Monitoring report form (Version 03.2)

Monitoring report

Title of the project activity	Chacayes Hydroelectric Project, Chile
Reference number of the project activity	6848
Version number of the monitoring report	4
Completion date of the monitoring report	20/05/2014
Registration date of the project activity	26/07/2012 *(Date of registration action 29 Oct 12)*
Monitoring period number and duration of this monitoring period	Monitoring period 1; 1 year,(365 days) from 30/07/2012 to 29/07/2013, both days included
Project participant(s)	Pacific Hydro Chacayes S.A. (PHCSA)
Host Party(ies)	Chile
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1: Energy industries (renewable/non-renewable sources). ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 13.0.0; EB 67)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	357,011 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	318,953 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012 (if applicable)	153,657 tCO2e (up to 31 December 2012)
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	165,296 tCO2e (up to 29 July 2013, included)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> The Chacayes Hydroelectric Project is a run-of-river hydroelectric power scheme operating on the Cachapoal River within the Alto Cachapoal basin in Chile. The project activity is operated by Pacific Hydro Chacayes S.A. ("PHCSA"), a subsidiary of Pacific Hydro Chile S.A. ("PHC"). In May 2009 Astaldi SpA acquired 27% of PHCSA.

1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:

The purpose of the project activity is to utilize the hydrological resources of the Cachapoal and Cipreses rivers to generate electricity which will be exported to the Sistema Interconectado Central ("SIC grid"), the Chilean central electricity grid.

A large proportion of electricity supplied to the SIC grid is generated from non-renewable fossil fuel resources. Prior to the implementation of the project activity the electricity that is supplied by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of other new generation sources. The baseline scenario is the same as the scenario existing prior to the implementation of the project activity. In the project scenario, the electricity generated from the Chacayes Project will displace this more emission-intensive grid sourced electricity and will therefore result in a reduction in greenhouse gas (GHG) emissions of approximately 357,011 tonnes CO2e per annum.

2. Brief description of the installed technology and equipment:

The project has a total installed capacity of 110.8 MW, consisting of 2 turbines with a rated capacity of 56.68 MW each, and two generators with a rated capacity 65,600 KVA each.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

- Starting date of the construction : May, 2009
- Starting date of commissioning: March 2011
- Starting date of commercial operation: December 31st , 2011

4. Total emission reductions achieved in this monitoring period.

318,953 tCO2e

A.2. Location of project activity

>> The host Party is Chile.

This project is located in the Cachapoal valley approximately 10 km upstream of the town of Coya on the northern bank of the Cachapoal River. Coya town is approximately 30 km east of the city of Rancagua, which is the major city of Chile´s 6th Region. Rancagua is located approximately 80 km south of Santiago, Chile. The coordinates of the project are the following:

The geographical coordinates of the power house are:

