Monitoring report form for CDM project activity (Version 09.0)

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MONITORING REPORT			
Title of the project activity	Nalcas Small Hydroelectric Run-of-River Power Plant		
UNFCCC reference number of the project activity	8981		
Version number of the PDD applicable to this monitoring report	03.1		
Version number of this monitoring report	02		
Completion date of this monitoring report	19/11/2021		
Monitoring period number	01		
Duration of this monitoring period	24/12/2012 to 23/12/2019 (inclusive of start and end dates)		
Monitoring report number for this monitoring period	Not Applicable		
Project participants	HIDRONALCAS S.A. Carbonbay GmbH & Co. KG		
Host Party	Chile		
Applied methodologies and standardized baselines	AMS-I.D. ver. 17 - Grid connected renewable electricity Generation Standardized baseline: Not Applicable		
Sectoral scopes	Sectoral Scope 1 : Energy industries (renewable/ non-renewable sources)		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0 tCO_2e	118,537 tCO_2e	0 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	152,450tCO_2e		

SECTION A. Description of project activity

A.1. General description of project activity

The CDM project activity involves the construction and operation of a new small scale run-of-river hydroelectric power plant to be implemented on the Nalcas River, in Los Lagos Region of Chile (also known as X Region). The total installed capacity of the project activity is 6.652 MW. The electricity generated from the plant is delivered to the Regional SIC Grid (SIC is "Sistema Interconectado Central - Central Interconnected System). The run-of-river hydroelectric power plant utilizes the technology of using water as a resource and converts the potential energy available in the water flow into mechanical energy using turbines and then to electrical energy using generators.

The project activity complies with the with a maximum output capacity stated for Type I projects (15 MW) because its installed capacity is 6.652 MW. The scenario prior to the implementation of the project activity was electricity was electricity supplied by the grid and the same has been considered as the baseline scenario i.e. the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid. The project has led to reduced greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants and through the electricity supply to the grid the project activity has a direct environmental benefit by reducing the amount of fossil fuels combusted for energy generation and the associated pollutant emissions (like GHGs, PM, SOx, NOx).

The construction of the project activity started in 27/12/2010 (the date corresponds to the signature of the contract of the equipment like turbines, generators and electromechanical equipment) and has been in operation since 23/08/2012. However, till 30/04/2013 it was under trial run and from 01/05/2013 commercial operation started, hence electricity generation from 24/12/2012 to 30/04/2013 has been considered as zero and PP does not wish to claim GHG emission reductions for the period 24/12/2012 to 30/04/2013 and electricity generation (hence GHG emission reductions) claimed from 01/05/2013.

During the current monitoring period 24/12/2012[1] to 23/12/2019, the project activity.The project activity has supplied 180,979.85 MWh electricity to grid during current monitoring period, which has resulted emission reduction of 118,537 tCO_2e.

A.2. Location of project activity

The project is located in Community of Puerto Octay, Region of Los Lagos (X Region) / Province of Osorno. Chile. The project is located on the south bank of the Rupanco Lake, in the Community of Puerto Octay, in the Province of Osorno, Region of Los Lagos (X Region of Chile). The project site is accessible by route U91, which skirts Rupanco Lake. The water intake location can be accessed through the property Lot Nº1 of the plot Nº32 of the Rupanco Colony, owned by HIDRONALCAS S.A. The specific coordinates of the project at the intake are -72.32711757226643 longitude and -40.90875503530434 latitude and the power house is located in the coordinates -72.34000740739955 longitude -40.895218536172486 latitude.

The location of the project activity is illustrated in the following figure:

[1] However, till 30/04/2013 it was under trial run and from 01/05/2013 commercial operation started, hence electricity generation from 24/12/2012 to 30/04/2013 has been considered as zero and PP does not wish to claim GHG emission reductions for the period 24/12/2012 to 30/04/2013 and electricity generation (hence GHG emission reductions) claimed from 01/05/2013.

Region of Los Lagos (X Region) / Province of Osorno.

