scale project activities, version 09.0), paragraph 11 (a), it is required to demonstrate that the geographic location of the Providencia I capacity addition project is in a special underdeveloped zone (SUZ) of Colombia¹⁴.

Below there is an extensive demonstration of the social characteristics of the Anorí municipality and the intensity of the armed conflict in the surrounding region, that has come to be named as an Special Consolidation Territory (Zonas de Consolidación Territorial) for the eradication of coca crops and bring assistance for economic, social and environmental issues to the zone. The *Unidad Administrativa Especial de Consolidación Territorial* (UAECT)¹⁵ is a recently created entity that operates directly from the President's office created under Decree Number 4161 issued on 3 November 2011 is committed to "implement, execute [programs of development assistance] and follow up the National Territory Consolidation Policy seeking to channel, articulate and coordinate the institutional interventions in zones affected by the growing of illicit crops. UAECT and the United Nation Offices on Drugs and Crime issued on June 2012 the report named *Colombia Monitoreo de Cultivos de Coca 2011*¹⁶. On page 68, for the first time a map is presented defining the Territory Consolidation Zones which are subject of a special treatment and financing for

¹⁴ Tool 19 §8 sets that "In case where SUZs have already been approved by Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM)8 there is no need for the project participant to provide proofs as indicated above to demonstrate that the region is demarked as SUZ in the host country"

¹⁵ https://www.cancilleria.gov.co/sites/default/files/Normograma/docs/resolucion_uact_0267_2012.htm

¹⁶ Oficina de las Naciones Unidas contra la Droga y el Delito. Gobierno de Colombia. 2012. Colombia Monitoreo de Cultivo de Coca 2011. Electronic source on: http://www.unodc.org/documents/crop-monitoring/Colombia/Censo_cultivos_coca_2011.pdf

illicit crops eradication and strengthening of the social structures in such zones. The zone called *Nudo de Paramillo (Bajo Cauca Antioqueño y Sur de Bolívar)* includes the Anorí municipality as part of this Territory Consolidation Zone.

Appendix 3, Section 3 presents statistical information on the Municipalities reported by UAECT in page 68 of the report, from the National Statistic Department (DANE- Departamento Administrativo Nacional de Estadística) based on projections of the latest population census. DANE reports Unsatisfied Basic Needs index and People Under Misery line index. The National Planning Department is the authority that determines how to calculate those indexes, and the definition can be found at: <http://www.dnp.gov.co/LinkClick.aspx?fileticket=yEIFkuUI5co%3D&tabid=1157>. According to the National Planning Department a person is considered under Unsatisfied Basic Needs if his monthly income is below Col\$187.079 and is Under the Misery Line if his monthly income is below Col\$83.581. Following these definitions the Table in Appendix 3, Section 3, presents all municipalities within the Antioquia Department included in the *Nudo de Paramillo* Territory Consolidation Zone. It can be seen that in average 59% of the total population falls into the Unsatisfied Basic Needs Line and that the weighted average of per capita daily incomes of this population is USD\$1,84.¹⁷ Calculations in Appendix 3, Section 3 demonstrate that conditions requested to demonstrate additionality in microscale projects in EB 68, Annex 26 are satisfied.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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The emission reductions calculation follows methodology AMS-I.F named “Renewable electricity generation for captive use and mini-grid” version 3, Tool 5 “Baseline project and/or leakage emissions from electricity consumption and monitoring of electricity generation v.3”; and Tool 7 “Tool to Calculate the Emissions Factor for an Electricity System v.7”

General Set of equations

<i>Equation in this PDD</i>	Explanation of methodological choices.
(1) $ER_y = BE_y - PE_y - LE_y$ $LE_y = 0$ $PE_y = 0$ $ER_y = BE_y$	Equation 2 AMS-I.F Version 03. Following paragraph 24 in AMS-I.F Version 03 $PE_y=0$. Leakage is not to be considered.

¹⁷ It was considered that the average yearly exchange rate is Col\$1848.17/USD\$ (Source: National Central Bank – Banco de la Republica at: http://www.banrep.gov.co/series-estadisticas/see_ts_trm.htm#tasa, click on the Excel link named “Serie de datos promedio anual (Información disponible desde 1950)”

(2) $BE_y = EG_{BL,y} * EF_{CO2,y}$	Equation 1 AMS-I.F Version 03.
(3) $EF_{CO2,y} = EF_{CO2,grid,y}$	Following paragraph 19. AMS-I.F Version 3 For a mini-grid system other than described in paragraph 18 above, the baseline emission factor shall be determined as per the weighted average emissions for the current generation mix following the procedure provided in AMS-I.D.
(4) $EF_{Grid,CM,y} = EF_{Grid,OM,y} * W_{OM} + EF_{Grid,BM,y} * W_{BM}$	$EF_{CO2,Grid}$ follows AMS-I.F Version 3 paragraph 19 first vignette and the Tool to calculate the emission factor for an electricity system v.7. Seeking to help CDM project activities, the Colombian government by means of the Ministry of Energy and Mining and its Energy and Mining Planning Unit (UPME as its acronym in Spanish) according to Resolution MME 91304/2014 art. 3. The Ministry of Energy assigns the responsibility to calculate the yearly National Grid's emissions factor and release a ministerial resolution including the calculation of the national grid emissions factor by the simple adjusted methodology, for project developers to rely on this official information for project activities emission reductions calculations. This project activity uses the results from the calculation of the built and operating margins for the latest period billed on Resolution 385/2020 and also ponder them by the weights set in the Tool for the second and third crediting periods. Technical attachment to Resolution UPME 385/2020 explains procedures according to Tool 07 v.7 and supports official sources of information use for the calculation of the official grid emissions factor for year 2020.
(5) $EG_{BL,y} = EG_{Pj,y} = EG_{Pj,Add,y} =$	Following paragraph 17 AMS-I.F Version 03 for project activities that involve [...] capacity addition at an existing facility, the baseline emissions shall be calculated following the applicable procedures prescribed in AMS-I.D Version 18. Considering that this PA is a Run-of-the-river type power plant, and no reservoir is used to run the plant, §27 better estimates electricity generation in Providencia I Project Activity.
(6) $PE_y = 0.$	Following paragraph 19 in AMS-I.F Version 02 for most renewable energy project activities, $PE_y = 0.$

No emissions from fossil fuels are to occur during the Small Hydropower plant operation.