Latitude 34°16'31.54"S

Longitude 70°27'8.76"W

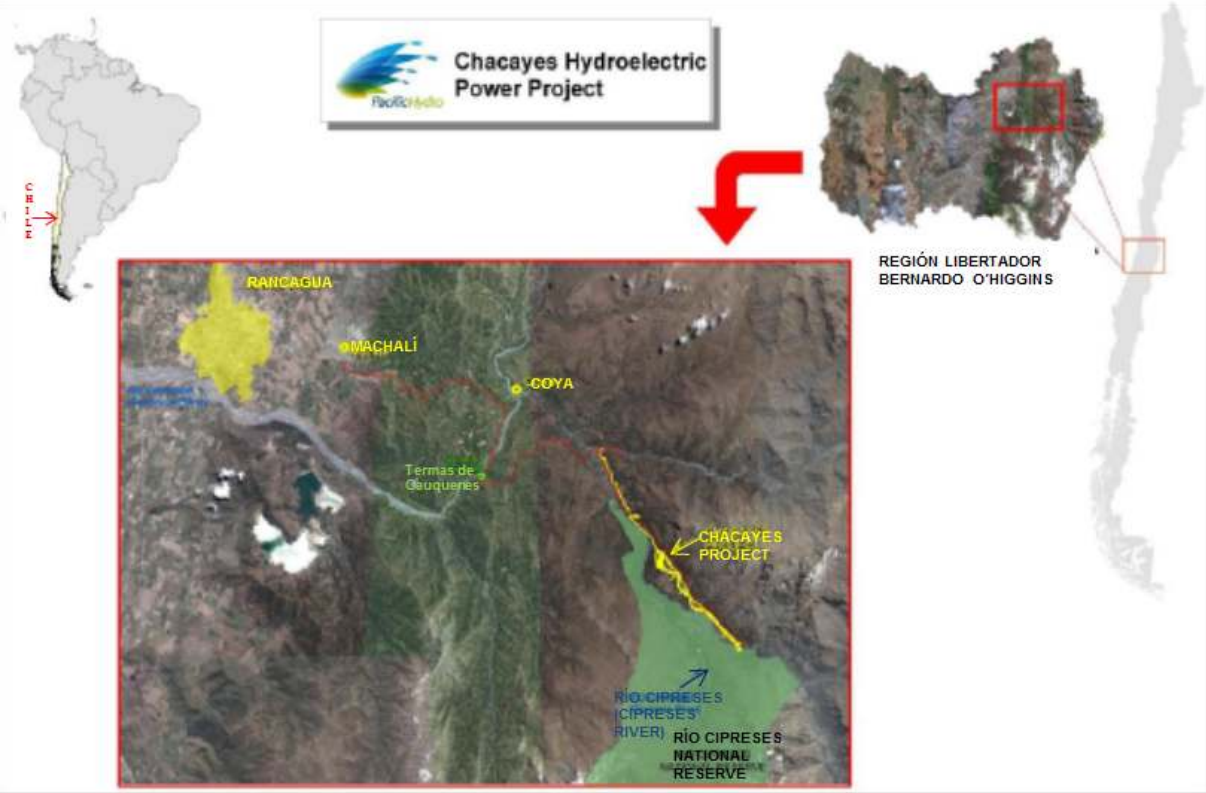


Figure 1 Location of the project activity

A.3. Parties and project participant(s)

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)
Chile	Pacific Hydro Chacayes S.A. ("PHCSA") (Private entity)	No

A.4. Reference of applied methodology

>> ACM0002 (version 13.0.0; EB 67): Consolidated baseline methodology for grid-connected electricity generation from renewable sources. More information about the methodology can be found on the website :

http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

In accordance with ACM0002 (Version 13.0.0; EB 67) the following tools were used:

- Tool to calculate the emission factor for an electricity system (Version 02.2.1; EB 63)
- Tool for the demonstration and assessment of additionality (Version 5.2.1; EB 39)

A.5. Crediting period of project activity

>> 7 years from 30/07/2012 to 29/7/2019, both days included (Renewable).

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>> The project activity is a run-of river hydroelectric power plant with an installed capacity of 110.8 MW and an expected annual net generation of approximately 560 GWh of electricity per annum. The purpose of the project activity is to utilize the waters of the Cipreses and Cachapoal Rivers to generate hydro-electricity for export to the SIC grid.

Water will be diverted from the Cipreses River through an intake (1) via a tunnel and short canal (2), to the Cachapoal River, where it will be discharged immediately upstream of the Chacayes intake (3). At this point the water, which is the combination of the Cachapoal and Cipreses rivers, will pass through a desander and a water conveyance system comprising of open canal, two free flow tunnels and two culverts (4) into the Chupallal regulation pond (5). The pond has an approximate surface area of 180,000 m² and provides up to 8 hours storage.

Water discharged from the pond enters a 2.6 km pressure tunnel (6) which delivers the water to the Chacayes powerhouse (7). A surge shaft will control pressure variations from operation and shut down of the turbines. The powerhouse will be located above ground and will house two vertical Francis turbines coupled with generators. Part of the turbined water will be discharged through an aqueduct to feed the existing Coya project canal and the remainder spilled back into the Cachapoal River

The main power transformers are located adjacent to the power house from where electricity is exported to the grid via a new 220 kV transmission line approximately 17 km in length to the Maitenes substation, and from there through existing transmission lines to the connection to the SIC at Sauzal substation.

The following figures provide detail of the project schematic and physical layouts.