Figure 1. Location of the Region of Los Lagos (X Region)

Figure 2. Location of Osorno Province in the Map of Los Lagos Region

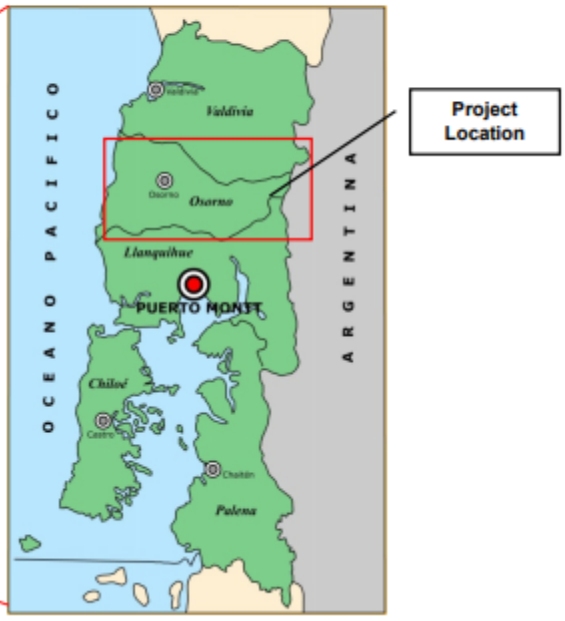
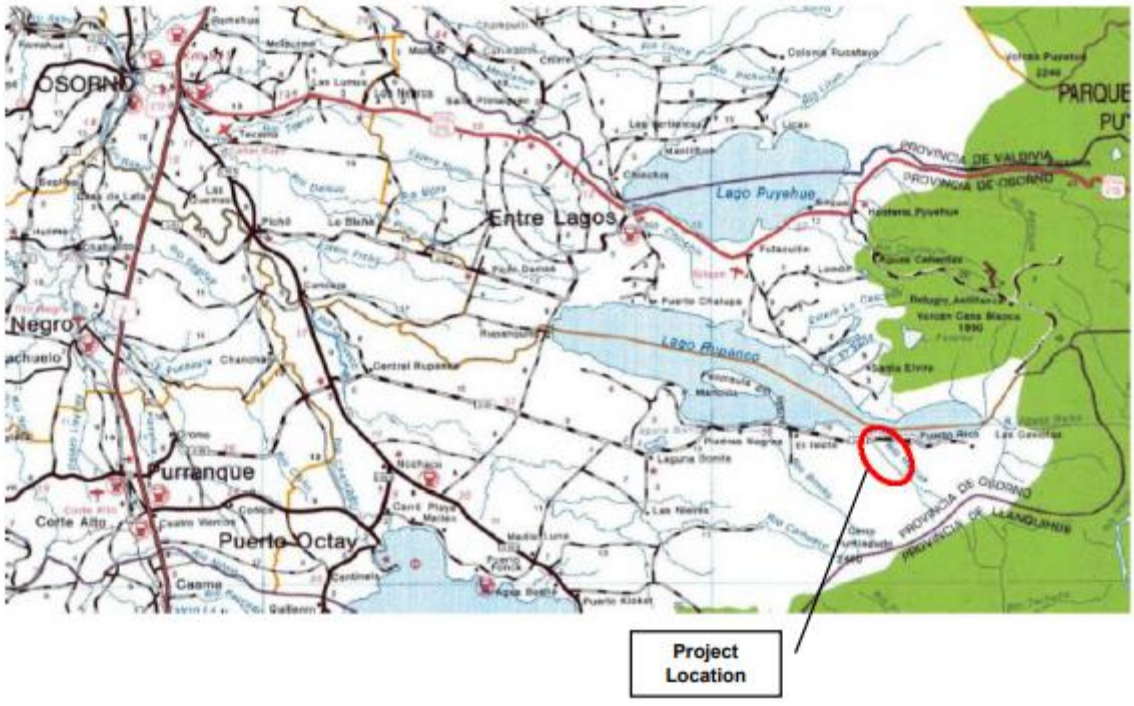


Figure 3. Specific location of the Project



A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Chile (host)	HIDRONALCAS S.A. (Private entity)	No
The Netherlands	Mabanaft Carbon B.V. (Private entity)	No
Germany	Carbonbay GmbH & Co. KG (Private entity)	No

A.4. References to applied methodologies and standardized baselines

Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)
AMS-I.D. ver. 17 - Grid connected renewable electricity generation[2]

A.5. Crediting period type and duration

24/12/2012 – 23/12/2019 (Renewable)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The project activity is implemented and operated as per registered PDD, there were no incident which affects the applicability of applied baseline and monitoring methodology. The project activity is a 6.652 MW run-of-river hydroelectric project, which utilizes hydro potential to generate GHG emission-free electricity and exports it to the regional grid. The project was commissioned on 23-August-2012 and since then the project is operational.