Where:

- ER_y Emission reductions in year y (t CO₂e/y)
- BE_y Baseline Emissions in year y (t CO₂/y)
- PE_y Project emissions in year y (t CO₂/y)
- LE_y Leakage emissions in year y (t CO₂/y)
- $BE_{capacity\ addition,CO2,y}$ Baseline Emissions in year y (t CO₂) for the capacity addition.
- $EG_{BL,y}$ Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)
- $EG_{BL, capacity\ addition,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
- $EF_{CO2,y}$ Emission factor (tCO₂/MWh) follows AMS-I.F Version 02 paragraph 14 first vignette and the Tool to calculate the emission factor for an electricity system v.3.0.0, therefore, $EF_{CO2,y} = EF_{CO2Grid}$.
- $EG_{PJ,facility,y}$ Quantity of net electricity supplied to the grid by the project plant/unit in year y (MWh)
- $EF_{Grid,CM,y}$ 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 . $EF_{CO2Grid} = EF_{Grid,CM,y}$ Following Resolution No. 180947 issued on 4 June 2010 by National Energy and Mining Planning Unit (UPME) as part of the Ministry of Mines and energy the “Tool to calculate the mission Factor for an electricity system” version 3.0.0 was used to calculate a combined margin (CM) grid emissions factor for the National Interconnected Electricity System in Colombia, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed. This project activity uses the UPME calculated emissions factor, given that UPME is the national institution commissioned for doing such calculations by the designated national authority (DNA) for the CDM.
- $EF_{Grid,OM,y}$ Operating margin CO₂ emission factor in year y (tCO₂/MWh).
- $EF_{Grid,BM,y}$ Build margin CO₂ emission factor in year y (tCO₂/MWh).
- W_{OM} Weighting of operating margin emissions factor (%).
- W_{BM} Weighting of build margin emissions factor (%). The values considered for W_{OM} and W_{BM} will be the following:

Variable	First crediting period	Second and third crediting period
W_{OM}	0.5	0.25
W_{BM}	0.5	0.75

- W_1 Weights of grid electricity used for the calculation of $EF_{CO2,y}$ emissions factor from the current generation mix.
- W_2 Weights of fossil fuel electricity used for the calculation of $EF_{CO2,y}$ emissions factor from the current generation mix.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data or parameter.)

Data/Parameter	$EF_{BM,grid,y}$
Data unit	tCO ₂ e/MWh
Description	<p>The latest "Tool to calculate the emission factor for an electricity system" calculates the grid emissions factor</p> $EF_{CO_2,y} = EF_{CO_2,grid,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ <p>As per the second and third crediting periods it is mandated that $EF_{grid,BM,y}$ remains fixed.</p> <p>The National Planning Unit in Energy and Mining is the governmental agency commissioned to calculate the official National grid emissions factor. As part of the tool they also calculate the Grid's Built Margin.</p> <p>This project takes from the UPME's official resolution, billed in a yearly manner, Built Margin for the calculation of the official National Grid emissions factor.</p>
Source of data	UPME latest resolution setting the Colombian National grid's emission factor f
Value(s) applied	0.281
Choice of data or measurement methods and procedures	Latest resolution billed is Resolución 385 billed on 31 th December 2020 (https://www1.upme.gov.co/Normatividad/385_2020.pdf) which bases calculations on the technical document named "FACTORES DE EMISIÓN DEL SIN SISTEMA INTERCONECTADO NACIONAL COLOMBIA 2019" (Resolution mentions this file) where in page 23 is presented the result of the calculation for the Built Margin for 2019.
Purpose of data	Calculation of the grid emissions factor for the project
Additional comment	--/--

B.6.3. Ex-ante calculation of emission reductions

The following table summarizes equations presented in Section B.6.1. in conformity with results presented in the attached excel sheet entitled "power generation Providencia I 2020 - 2027.xls rJCC16012021".

As per eq. (5) in section B.6.1

(5) $EG_{BI,y} = EG_{Pj,y} = EG_{Pj,Add,y} =$	$EG_{Pj,Add,y}$ is the product of the installed Capacity and the Maximum operating time in one year
Where $EG_{Pj,Add,y}$ = Energy generation for the Project activity capacity addition for year y	<p>Instaled capacity = 1,895kW</p> <p>Maximum operating time in one year = 8760hr.</p> <p>$EG_{Pj,Add,y} = (1895 * 8760) / 1000 = 16,600.2 \text{ MWh/y}$</p> <p>Since the crediting period starts on 17 February, year 2020 will not account for 8760 but less. In the opposite side, year 2026 account for mor than 8760 haur since it considers additional hours until the end of the crediting period.</p>

As per eqs, (3) and (4) in section B.6.1

(3) $EF_{CO_2,y} = EF_{CO_2,grid,y}$ (4) $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{om} + EF_{grid,BM,y} * W_{Bm}$	<p>Following UPME Resolution 385/2020</p> <p>$EF_{grid,OM,y} = 0.694 \text{ tCO}_2\text{e/MWh}$</p> <p>$EF_{grid,BM,y} = 0.281 \text{ tCO}_2\text{e/MWh}$</p>
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	For the second and third crediting periods $W_{om}=0.25$ $W_{Bm}=0.75$ Therefore, calculating EF: $EF_{grid,CM,y}=0.694*0.25+0.281*0.75$ $EF_{grid,CM,y}=0.385 \text{ tCO}_2 \text{ e/MWh}$
Equation (2) calculates Baseline emissions. For instance, for the year 2021	
(2) $BE_y = E_{GBL,y} * EF_{CO2,y}$	$BE_{y=2021}=16,600.2 \text{ [MWh/y=2021]} * 0.385 \text{ [tCO}_2 \text{ e/MWh]}$ $BE_{y=2021}= 6,391 \text{ tCO}_2 \text{ e/y}$
Hence, following Equation calculating for the same year as before (1)	
(1) $ER_y = BE_y - PE_y - LE_y$	$ER_y=6,391 \text{ tCO}_2 \text{ e/y} - 0 - 0$ $ER_y=6,391 \text{ tCO}_2 \text{ e/y}$

B.6.4. Summary of ex-ante estimates of emission reductions

Period		ER _y	BE _y	PE _y	LE _y
		[tCO ₂ e/y]	[tCO ₂ e/y]	[tCO ₂ e/y]	[tCO ₂ e/y]
1	Feb.17-Dec.31,2020	5,586	5,586	-	-
2	Jan.1-Dec.31,2021	6,391	6,391	-	-
3	Jan.1-Dec.31,2022	6,391	6,391	-	-
4	Jan.1-Dec.31,2023	6,391	6,391	-	-
5	Jan.1-Dec.31,2024	6,391	6,391	-	-
6	Jan.1-Dec.31,2025	6,391	6,391	-	-
7	Jan.1,2026-Feb.16,2027	7,197	7,197	-	-
Total		44,738	44,738		
# of crediting years		7			
AnnualAvgoverCP		6,391			

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data or parameter.)

Data / Parameter	$EG_{BL,retrofit,y}$
Unit	MWh/y
Description	Quantity of net electricity supplied by Unit 5 (Providencia I) Small HydroPower Plant to the Mineros Aluvial S.A.S. small grid in year y.
Source of data	High precision electricity meter installed on the exit of the Unit 5 of Providencia I Power Station to be measured at the Providencia Substation.
Value(s) applied	16,600 MWh/y

Measurement methods and procedures	<p>Measurement is undertaken using a high precision energy meter located at Providencia Substation. A backup high precision electricity meter should be available. This measurement will include total electricity delivery by Unit 5.</p> <p>Check of the information will be performed by MINEROS ALUVIAL S.A.S. Energy Division at Providencia SHP plant. The MINEROS ALUVIAL S.A.S. power station staff shall, in an hourly basis, take the reading from the electricity meter in a paper based template. Data from the template will be aggregated and stored in a daily basis on a spreadsheet and will be checked daily by the plant's supervisor. Daily information shall be sent to El Bagre headquarters where a double check is performed for quality assurance purposes.</p> <p>The records of energy generated should be recorded since the start of project.</p> <p>Hourly records will be taken by supervisors at Providencia power station in paper formats; daily electricity generation will be written in an internal spreadsheet and sent to Mineros Aluvial S.A.S. El Bagre Headquarters energy division.</p>
Monitoring frequency	<p>Continuous monitoring, hourly measurement and at least monthly recording</p>