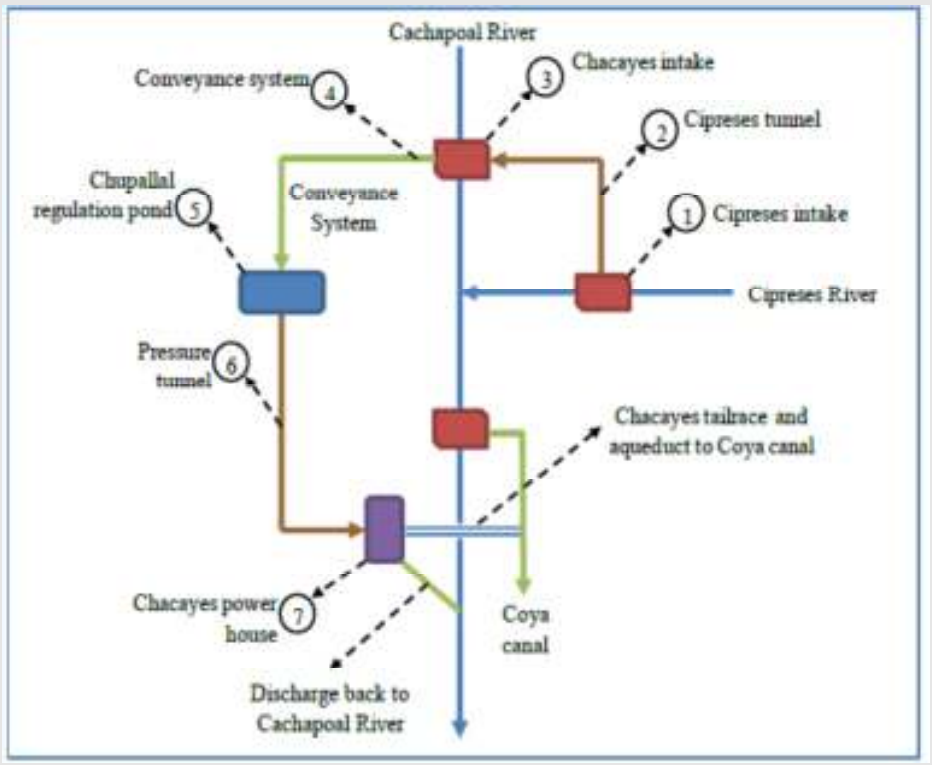


Figure 2 Schematic layout of the project activity

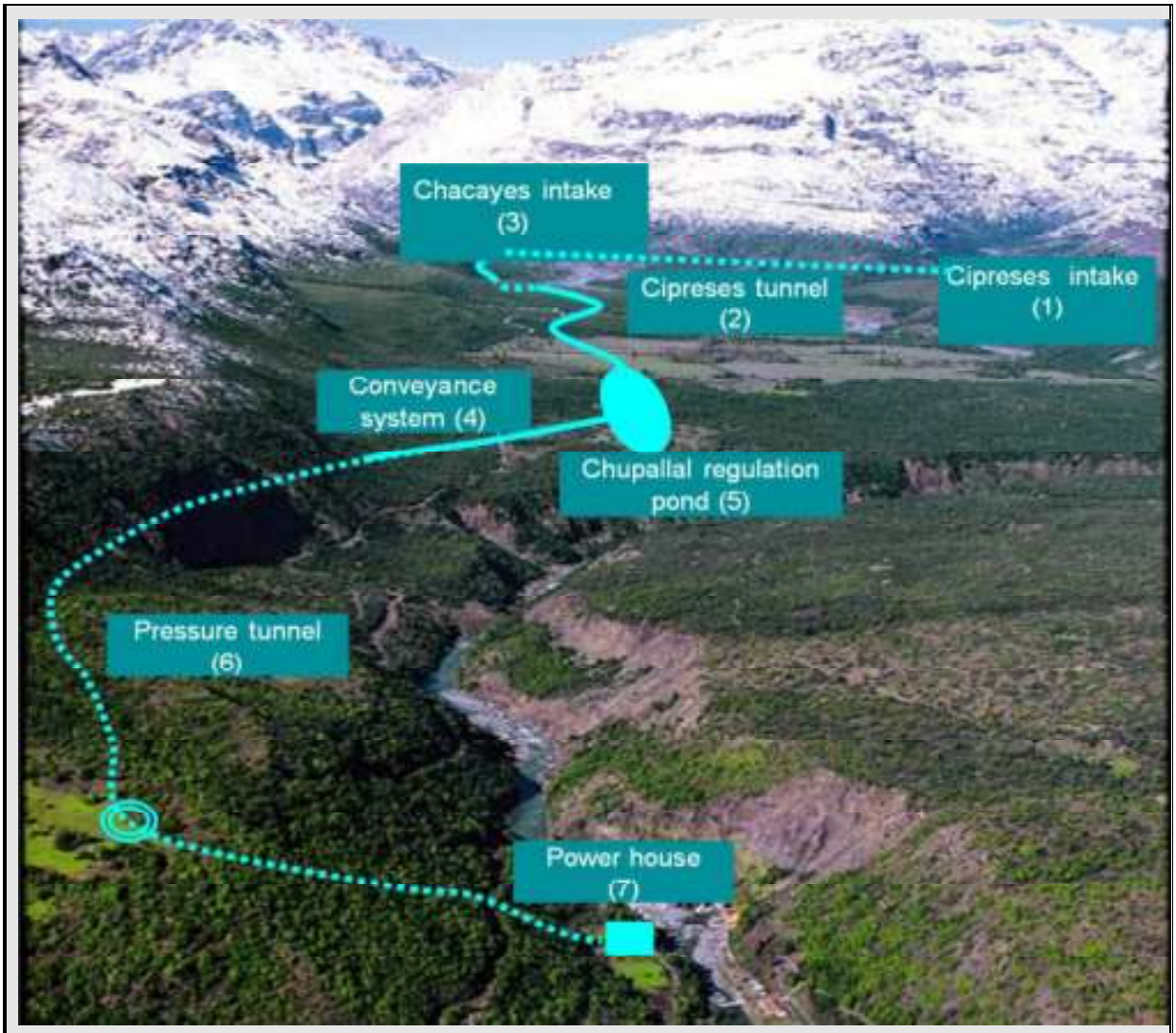


Figure 3 Physical layout of the Project Activity

Category	Item	Specification
Turbine	Type of turbine	Francis type, vertical shaft
	Number of generating units	2
	Rated capacity of each unit	56.68 MW
	Gross Head	181 m
	Rated Flow	72.5 m^3/s
	Rated Speed	375 rpm
	Technical Lifetime	25 years
	Manufacturer	Andritz Hydro
	Location manufactured (domestic or imported)	Imported
Generator	Generator Type	Three-phase synchronous generator
	Rated capacity of each unit	65,600 kVA

	Power Factor	0.9
	Frequency	50 Hz
	Technical Lifetime	25 years
	Manufacturer	Andritz Hydro
	Location manufactured (domestic or imported)	Imported
Net Capacity	Minimun Continuous Rating Electrical Output at metering point	110.8 MW (*).