The technology employed for power generation in the small scale project activity involves the conversion of potential energy available in the water flow into mechanical energy using hydro turbines and then into electric energy using alternators. The electricity generated by this project activity is delivered to the Regional SIC Grid.

The project activity consists of lateral water intake built up stream Nalcas River, at 333 m.a.s.l. This lateral intake allows the water to enter the forebay tank which feeds the penstock. The 2,500 m long penstock leads to two Pelton vertical turbines designed for a nominal flow of 4.5 m^3/s and located at 169 m.a.s.l. After moving the turbines the water is returned to the Nalcas River through the discharge channel. In the power house two synchronous vertical-axis generators transform the mechanical energy of the turbines into electrical energy, being 6.652 MW the total installed capacity of this project.

Intake	- Nominal flow: 4.5 m3/s - Revetment: concrete - Level location: Nalcas River 333 m.a.s.l.
Forebay tank	- Length: 41.2 m, Wide: 7 m and Depth: 5.5 m.

[2] https://cdm.unfccc.int/UserManagement/FileStorage/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ

<table>
<tr><td>Penstock</td><td>- Number of pipes: one
- Material: steel S275JR
- Pressure (max.): 25 bar
- Total Length: 2,500 m
- Diameter: 1.6 m</td></tr>
<tr><td>Power House</td><td>- Equipment: turbine, safety valve and generator.
<table>
<tr><td>Turbines</td><td>Generators</td></tr>
<tr><td>Number: 2
Type: Pelton
Axis: Vertical
Nominal flow: 4.5 m^3/s</td><td>Number: 2
Type: Synchronous
Axis: Vertical
Total Electrical Installed Power: 7.2MVA (2 x 3.6 MVA)</td></tr>
<tr><td colspan="2">Gross height of fall: 164 m
Total Installed Capacity: 6.652 MW</td></tr>
</table></td></tr>
</table>

The project has been in operation since 23/08/2012., however, till 30/04/2013 it was under trial run and from 01/05/2013 commercial operation started, hence electricity generation from 24/12/2012 to 30/04/2013 has been considered as zero and PP does not wish to claim GHG emission reductions for the period 24/12/2012 to 30/04/2013 and electricity generation (hence GHG emission reductions) claimed from 01/05/2013.

The year-wise estimated and actual electricity generation comparison given below:

Year	Estimated Net Electricity Supplied to grid (MWh)	Actual Net Electricity Supplied to the grid (MWh)
2012	728.48[3]	0
2013	33,237	25,583.89
2014	33,237	27,821.45
2015	33,237	18,159.06
2016	33,237	12,384.53
2017	33,237	30,731.71
2018	33,237	35,271.93
2019	32,508.51[4]	31,027.29

From the comparison it can be concluded that there are less generation in the years 2015 and 2016 and slightly higher generation in the year 2018 – these fluctuations are attributed to the factors like water availability, rainfall, grid availability etc which are beyond the control of PP**.**

[3] Monitoring period included only 8 days i.e. .from 24/12/2012 to 31/12/2012

[4] Monitoring period includes 357 days i.e. from 01/01/2019 to 23/12/2019

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

There was no deviation from registered monitoring plan and or applied methodology during current monitoring period.

B.2.2. Corrections

There was no correction from registered PDD during current monitoring period.

B.2.3. Changes to the start date of the crediting period

There was no change in crediting period start date.

B.2.4. Inclusion of monitoring plan

Not applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

There were no changes from registered monitoring plan, applied methodology during current monitoring period.

B.2.6. Changes to project design

No change in project design during current monitoring period.

B.2.7. Changes specific to afforestation or reforestation project activity

As the project activity falls under Sectoral Scope 1: Energy industries (renewable - / non-renewable sources) this section is not applicable.

SECTION C. Description of monitoring system

Monitoring Systems and Procedures

The hydroelectric power plant being designed to operate remotely and therefore, the main monitoring procedures is undertaken from the main office, except the monitoring of the diesel consumption, as specified below.

Monitoring of Diesel Consumption:

The Plant Manager is in charge of reporting in the Diesel Consumption Report the starting and ending time everyday the diesel generators are operated. The diesel engines have an automatic operating hour counter and the starting and ending value of the counter are used to calculate the operating hours. The Diesel Consumption Report is kept on site and is available for the DOE during verification.