QA/QC procedures	<p>Calibration should be undertaken as per the “Código de medida” (Measurement Code) that under type 2 measurement points calibration and other maintenance procedures should be performed no longer than 4 years after last calibration</p> <p>Records will be stored in a spreadsheet and checked daily by the plant’s supervisor. Daily information shall be sent to El Bagre headquarters and double checked for quality assurance purposes.</p> <p>At El Bagre Mineros Aluvial S.A.S. headquarters, information will be stored in databases and consolidated monthly. Information will be available for third persons under supervision of a Mineros Aluvial S.A.S. staff member. Gathered information will contain all relevant parameters of measurement instruments including: Date of installation, registries taken by the instruments, registry of calibrations and maintenance and certifications of calibration.</p> <p>To ensure the proper functioning of a given instrument MINEROS ALUVIAL S.A.S. undertakes the following activities:</p> <ul style="list-style-type: none"> - <u>Preventive maintenance</u>: every second month MINEROS ALUVIAL S.A.S. staff undergoes routine/preventive maintenance (according to the activities planned with anticipation) of cleaning and revision of a given instrument depending on the type of the equipment, the specifications of the manufacturer and the functioning of the device itself. - <u>Corrective maintenance</u>: In case of the necessity of the replacement of the measurement device, MINEROS ALUVIAL S.A.S. has its stand-by calibrated replacement on stock. The instrument on stock will be stored and maintained according to the indications given by the manufacturer and planned accordingly by MINEROS ALUVIAL S.A.S. staff in the monthly reports of instruments preventive maintenance. Replacement of measurement equipments will be performed by MINEROS ALUVIAL S.A.S. staff assisted by external experts. - <u>Calibration</u>: As per Resolution 038/2014 Measurement Code. MINEROS ALUVIAL S.A.S. will replace the instrument as per corrective maintenance procedures and perform calibration by means of an external expert entity.¹⁸ - <u>Quality control</u>: The MINEROS ALUVIAL S.A.S. Energy Division at El Bagre city will undertake statistical control that indicates deviations from the daily measurements. In cases where deviation is higher than the internal standard data will be placed under revision and the information flow chain will revise data of such period.
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¹⁸ According to the Colombian Measurement Code (Codigo de Medida at: [http://apolo.creg.gov.co/Publicac.nsf/1c09d18d2d5ffb5b05256eee00709c02/0131f0642192a5a205257cd800728c5e/\\$FILE/Creg038-2014.pdf](http://apolo.creg.gov.co/Publicac.nsf/1c09d18d2d5ffb5b05256eee00709c02/0131f0642192a5a205257cd800728c5e/$FILE/Creg038-2014.pdf)) Article 28: “The maintenance of the commercial border measurement systems with reporting to the ASIC is the responsibility of the agent representing the commercial border and the user, who must perform it with the frequency indicated in Table 4.” Table 4 sets maintenance frequency (including calibration) every 4 years for type 2 measurement points. Type 2 measurement points are classified in table 1 according to electricity transference in range between 1 and 30 MVA.

Purpose of data	Calculation of emissions reductions.
Additional comment	-

Data / Parameter	$EF_{Grid,OM,y}$
Unit	tCO ₂ e/MWh
Description	Operating CO ₂ emission factor of the grid electricity in year y
Source of data	Seeking to help CDM project activities, the Colombian government by means of the Ministry of Energy and Mining and its Energy and Mining Planning Unit (UPME as its acronym in Spanish) calculates yearly National Grid's emissions factor and releases a ministerial resolution including the calculation of the national grid emissions factor for the year being using the simple adjusted methodology, for project developers to rely on this official information for project activities emission reductions calculations. This project activity shall use the results from the calculation of the operating margin released by UPME and also ponder them by the weights set in the Tool.
Value(s) applied	0.694
Measurement methods and procedures	As for this PDD, the currently valid official grid emissions factor (and its components the built and operating factors) are set resolutions 385 billed on Dec. 31, 2020.
QA/QC procedures	-
Purpose of data	Calculation of emissions reductions.
Additional comment	The data will be stored for a period of two years after the verification.

B.7.2. Sampling plan

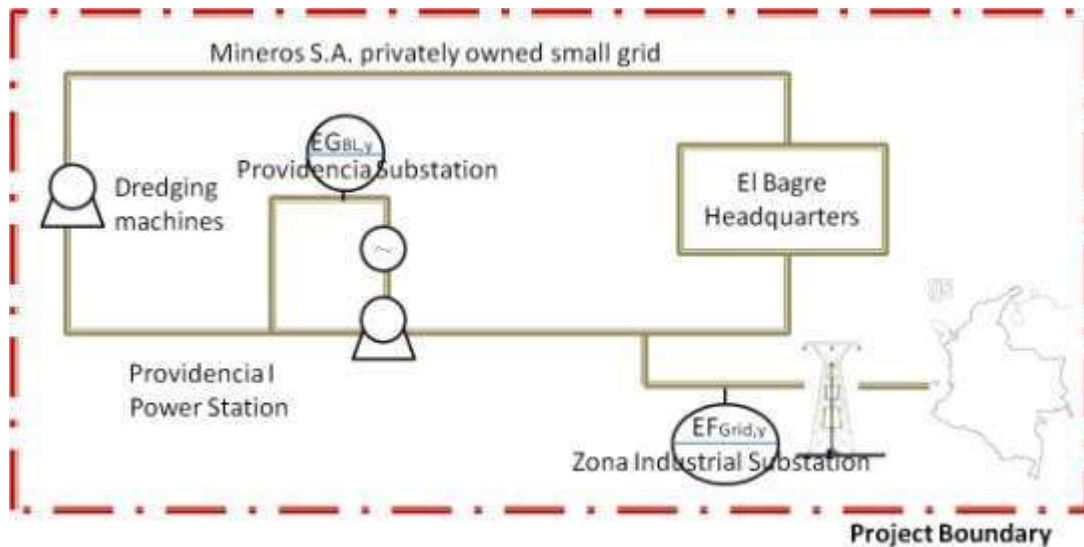
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No sampling is used for the determination of any parameter on this PDD. Data will be taken directly either from measurement instruments or official data sources.

B.7.3. Other elements of monitoring plan

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The parameters to be monitored, suggested in section B.7.1 are consistent with the AMS-I.F version 3 methodology and the "Tool to calculate the emission factor for an electricity system" version 7. The Figure below presents the project boundary and the main monitoring instruments for measuring parameters.



Once the project is built, CAEMA and MINEROS ALUVIAL S.A.S. will adjust and prepare pre-programmed spreadsheets to collect the information described in section B.7.1 and apply the formulas as instructed in section B.6.1. XM (the national dispatch centre) and UPME will be the data providers for the annual ex-post calculation of the Project's ERs. Paper and electronic based templates will be considered to bring redundancy and robustness to data taking. The on-site designated project staff will confirm these data with their own records.

Organizational Structure of the Monitoring Plan:

The management and operation of the monitoring program will involve both the environment division and the energy generation division of MINEROS ALUVIAL S.A.S. will oversee the implementers who must assemble a staff to consolidate monitoring data. CAEMA will use this data to complete periodic monitoring reports and briefings, which will be delivered to the DOE during the verification activities (Figure 6).