*: Net capacity was calculated according to technical data provided by the manufacturer, which considered the two turbine´s installed capacity (56.68 MW each), the generator´s efficiency (98.564%), the total auxiliary service´s consumption (375 kW) and the transformer´s efficiency (99.50%).

Below is the list of downtimes occurred during the monitoring period.

Date	Cause
3/08/2012	Unit 1 out of service. Failure of auxiliary services.
18/10/2012	Units 1 and 2 out of service. Mechanical failure,
27/01/2013	Unit 1 out of service. Failure of equipment.
13/04/2013 14/04/2013 15/04/2013	Disconnection request by CDEC-SIC (Unit 2). Change of insulator.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

>> N/A

B.2.2. Corrections

>>N/A

B.2.3. Permanent changes from registered monitoring plan or applied methodology

>> N/A

B.2.4. Changes to project design of registered project activity

>> N/A

B.2.5. Changes to start date of crediting period

>> N/A

B.2.6. Types of changes specific to afforestation or reforestation project activity

>> N/A

SECTION C. Description of monitoring system

>> This section details the monitoring plan applied on the electricity delivered (MWh) to the Central Interconnected System (SIC) by the project activity of Chacayes Hydroelectric.

Operational and Management Structure

The Operation and Management structure of the Chacayes Project is structured as presented in the following diagram.

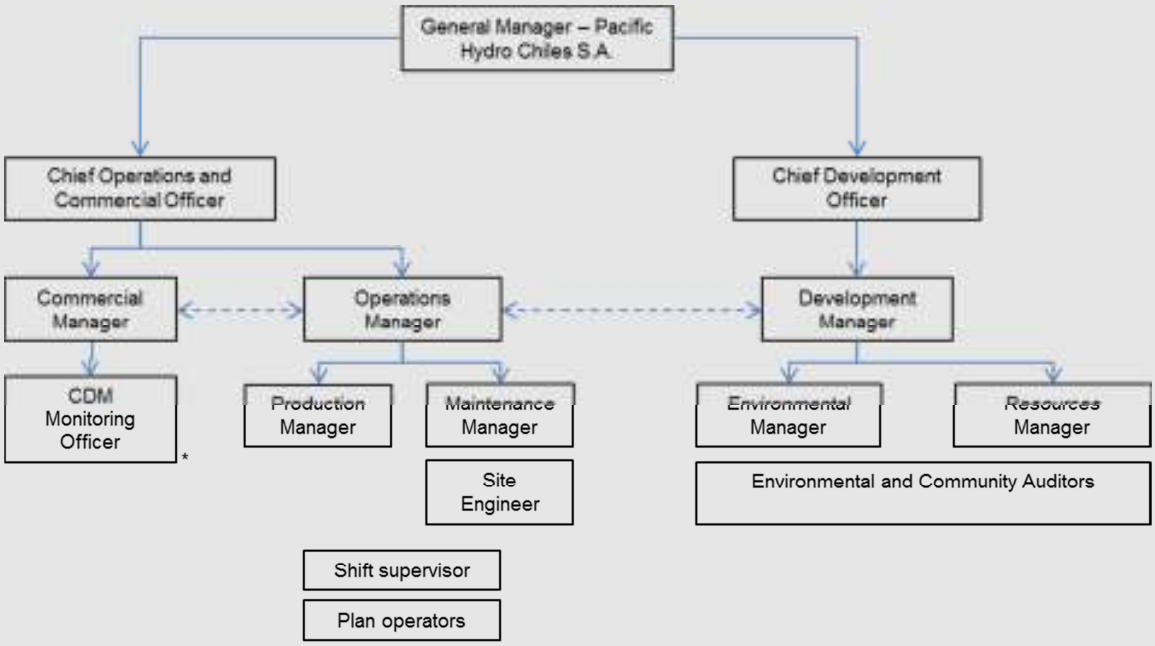


Figure 4 Organizational structure for CDM project

The CDM Monitoring Officer reports to Commercial Manager, and works along with the Commercial Contracts Engineer and the Operations Coordinator, considering the following structure and responsibilities.

Figure 5 Specific organizational structure for CDM project

Position	Responsibilities
CDM Monitoring	• Ensures on going compliance with the CDM monitoring plan.

Officer	• Supervises meter calibration requirements and preparation of the Meter Calibration Report. • Reviews and approves quarterly Metered Net Electricity Generation reports. • Oversees the collection, recording and storage of data. • Calculates Emission Reductions. • Prepares the CDM Monitoring Report.
Commercial Contracts Engineer	• Downloads invoice reports (records for sold electricity) from CDEC-SIC. • Performs crosscheck between invoice reports (records for sold electricity) and data collect from meters. • Sends reports to the CDM Monitoring Officer and CDEC-SIC.
Operations Coordinator	• Collects data from meters • Elaborates report of the monthly electricity generation • Sends reports to the Commercial Contracts Engineer

Training

All persons that are involved in the CDM monitoring received appropriate training. The training provided an overview of the CDM and covered all elements of the monitoring plan in detail.

Technical training for operation was provided by ACTICAP to all the operators involved in CDM monitoring.

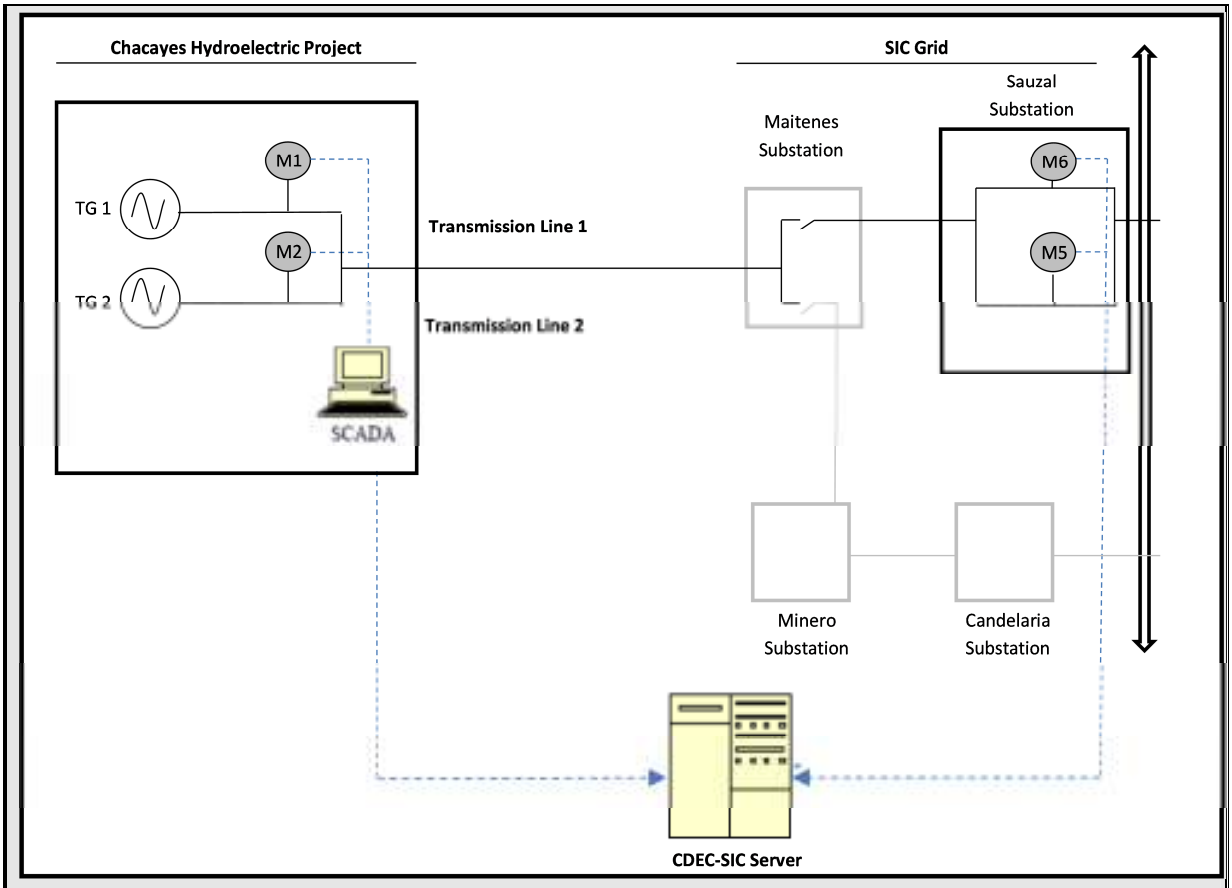
Metering Points

The net energy supplied to the grid by the project is measured at metering points M5 and M6 (Sauzal Substation), which are the main meters. This data is used for calculations of emission reductions.

Meters M1 and M2 are not used for CDM monitoring purposes, as they measure gross electricity generation. They are presented in the diagram because the actually exist, but they will only be used in a very exceptional case of a failure of M5 and M6, applying transmission losses to the monitored values.

Since the project presentation to the CDM, Meters M3 and M4, were never considered to measure the project electricity generation.

The metering diagram is presented as follows:



Data Collection Method

The electricity injected via Sauzal Substation is measured by main meters M5 and M6. Data from M5 and M6 is collected by an operator and the net electricity generation is calculated automatically by the meter´s software.

Data is reported on a monthly basis, measured by hour.

The electricity measured will be verified against the invoice reports (records for sold electricity).

A *Metered Net Electricity Generation Report* outlining net electricity generated and other relevant parameters is prepared monthly. The results from this report were used to prepare the *CDM Monitoring Report* for this monitoring period.