Mineros Aluvial S.A.S. will also be responsible for the equipment's operating procedures, and ensuring their maintenance and calibration so that the installed equipment complies with all requirements.

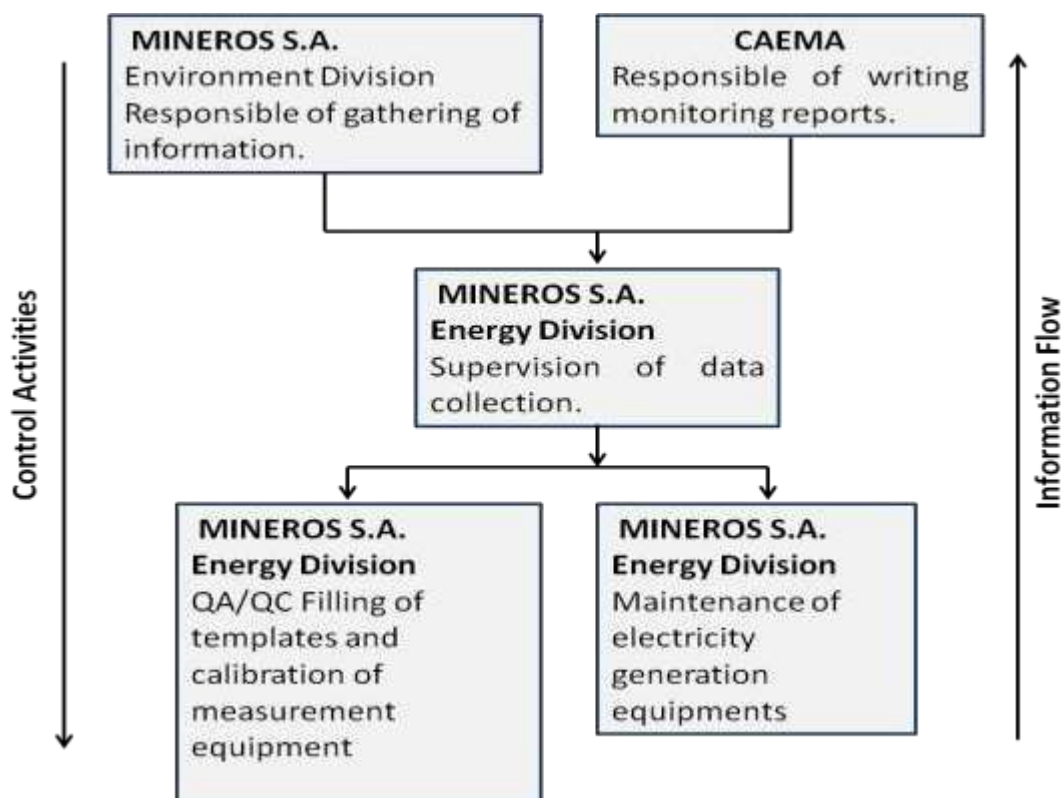


Figure 6. Organizational Structure

Monitoring and data storage:

Data to be monitored is specified in Section B.7.1. MINEROS ALUVIAL S.A.S. will be responsible for consolidating and storing the primary data collected; a copy of this data will be sent to the CAEMA who will periodically review it to verify its consistency.

Both CAEMA and MINEROS ALUVIAL S.A.S. will store data electronically, and regular backups should be performed. Data must be stored for at least two (2) years after crediting period.

CAEMA shall develop procedures for collecting the variables in the event of contingencies.

Quality Assurance and Control:

All equipment must be calibrated according to manufacturer specifications and inspected periodically according to the standards required by the equipment to ensure the accuracy of data collection. Mineros Aluvial S.A.S. shall require monitoring technology suppliers to offer their staff training in the operation of the equipment purchased. Mineros Aluvial S.A.S. will keep equipment calibration and maintenance records.

SECTION C. Start date, crediting period type and duration**C.1. Start date of project activity**

>>

In the context of a CDM project activity, the earliest date at which real action of the Providencia I: 1.8MW Small Hydro Power Generation Plant activity began was on 30th September 2011 when Bancolombia (Acting on behalf of MINEROS S.A.) and Andritz Hydro S.A.S. signed the purchase order for the delivery off the electricity generation equipment.

C.2. Expected operational lifetime of project activity

>>

30 years after starting operation

C.3. Crediting period of project activity**C.3.1. Type of crediting period**

>>

Seven years (twice renewable)

C.3.2. Start date of crediting period

>>

Start date is 17/02/2020 or the date of registration, whichever is later.

C.3.3. Duration of crediting period

>>

7 years (renewable twice)

SECTION D. Environmental impacts**D.1. Analysis of environmental impacts**

>>

Mineros Aluvial S.A.S. has an Environmental Management Plan for the operation of *Providencia* SHP plant that determines the most critical environmental impacts and provides measures for their prevention, control, mitigation and/or compensation of impacts during the stages of construction, operation and closure of the SHP plant.

Mineros Aluvial S.A.S. presented such environmental management plan to CORANTIOQUIA, the competent environmental authority relevant to the project area. CORANTIOQUIA granted permissions for the use of water resources, forestry, soil, etc. and at the same time issued permits for the dumping and disposal of the solid waste generated during operation of the projects.

The project activity involves the capacity addition to the Providencia run-of-the-river SHP plant, requiring no reservoir or large civil works. The operation of the SHP plant generates the following positive impacts:

- Renewable energy to replace energy from fossil fuels reduces emissions of greenhouse gases and other polluting gases with local effects.
- Aeration of the water by the turbine can help improve the quality of water resources by increasing the concentration of oxygen dissolved in the water.
- The creation of new sources of employment produces a positive impact on the socio-economic environment of the population located in the area of influence of the projects activity.
- A positive effect in terms of quality of life for the surrounding communities with new opportunities for stable employment, training and access to better quality electricity.

- They contribute to the conservation and sustainability of the river basin where the project takes place.
- Slope and forest intervention during the construction of the SHP plant, included in the Environmental Management Plan that establishes the revegetation and reforestation of the affected areas.
- Flow rate regulation to avoid disasters due to flooding. Although the SHP plant does not have a reservoir, the water inlet and channeling of the stream to the turbine serve as means to regulate flow and creates traps to attenuate torrential phenomena and the dragging of stones and sludge.

The most significant negative impacts are:

- The production of discharge and solid waste during the construction and operation of the generator plant. These will be handled and disposed of in accordance with the provisions of the Environmental Management Plan approved by CORANTIOQUIA.
- Noise created by the operation of the SHP plant. The noise will be measured periodically to determine compliance with environmental regulations regarding the maximum permissible standards.

D.2. Environmental impact assessment

>>

All permits required to implement this project activity are available at the time of validation. Legal requirements do not solicit a formal environmental assessment for this project activity due to scale. According to Mineros Aluvial S.A.S. Environmental Management Plan, major impacts were evaluated and are being considered in each of the operations Mineros perform. At present, there is not a formal Environmental Impact Assessment (EIA) as a guiding document but work on environmental impacts is now settled as part Environmental Management Plan.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

THE NETWORKING EVENT OF THE PROVIDENCIA I AND PROVIDENCIA III PROJECTS.