Data Cross-Checks

The electricity generation data collected by the main meters M5 and M6 is cross checked against the invoice reports (records for sold electricity) from CDEC-SIC.[1]

Procedures were developed to cross check and verify energy generation data.

Standards and Verification of Meters

The electricity meters are verified at least once every three years. The last verifications were issued as detailed in the following table:

[1] CDEC-SIC report is based on main meters M5 and M6. Meters M1 and M2 are not used for crosschecking as the measure gross electricity generation. They will be used only in emergency (failure of main meters M5 and M6) applying transmission losses to the monitored values.

Meter	Type	Serial number	Location	Date (dd/mm/yyyy)	Validity of last calibration (dd/mm/yyyy)
M6	JEM STAR	112416380	Sauzal Substation (Line 1)	8/07/2011 13/04/2013	12/04/2016
M5	JEM STAR	112416378	Sauzal Substation (Line 2)	5/07/2011 13/04/2013	12/04/2016
M1*	ION 7550	MI-1002A422-02	Chacayes Powerhouse (Line 1)	23/08/2011	22/08/2014
M2*	ION 7550	MI-1002A425-02	Chacayes Powerhouse (Line 2)	23/08/2011	22/08/2014

*: Meters M1 and M2 are not used for CDM monitoring purposes, as they measure gross electricity generation. There verifications are presented because the actually exist, and they might be used in a very exceptional case of a failure of M5 and M6 applying transmission losses to the monitored values.

Validity of the calibration is 3 years.

Issued verifications establish that meters M1, M2, M5 and M6 are under the limit of 0.2% accuracy.

Procedures for Meter Failure

In the event that the electricity main meters M5 and M6 are found to be faulty they will be repaired or replaced and the data from meters M1 and M2 will be used in its place and the transmission losses to Sauzal Substation will be applied to the monitored values. In these instances an *Emergency Report: Meter Failure* will be prepared to describe the details of the meter failure and the application of the emergency management procedure.

For this monitoring period there was not a meter failure event.

Emission Reductions

Emission reductions are calculated using the project and baseline emission data, and the methodology described in section B.6.1 of the registered PDD. Emission reductions occurring as a result of the project activity was calculated by the CDM Monitoring Officer and included in the present *Monitoring Report* for this monitoring period.

Updating the Baseline Emission Factor

The baseline emission factor will be updated at the end of each crediting period in accordance with ACM0002 and the methodology stipulated in B6.1 of the registered PDD.

The emission factor was calculated ex ante, therefore, for the first crediting period (30/07/2012 – 29/07/2019). The emission reductions of Chacayes Hidroelectric Project shall be calculated multiplying the emission factor 0.637 tCO2/MWh by the net electricity generated by the project at the injection point to the SIC.

Emergency Preparedness

The project has the necessary provisions for emergency preparedness to deal with any unforeseen events such as fire or an electrical blackout. These provisions include a detailed management plan that requires all staff and local residents to comply with in case of an emergency.

Reporting

A template for all monitoring reports will be developed by the CDM Monitoring Officer, to ensure that the data is reported consistently and can be compared across each reporting period. The CDM Monitoring Officer will review all reports and perform cross checks of data against invoice reports (records for sold electricity). Any irregularities will be investigated as described below in “Review of Reports and Treatment of

Uncertainty".

Review of Reports and Treatment of Uncertainty

When reviewing monitoring reports, the CDM Monitoring Officer will examine the report for data anomalies and compare the report with previous periods for consistency.

If any discrepancies or errors are found they will be investigated and corrected. Any corrective actions which are taken to resolve identified discrepancies will be recorded in an appendix to the relevant report. If the corrective actions result in any adjustments to monitoring data, the relevant report will be revised after the adjustments have been made.

Record Storage

Data from the metering is stored at the powerhouse on hard disks. This is backed up on a weekly basis, with weekly magnetic tapes being stored off site (in the Santiago Office).

A paper copy of all documentation is stored in a secure area at the Chacayes site. Copies of all reports are also held in electronic form and backed up on a quarterly basis. Any documents which are archived will be kept until two years after last issuance of CERs.

The documents that are stored include:

- Manufacturer's test certificates and Meter Calibration Report
- Quarterly report of Metered Net Electricity Generation
- CDM Monitoring Report (including records of training and emission reduction calculations)

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	**EF** $_{grid,OM-adj,y}$
Unit:	tCO_2/MWh
Description:	Operating margin factor for the SIC grid
Source of data:	https://www.cdec-sic.cl/datos/anuario2010_ing.pdf
Value(s) applied):	0.867
Purpose of data:	Baseline calculation
Additional comment:	For detail, please refer to validated PDD

Data / Parameter:	**EF** $_{grid,BM,y}$
Unit:	tCO_2/MWh
Description:	Build margin factor for the SIC grid
Source of data:	https://www.cdec-sic.cl/datos/anuario2010_ing.pdf
Value(s) applied):	0.407
Purpose of data:	Baseline calculation
Additional comment:	For detail, please refer to validated PDD

Data / Parameter:	**EF** $_{grid,CM,y}$ (equal to $EF_{CO2,grid,y}$)

Unit:	tCO_2/MWh
Description:	Combined margin factor for the SIC grid
Source of data:	https://www.cdec-sic.cl/datos/anuario2010_ing.pdf
Value(s) applied):	0.637
Purpose of data:	Baseline calculation
Additional comment:	For detail, please refer to validated PDD

Data / Parameter:	$Cap_{,BL}$
Unit:	W
Description:	Installed capacity of the project activity before the implementation of the project activity. For new hydropower plants this value is zero.
Source of data:	-
Value(s) applied:	0
Purpose of data:	Baseline calculation
Additional comment:	-

Data / Parameter:	A_{BL}
Unit:	m^2
Description:	Area of the single reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full. For new reservoirs, this value is zero.
Source of data:	-
Value(s) applied:	0
Purpose of data:	Baseline
Additional comment:	-

D.2. Data and parameters monitored

Data / Parameter:	$EG_{facility,y}$
Unit:	MWh
Description:	Quantity of net electricity generation supplied by the projects plant/unit to the grid in the year *y*
Measured/ Calculated / Default:	Measured
Source of data:	Electricity Meter(s)
Value(s) of monitored parameter:	500,720.00

Monitoring equipment:	<table><tr><th>Meter</th><th>Type</th><th>Serial number</th><th>Location</th><th>Date of verification (dd/mm/yyyy)</th></tr><tr><td>M6</td><td>JEM STAR</td><td>112416380</td><td>Sauzal Substation (Line 1)</td><td>8/07/2011 13/04/2013</td></tr><tr><td>M5</td><td>JEM STAR</td><td>112416378</td><td>Sauzal Substation (Line 2)</td><td>5/07/2011 13/04/2013</td></tr><tr><td>M1*</td><td>ION 7550</td><td>MI-1002A422-02</td><td>Chacayes Powerhouse (Line 1)</td><td>23/08/2011</td></tr><tr><td>M2*</td><td>ION 7550</td><td>MI-1002A425-02</td><td>Chacayes Powerhouse (Line 2)</td><td>23/08/2011</td></tr></table> *: Meters M1 and M2 are not used for CDM monitoring purposes, as they measure gross electricity generation. There verifications are presented because the actually exist, and they might be used in a very exceptional case of a failure of M5 and M6 applying transmission losses to the monitored values.
Measuring/ Reading/ Recording frequency:	Measured hourly and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic backup.
Calculation method (if applicable):	-
QA/QC procedures:	The metering instruments will be properly verified/calibrated and inspected periodically to ensure their accuracy according to the manufacturer's specifications. Validity of the calibration is 3 years. Issued verifications establish that meters M1, M2, M5 and M6 are under the limit of 0.2% accuracy. The electricity measured will be verified against the invoice reports (records for sold electricity).
Purpose of data:	Baseline calculation
Additional comment:	-

Data / Parameter:	$Cap_{,PJ}$
Unit:	MW
Description:	Installed capacity of the project activity after the implementation of the project activity
Measured/ Calculated / Default:	Default
Source of data:	Project Site
Value(s) of monitored parameter:	110.8
Monitoring equipment:	Turbines nameplates

Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Project emission calculation
Additional comment:	-

Data / Parameter:	A_{PJ}
Unit:	m²
Description:	Area of the single reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Measured/ Calculated / Default:	Measured
Source of data:	Project Site
Value(s) of monitored parameter:	176,700 (monitored on December 2012) 186,473 (monitored on August 2013)
Monitoring equipment:	Topographical survey
Measuring/ Reading/ Recording frequency:	Measured annually
Calculation method (if applicable):	
QA/QC procedures:	-
Purpose of data:	Project emission calculation
Additional comment:	-

D.3. Implementation of sampling plan

>> N/A

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>> According to ACM0002 (version 13.0.0; EB 67), the emission reductions attributable to the project activity during any given year (*y*) are calculated as the difference between the Baseline Emissions (BE_y) and the Project Emissions (PE_y) in that year.

According to ACM0002, the combined margin CO2 emission factor for grid connected power generation ($EF_{grid,CM,y}$) was calculated in accordance with the latest approved version of the "Tool to calculate the emission factor for an electricity system" (version 02.2.1; EB 63).

Operating Margin

The Operating Margin was calculated according to the Simple Adjusted OM methodology from the "Tool to calculate the emission factor for an electricity system" (version 02.2.1; EB 63).

The formula used to calculated the Operating Margin was the following:

$$EF_{grid,OM-adj,y} = (1-\lambda_y)\frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

Where:

$EF_{grid,OM-adj,y}$: Simple adjusted operating margin CO_2 emission factor in year y (tCO_2/MWh)

λ_y : Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year y

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

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

$EF_{EL,m,y}$: CO_2 emission factor of power unit m in year y (tCO_2/MWh)

$EF_{EL,k,y}$: CO_2 emission factor of power unit k in year y (tCO_2/MWh)

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

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

y : The relevant year as per the data vintage chosen

The following table shows the simple adjusted OM calculated for year 2007 to 2009, presented in the registered PDD.