Presentation held in the Educational Institution of the township of Charcón, in Anorí, Antioquia, on September 15, 2011

Review: The social consultation event regarding the Providencia I and III CDM projects was conducted to fruition within the parameters of the UNFCCC and as per the requirements established by the Ministry of Environment and Territorial Development (MADT). Photographic record of the event is available (see attached CD). The presentation of the PDD before the public representative, the invitations to the agencies and the community, and the public presentation of the project were carried out in accordance with resolution 2734 of 2010 by the MADT. Attendance was 150 people, exceeding by more than 50% the expectations of the event organizers. Most importantly, the signed surveys of 93 individuals were obtained, most of them, confirming support for Providencia I, no opposition to the project was observed.

Participants: Assistance sheet signed by 150 people as they entered (attached). The day of networking began at 10:45 am and ended at 1:30 pm.

Special guests: Mayor of Anorí - Antioquia (Dr. Nicolás Herón), Public Representative (Carolina Peláez), Commander of the Fourteenth Brigade (Colonel Edgar Ferrucio Correa Coppola), Director of CSR (Dr. Jaime Jaramillo), Regional Director Corantiquia (Eng. Juan Carlos Marín), Chairman of the Anorí Council (Juan Fernando Barrientos Gómez).

Annexes: The invitations to the social consultation are attached, as well as the Assistance Sheet and the surveys completed by some of the community.

1. Opening by the Director of Corporate Social Responsibility (CSR) of Mineros Aluvial S.A.S.: Dr. Jaime Jaramillo



Figure7:Dr. Jaime Jaramillo, Director of CSR

The Director of CSR began his presentation by greeting the community present as well as the special guests. Following, he explained who Mineros Aluvial S.A.S. is and its gold mining tradition, as well as their need to generate energy development through the Providencia I project to allow Mineros Aluvial S.A.S. to fulfil their plans in terms of growth.

He then explained in a clear manner why it was decided to undertake the improvement and expansion of generation framed within the neighbouring areas around el Charcón, alluding to the need to strengthen the supply of electricity to the sub region, especially to towns located at the fringes of the interconnected network.

2. Opening by the Mayor of Anorí: Dr. Nicolás Herón Arango



Figure8. Dr. Nicolás Herón, Mayor of the municipality of Anorí, Antioquia.

The mayor of Anorí began by thanking the community for its excellent attendance to this networking event. The Mayor, Nicolás Herón Arango expressed his support of the *Providencia I and III* projects and highlighted the benefits these would generate for the community. He then issued two recommendations regarding the development of the *Providencia I and III* projects:

- The first, referred to the fact that all projects undertaken in the area, should be seen from a different perspective: The perspective of regional development through new jobs in contrast to the old perspective of welfarism by the company.
- The second was a request to Mineros S.A to share and implement the projects with the communities and presidents of the JAC - especially those from Usurá, Charcón, Toná and Providencia, to form a committee between the community, the administration, law enforcement and different actors in the area, the Mayor of the municipality of Anorí requested that *“all efforts be articulated so they can be acknowledged and legitimized by all. Maintain constant communication with the presidents of the entire area, not only with those in Charcón”*.

His speech ended with a commitment to the *Providence I and III* projects by the administration, which offered its accompaniment, as necessary, and participation in joint processes.

3. Speech by the Regional Director of the local environmental authority (Corantioquia): Eng. Juan Carlos Marín



Figure 9: Eng. Juan Carlos Marín, Regional Director of Corantioquia

At the start of his speech, Juan Carlos Marín gave an explanation about who Corantioquia is and what their role is in the management of natural resources. In retrospection, he thanked Mineros Aluvial S.A.S. for the invitation to participate in the networking of the Projects.

He then presented in an orderly and prompt fashion the paperwork required for a project like *Providencia I*. Among those, he mentioned: a water concession, disposal permit, forest harvesting permit, a mining permit for dragging material and a license to extract material.

He also mentioned that at present, Mineros Aluvial S.A.S. had requested 18 environmental permits (six water concession permits, six disposal permits, a forest harvesting permit and one for dragging material).

At the end of his speech, he highlighted the specific characteristics of this type of projects, agreeing that the user should take measures to compensate and mitigate any impacts, and thus explained, these projects are of great importance and retain all the requirements of environmental regulation.

4. Words from the Director of the Corporate Environmental Division of Mineros Aluvial S.A.S.: Eng. Carlos Castaño

At the beginning of his speech, the Director of the Corporate Environmental Division explained the environmental regulatory framework under which these projects were governed. Similarly, he spoke of Mineros Aluvial S.A.S.'s environmental and social responsibility and the example set by them as a mining company.



Figure10: Eng. Carlos Castaño, Director of the Corporate Department of Environment

"The challenge is to work in the best way possible and make no environmental impact" Director of the Corporate Environmental Division.

He then emphasized the fact that the two new centrals are based on clean technologies. Finally, he requested the participation of the community, the State and Mineros Aluvial S.A.S. to head all the challenges, which may arise, making clear that only this way could they reach the proposed goals.

5. Explanation of the project by the Regional Director of hydroelectric projects of Mineros Aluvial S.A.S.: Eng. Juan Carlos Meza.



Figure 11: Eng. Juan Carlos Meza, Technical Director of the Providencia I hydroelectric project by Mineros S.A.

Engineer Meza gave a detailed explanation of the work that will take place to achieve the capacity increase in Providencia I. He also presented the technical characteristics of the equipment and where these would be located on the territory. Juan Carlos Meza made it clear that because of their positioning, no area would flood because of the Providencia I project. He then called attention to the discharge areas.

In conclusion, he informed the community that the road between Charcón and Toná would be improved and equally, two new bridges would be built and two other existing bridges would be repaired, these works would service the community.

6. Explanation of the project by the Technical Advisor to the CDM Project: Eng. Juan Carlos Caycedo



Figura 12. Ing. Juan Carlos Caicedo. CAEMA

At the beginning of his speech, he spoke about climate change and the effects it generates. He reviewed the elements that make up the Environmental Management Plan (PMA) and the result of the assessment of the main impacts that would be perceived by the community during the project construction and its subsequent operation.

Ing. Caycedo concludes that based on the PMA that all the aspects that suggest a risk to the community have been assessed and each has an action plan and a contingency measure. Therefore, the Providencia I hydroelectric project would not create negative impacts for the community, on the contrary, the works serve as flow rate regulators and will protect the community from future flooding like the one experienced in 1998. Additionally, the project ensures that *“An ecological flow will be left behind to maintain the natural flow”*.

E.2. Summary of comments received

>>



The 80 people surveyed responded positively in support of the *Providencia I* project. For most of the participants in the social consultation, this project will mean new job opportunities as well as improvements to their municipality, as is the case of Mrs. Alba Lucelis Patito Hernández, who lives in Charcón, she refers to *Providencia I* as follows: *“I agree with all projects that benefit the community”*. It must be noted that only one respondent refused to support Mineros Aluvial S.A.S., however the respondent did not specify why not.

Ver

Conclusion

It can be concluded that the *Providencia I* project enjoys a high degree of acceptance among the population, those who in its implementation can envision progress for the municipality of Anorí and the areas of El Charcón, Usurá, Providencia and Toná due to, among others, the social and employment benefits, obtained from the construction and operation of the project. *"This project is of great interest to the community, because it can bring many opportunities"* María Marleny Muñoz Rodríguez, a resident of Anorí.

While some confusion existed in the community while completing the survey, this confusion was due to an overload of the contracted staff that faced the overwhelming welcome of the event, unexpected even to event organizers.

As for concerns that arose after the event and were reflected in the survey, such as the case of Mr. Edis Manuel Piñedas Jaraba, the Mineros Aluvial S.A.S. company commits to providing comprehensive and adequate information in the Mayor's Office in the municipality of Anorí, ensuring the community full understanding regarding the *Providencia I* project.

After all the special guests had spoken, ample space was provided the community to pose questions and clarify any queries regarding the *Providencia I and III* projects.



Following is a transcript of the inquiries, which arose during the event

Question: ¿What impacts will the projects have on flooding?

Answer: Flooding will be prevented and there will be a network of hydrologic monitoring. Should a high water phenomenon occur, it will be detected and the necessary alarms will be activated, thus avoiding possible flooding.

The project involves a decrease of minor risks, for example, lower sediments (trees, etc.), because these things can hinder the dam.

Question: How will the population benefit from the areas of influence in matters of employment? Answer: Local employment has been and will continue to be a policy of Mineros Aluvial S.A.S. We will consider those who live in the area of project influence as a priority (areas of Toná, Providencia, Usura, and the town of El Charcón) when generating employment. When we are unsuccessful finding someone in that area due to the requirements for filling the position, we will look in a broader region. Similarly, we will provide necessary training so that in the medium-term we may have the necessary manpower. It should be noted that to solicit their services and apply for jobs, intermediaries are not necessary. MINEROS ALUVIAL S.A.S. has commissioned to Mr. Ivan Darío Casas to attend all job applications needed to accomplish the project.

At this point, Mr. Iván Darío Casas (Mineros Aluvial S.A.S. project manager) introduced himself saying that he is the one who will channel the concerns of the project regarding employment and will relate directly with the community. Iván Darío Casas is the contact person within the company to handle the requests made by the community.

Mineros Aluvial S.A.S. continues to support social investment. For example, for the health station, which was a very felt necessity we approved the endowment of this station per the hospital's request. This donation was made official the day of social consultation.

Question: In what way does the Company commit to offer the technicians and technologists in our towns solutions?

Answer: We will generate employment opportunities within our possibilities; we will also seek ways to continue training these young people. With the resumes of members of the community who seek work on the project, the company has created a database, priority will be given to those with the profiles required by the company and who live in the areas of El Charcón, Providencia, Toná and Usurá.

Question: How does the Company undertake environmental education topics?

Answer: The Environmental Management Plan submitted to Corantioquia includes specific subjects of training regarding environmental education both for people involved in the project and those who are not related to it. Special attention will be given for this training to children attending schools in the townships nearest the project.

Question: What will be the most significant impacts?

Answer: Construction and assembly: the arrival of trucks, movement of people, but we will seek to manage them so they are not so high. Once the work is done, the river will flow through a tunnel and thus generates electricity. There may be noise generated, but not enough to cause discomfort. Other positive impacts include the creation of work within the districts close to the project and the support of small and medium enterprises to provide the services required by the project.

Question: What will the company offer the community?

We are seeking associates to find the solution to certain problems which you may have and which are in our power to resolve, by working together.

Question: Are you looking for headquarters for the community representatives (Junta de Acción Comunal)?

Answer: We have not decided yet to co-finance the community center, because this will be a joint endeavor among community representatives, the local government and MINEROS ALUVIAL S.A.S. that will depend on prioritized actions along with the community where the works will make the investment.

Question: How can the Company support the electrification of villages in the area of influence?

Answer: Mineros Aluvial S.A.S. will generate the electricity, however, it is necessary to establish clear agreements with transporters and distributors of electricity for residential use. It has been proposed that we convene with the EPM, the Office of the Governor of Antioquia, the Mayor's Office and other leaders to deliver this supply through companies endorsed to do so.

The Mayor of Anorí, Nicolás Herón: We have met with EPM and some areas have been benefited. Various projects have been submitted but institutions are weary of entering these areas due to issues of public order. The community has already guaranteed their safety and is waiting for an answer from EPM.

E.3. Consideration of comments received

>>

During the networking event, the communities issued the above questions verbally and were answered directly by the Mineros S.A and Corantioquia representatives. Answers by Mineros Aluvial S.A.S. were published on the message boards of the public defense offices of the municipality of Anorí.

SECTION F. Approval and authorization

>>

Letter of Approval issued on October 8, 2012

Appendix 1. Contact information of project participants

Organization name	Mineros Aluvial S.A.S BIC
Country	Colombia
Address	Cra 43A # 14-109. Ed. Nova Tempo. floor 6 Medellín (Antioquia), Colombia
Telephone	(574) 2665757
Fax	(574) 2666995
E-mail	santiago.cardona@mineros.com.co
Website	www.mineros.com.co
Contact person	Santiago Cardona

Organization name	The Andean Center for Economics in the Environment – CAEMA/ACEE
Country	Colombia
Address	Cra. 3 No. 11 – 55. Ed. Calle del Sol. 111711 Bogotá D.C.
Telephone	(57) 1 341 3477
Fax	(57) 1 341 3477 / 337 6616
E-mail	thomas.black.a@gmail.com
Website	www.andeancenter.com
Contact person	Thomas Black-Arbeláez.