Year	Lambda	Simple Adjusted OM (tCO2e/MWh)
2007	0.00010	0.866
2008	0.00011	0.907
2009	0.00011	0.827
	Average	**0.867**

Therefore, Simple Adjusted OM for the year 2007 to 2009 is **0.867 tCO_2e/MWh**.

Build Margin

The build margin emission factor was calculated as the generation-weighted average emission factor (tCO_2/MWh) of all power plant units *m* during the most recent year *y* for which power generation data was available at the time of preparing the PDD.

The Build Margin was calculated as:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$: Build margin CO_2 emission factor in year y (tCO_2/MWh)

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

$EF_{EL,m,y}$: CO_2 emission factor of power unit m in year y (tCO_2/MWh)

y : The most recent historical year for which power generation data is available

Therefore, the Build Margin (BM) for the year 2009 was calculated to be **0.407 tCO_2e/MWh.**

Combined Margin

The combined emission factor for the project, according to ACM0002 (version 13.0.0; EB 67), was calculated with the weighted average for both the Operating Margin (OM) and the Build Margin (BM) as follows:

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

Where:

$EF_{grid,OM,y}$: Operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,BM,y}$: Build margin CO_2 emission factor in year y (tCO_2/MWh)

W_{OM} : Operating margin weight, which is 0.5 by default for a hydro plant for the first crediting period;

W_{BM} : Build margin weight, which is 0.5 by default for a hydro plant for the first crediting period;

$$EF_y = 0.5 \cdot 0.867 + 0.5 \cdot 0.407 = 0.637$$

Therefore, the Combined Margin (CM) for the year 2007 to 2009 was calculated as **0.637 tCO2e/MWh.**

Baseline Emissions

The baseline emissions (BE_y) were obtained as:

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

Where:

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

And:

BE_y : Baseline emissions in year *y* (tCO_2)

$EF_{grid,CM,y}$: Baseline emissions factor

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

$EG_{facility,y}$: Quantity of net electricity generation supplied by the proposed project activity to the grid in year *y* (MWh).

Therefore, estimated baseline emissions are shown below:

Month	Data	Cross-check	Conservative selection	SIC EF	Baseline emissions
	Monitored value	Invoice reports (records for sold electricity) CDEC-SIC			
	MWh	MWh	MWh	(tCO2/MWh)	(tCO2e)
July 12 (30 and 31)	2,006.952	1,898.370	1,898.370	0.637	1,209
August 2012	23,789.078	23,789.079	23,789.078	0.637	15,153
September 2012	30,519.341	30,519.341	30,519.341	0.637	19,440
October 2012	36,192.217	36,192.218	36,192.217	0.637	23,054
November 2012	70,753.770	70,753.771	70,753.770	0.637	45,070
December 2012	78,071.335	78,071.336	78,071.335	0.637	49,731
January 2013	76,442.753	76,442.754	76,442.753	0.637	48,694
February 2013	61,369.615	61,369.616	61,369.615	0.637	39,092
March 2013	42,716.969	42,716.970	42,716.969	0.637	27,210
April 2013	24,836.771	24,836.772	24,836.771	0.637	15,821
May 2013	19,217.442	19,217.443	19,217.442	0.637	12,241
June 2013	19,644.461	19,644.462	19,644.461	0.637	12,513
July 2013 (1st to 29th, included)	15,338.473	15,267.920	15,267.920	0.637	9,725
Total	**500,899.177**	**500,720.052**	**500,720.042**	-	**318,953**

E.2. Calculation of project emissions or actual net GHG removals by sinks

>> Since Chacayes Hydroelectric Project consists of a hydro power plant, there are no Project Emissions (PE_y).

Therefore, $PE_y = 0$.

E.3. Calculation of leakage

>> According to the applied methodology ACM0002 (version 13.0.0; EB 67) and the registered PDD, leakage is not considered in this project.

Therefore, $LE_y = 0$.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
July 2012 (30 and 31)	1,209	0	0	1,209
August 2012	15,153	0	0	15,153
September 2012	19,440	0	0	19,440
October 2012	23,054	0	0	23,054
November 2012	45,070	0	0	45,070
December 2012	49,731	0	0	49,731
January 2013	48,694	0	0	48,694
February 2013	39,092	0	0	39,092
March 2013	27,210	0	0	27,210
April 2013	15,821	0	0	15,821
May 2013	12,241	0	0	12,241
June 2013	12,513	0	0	12,513
July 2013 (1st to 29th, included)	9,725	0	0	9,725
Total	**318,953**	**0**	**0**	**318,953**

Values of emission reductions have been rounded down in a conservative manner.

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	**357,011**	**318,953**

E.6. Remarks on difference from estimated value in registered PDD

>> N/A

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards

	Emission reductions or GHG removals by sinks (t CO_2e)	153,657 (up to 31 December 2012)	165,296 (up to 29 July 2013, included)	

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Document information

Version	*Date*	*Description*
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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