Appendix 2. Affirmation regarding public funding

No public funding is required for this project

Appendix 3. Applicability of methodologies and standardized baselines

BASELINE INFORMATION

1. Electricity consumption of administrative facilities and dredging machines at Mineros Aluvial S.A.S.

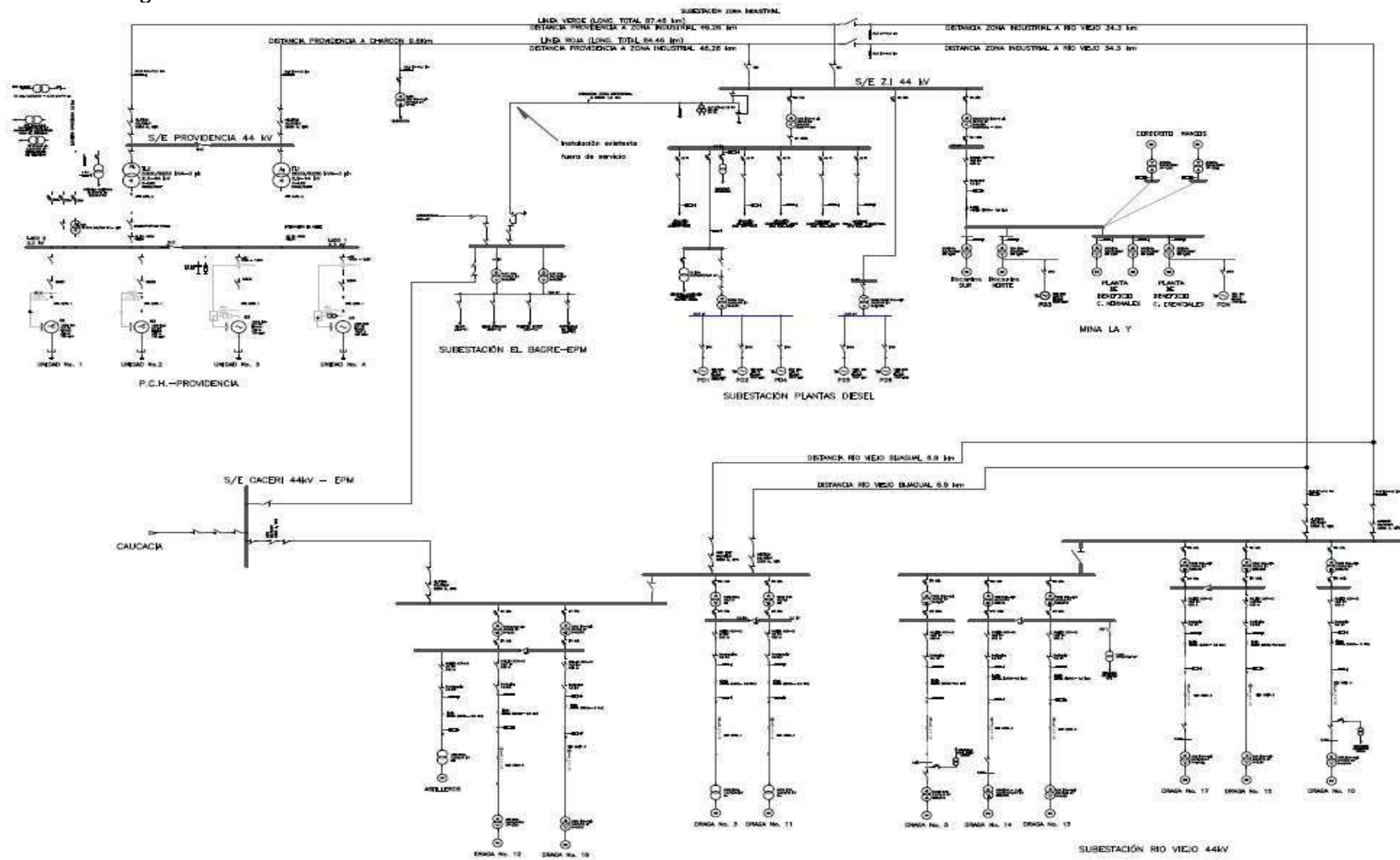
	2008			
	Providencia kW	Diesel kW	Interconex 1 at Zona Industrial Substation kW	net electricity consumption kW
Jan	5,405,380	-	-990,235	4,415,145
Feb	5,226,907	-	-819,502	4,407,405
Mar	4,340,559	76,512	-631,172	3,785,899
Apr	5,019,507	8,800	-751,120	4,277,187
May	5,222,203	-	-857,262	4,364,961
Jun	5,377,214	-	-830,036	4,547,178
Jul	5,377,995	-	-988,928	4,389,067
Aug	4,853,070	41,150	-703,451	4,231,919

Sep	5,524,001	3,700	-888,974	4,638,727	
Oct	5,177,977	400	-836,680	4,341,697	
Nov	5,251,224	-	-901,376	4,436,739	
Dec	5,338,115	-	-602,723	4,648,501	
2009					
	Providencia kW	Diesel kW	Interconex 1 at Zona Industrial Substation kW	Interconex 2 at Bijagual Substation kW	net electricity consumption kW
Jan	5,468,625	-	-1,289,359	411,902	4,591,168
Feb	4,727,782	-	-869,306	1,243,651	5,102,127
Mar	4,930,158	-	-870,970	1,575,303	5,634,491
Apr	4,878,033	-	-1,228,681	1,509,894	5,159,246
May	5,273,225	14,620	-666,135	967,285	5,588,995
Jun	5,162,153	-	0	531,556	5,693,709
Jul	4,663,623	4,470	0	647,971	5,316,064
Aug	5,328,352	-	0	612,706	5,941,058
Sep	4,851,669	21,196	0	468,907	5,341,772
Oct	4,893,096	-	0	549,479	5,442,575
Nov	4,797,806	-	0	555,812	5,353,618
Dec	4,797,806	28,150	0	783,311	4,930,074
2010					

	Providencia kW	Diesel kW	Interconex 2 at Bijagual Substation kW	net electricity consumption kW	
Jan	3,909,048		1,051,655	4,960,703	
Feb	3,047,005	135,594	1,401,362	4,583,961	
Mar	4,774,364	5,950	1,270,642	6,050,956	
Apr	4,699,740	39,349	1,422,158	6,161,247	
May	4,730,832	44,723	1,531,245	6,306,800	
Jun	4,955,581	54,130	1,429,262	6,438,973	
Jul	4,080,285	71,430	1,957,773	6,109,488	
Aug	4,167,390	298,756	1,821,607	6,287,753	
Sep	3,340,708	113,310	1,869,370	5,323,388	
Oct	5,189,060	87,025	2,004,288	7,280,373	
Nov	2,467,288	356,470	2,227,913	5,051,671	
Dec	2,913,685	198,360	2,213,938	5,325,983	
2011					
	Providencia kW	Diesel kW	Interconex 2 at Bijagual Substation kW	net electricity consumption kW	
Jan	4,107,661	19,220	1,974,119	6,101,000	
Feb	4,151,971	40,350	2,101,888	6,294,209	

Mar	3,568,497	303,300	2,540,980	6,412,777	
Apr	3,533,414	225,473	2,210,750	5,969,637	
May	4,228,594	-	2,503,974	6,732,568	
Jun	4,883,506	17,990	2,035,320	6,936,816	
Jul	2,632,753	767,610	2,614,744	6,015,107	
Aug	4,356,493	4,650	2,031,068	6,392,211	
Sep	4,772,626	30,071	2,216,578	7,019,275	
Oct	2,877,124	796,933	3,228,177	6,902,234	
Nov	1,211,958	1,196,060	2,862,687	5,270,705	
Dec	4,977,776	2,450	1,766,248	6,746,474	

2. Current electricity connexions from the Providencia SHP plant to the small MINEROS ALUVIAL S.A.S. grid and to the national electricity grid



3. Statistical information from the Municipalities reported by UAECT: Unsatisfied Basic Needs and Under the Misery Line indexes.

Deapartment Code	Department Name	Municipality Code	Municipa lity Na me	Unsatisfied Basic Needs Index (Necesidades Basicas Insatisfechas)						Total Population 2011			Percapit Income
				Town		Rural Areas		Total		Total	Town	Rural Areas	Total
				Unsatisfied Basic Needs	Under the Misery Line	Unsatisfied Basic Needs	Under the Misery Line	Unsatisfied Basic Needs	Under the Misery Line				
05	ANTIOQUIA	040	ANORI	0.42	0.14	0.56	0.26	0.48	0.20	16,237	6,187	10,050	2.1173
05		107	BRICEÑO	0.44	0.20	0.59	0.31	0.55	0.28	8,737	2,429	6,308	1.8490
05		154	CAUCASIA	0.49	0.18	0.71	0.39	0.52	0.22	101,788	82,481	19,307	2.1148
05		250	EL BAGRE	0.40	0.18	0.71	0.43	0.51	0.26	48,211	25,747	22,464	1.8077
05		361	ITUANGO	0.28	0.11	0.79	0.57	0.65	0.44	22,538	5,897	16,641	1.4893
05		495	NECHI	0.62	0.38	0.77	0.48	0.68	0.42	24,085	12,624	11,461	1.6939
05		895	ZARAGOZA	0.46	0.14	0.83	0.58	0.64	0.36	29,228	13,400	15,828	1.8116
05		120	CACERES	0.61	0.35	0.68	0.38	0.67	0.37	33,950	7,688	26,262	1.8452
			Average USD\$	0.46	0.21	0.71	0.43	0.59	0.32	35,596.75	19,556.63	16,040.13	1.84

4. Photo of Unit 5 manufacturer's machine plate



Figure 1: Equipment Plate for Turbine 5

Trespassing the information, the equipment plate contains the following data:

Indar		Tel: +34 943 028 200 hydro@indar.ingeteam.com 20200 BEASAIN (SPAIN)		IEC G0034-1
Synchronous Machine			LSA-710-L/12	
No.: 30140000408		Output 2369 kVA		
Year: 2012	Weight: 14500 kg	Voltage: 2300 V		
Connection:	Phases:3~	Current: 594.6 A		
Duty: S1	IP 23	Frequency: 60 Hz		
Thermal Class: F	IC 21	Speed: 600 rpm		
Temperature rise: B	IM 1001	Max. Speed: 1163 (10') rpm		
Min. Ambient temp: - °C	Max. Ambient Temp.: 40°C	Rated Power Factor (lagging/Leading): 0.8/- p.u.		
Max. Water Temp.: 25°C	Altitude: <1000 m.a.s.l.	V excitation: 55V	I excitation: 7.1 A	

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer to Section B.6.3. and the attached excel sheet entitled “power generation Providencia I 2020 - 2027.xlsx”.

Appendix 5. Further background information on monitoring plan

The monitoring plan for Providencia I small scale project activity includes monitoring of the grid emissions factor since, in the absence of the project activity the increasing electricity demand would have been supplied by the National Interconnected Electricity Grid (SIN for its acronym in Spanish).

Appendix 6. Summary report of comments received from local stakeholders

At the end of presentations by each one of the special guests and representatives of Mineros Aluvial S.A.S., the support of the community regarding the project was evaluated through a survey. The surveys discussed in this document were collected during the Providence I project social consultation on September 15, 2011, in the municipality Anorí, in Antioquia.

These were completed by a section of the community in direct or indirect contact with the corporate activities of Mineros Aluvial S.A.S., therefore, the results can serve as a basis to establish the degree of acceptance, by area residents, of the *Providencia I* project.

It is essential to highlight the large number of participants in the meeting organized by Mineros Aluvial S.A.S., which exceeded the expected participation by 50% (150 participants). For most, the *Providencia I* project has a high relevance, as is the case of Enith Yohana Ramírez Jaramillo, who lives in Liberia: *“Accept my most sincere support. I am very happy because this project will generate employment and development”*.

Figure 12 shows the results that correspond to the third question in the *Providence I* survey (see attached survey form). During the survey evaluation contradictions were found in the answers to this question. Although 20 people answered the previous question negatively, contradictions were found in the answers, for example, eight of the respondents in spite of their negative response to the impact of the project responded that the community could benefit from the *Providencia I* project. This is the case of Mr. Daniel José Hoyos Peves, a resident of Liberia, *“people could benefit from this project and it is something we need”*. Of this group, four others explained that they were not affected by the project or did not belong to the association. Six of the remaining 20 made no comments on how they will be affected, and lastly, of the remaining two, the former referred to the space occupied by the company - the question did not obtain further justification, and the latter responds negatively due to lack of information. See the section, Questions by the Public for answers to other questions asked during the consultation day and answered in the surveys.

In comparison to the current state, ¿how will you be affected by the new hydroelectric energy generation project presented today?

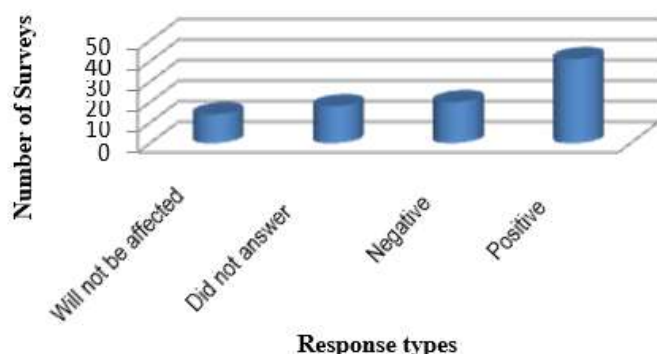


Figure13: Effect on the community by the development of the Providencia I Hydroelectric project

The second graphic presents the results corresponding to the fourth *Providencia I* survey question (see annexed surveys).

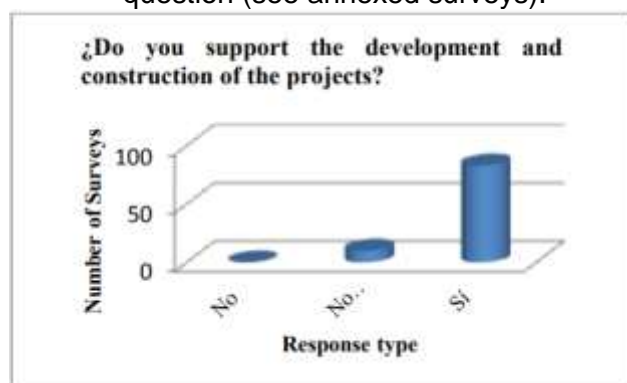


Figure14: Community acceptance of the development of the Providencia I Hydroelectric project.

Appendix 7. Summary of post-registration changes

- Description of the Post-registration change:** Permanent increase in capacity at the commissioning of the Pelton turbine. When finished Validation and registration of this project activity, technical features of the Pelton turbine to be installed was not fixed yet since negotiation haven't finished completely. At the closing of the negotiation it was possible to improve installed capacity of the turbine without increasing price. Therefore, decision of accepting the new improved turbine was intuitive.

Impact of the post registration Change: The scale and type of the project activity do not change once applied the PRC. Also methodology will continue being the same but updated from version 2 to version 3; all components of the methodology are calculated and supported on the same manner with the application of this PRC. No increase in costs were incurred for the implementation of the project. Barriers the project activity overcame during implementation are the same as those described for the project activity. Accuracy for the monitoring of electricity generation is high, as MINEROS ALUVIAL S.A.S. improved data custody and storage of information.
- Yearly monitoring of the Colombian grid emissions factor billed by UPME.** A fixed emissions factor of 0.28 tCO₂e/MWh do not represent the real contribution to emission

reductions considering that UPME emission factor for 2019 equals 0.388 and it has been higher in previous years.

Impact of the post registration Change: this impact is mainly related to the number of emission reductions to be achieved by the project, therefore, relates to the increase in the income from selling emission reductions. Project participants consider that increase in the income from selling CERs is marginal compared to the total cost of the project and the difficulties overpassed to implement the project activity; it is also important to consider that income expected in 2012 was higher than the one expected today since CERs price today is lower than it was in 2012-2013.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
11.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: <ul style="list-style-type: none"> • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.0	25 June 2014	Revision to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the “Guidelines for completing the project design document form” (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.
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