Monitoring the Net Electricity Generated:

The hydropower plant uses a bi-directional meter located at the project site to continually measure the electricity exported and imported from the grid. This meter is connected via SCADA system to

the grid operator (CDEC-SIC) and data is collected every 15 minutes. At the end of the month, these values are aggregated by the CDM Manager (located in the main office) to prepare the monthly net electricity generation report as the difference between electricity exported and imported. This report is sent to the CDEC-SIC and together with the other reports from all power plants connected to the SIC grid, the CDEC-SIC calculate the line losses corresponding to each of the power plants and this is reflected in the sale receipts. The sale receipts are e available to the DOE during the verification. For conservativeness, the lower value between the sale receipts and the monitored values is used for the emission reductions calculations.

The CDM Manager is in charge of verifying the values of the net electricity generated, cross checking the information with sales receipts from the grid company (SIC). The CDM Manager is in charge also of verifying that the monitoring instruments were correctly calibrated during the monitoring period and of performing the emission reduction calculations.

The CDM Manager is also be in charge of reporting any special events (stoppages, meter errors, etc.) happening in the hydropower plant that is included in the Monitoring Report.

Monitoring data required for the verification and emission of CERs is kept for at least two years after the end of the crediting period.

The following table summarizes the monitoring systems and procedures:

Responsible	Tasks
Plant Manager	In charge of reporting in the Diesel Consumption Report the starting and ending time every day the diesel generators are operated
CDM Manager	In charge of aggregating the electricity exported values at the end of each month and prepare the monthly net electricity generation report. In charge of sending the monthly generation report to the grid company CDEC-SIC Shall compare the value received from the grid company with those monitored by the main meter Assure that the main meter is correctly calibrated Report any special events

Internal Review:
The CDM Manager is responsible of verifying the sales invoices with the values monitored by the main meter. In case of discrepancies, the CDM Manager starts an investigation of the causes of the situation.

All the above stated monitoring systems and procedures are incorporated to the CDM Manual that is available on site at the power plant.

Calibration Procedures
The CDM Manager is in charge of coordinating with the Calibration Entity to perform the calibration of the monitoring instruments at least every 3 years. The CDM Manager should ensure that the Calibration Entity has a valid Accreditation during the time of performing the calibrations.

Training
The CDM manager is responsible that all the personal participating in the monitoring process is properly trained in the CDM monitoring requirements. Therefore, as the Plant Manager is in

charge only of monitoring the diesel consumption, he is trained regarding the use of the Diesel Consumption Report. The CDM Manager is trained in the monitoring requirements of the Monitoring Plan and general monitoring aspects of the CDM.

Location of the Monitoring Meters

The main meter is located at the project site in the 23 kV line at the output of the power plant. This meter is also record the electricity imported by the project activity from the Grid.

Project layout diagram is given below:

Emergency Procedures

In case the main meter is found to be beyond the permissible error then the error encountered will be discounted to all meter readings since the last calibration was performed as a conservative approach. However, the meter is calibrated as soon as possible once the error is detected. In case the meter fails and is not monitoring the electricity imported and exported, then the emission reductions are be accounted for while the meter was malfunctioning.

Calculation of Emission Reductions:
The emission reduction is derived from the following formula:
Emission reduction = Baseline emissions - Project emissions (As per the applicable methodology, the project has no Leakage emissions)

Baseline emissions are calculated as:
Baseline emissions = Net electricity delivered to the grid x Grid Emission Factor
The Grid Emission Factor is fixed ex-ante at: 0.655 tCO_2/MWh, and the net electricity delivered to the grid by the project activity is calculated as:
Net electricity delivered to the grid = Electricity exported monitored by the main meter - Electricity imported measured by the main meter

Project emissions are calculated based on the operating hours of the diesel generators during the monitoring period using the engine specific fuel consumption at full load of each generator. It is however envisaged that diesel emissions result in less than 1% of the baseline emissions, as the generators are used only in emergency situations in which main transmission line is out of service.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	**$EG_{m,y}$**
Unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y.
Source of data	CDEC-SIC. Hourly based Data from years 2008-2009 and 2010 from CDEC-SIC.
Value(s) applied	Please refer to Table 1 in Appendix 1
Choice of data or measurement methods and procedures	Data from CDEC-SIC represents the most recent and reliable information available.
Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	-

Data/Parameter	**$FC_{i,m,y}$**
Unit	For Diesel and Coal: kg/year, for Natural Gas: m^3/year.
Description	Amount of fossil fuel type i consumed by power plant / unit m in year y
Source of data	Annual fuel consumption for a specific power plant is directly obtained from CDEC-SIC Statistics Yearbook 2001-2010, page 30 (https://www.cdec-sic.cl/datos/anuario2011.pdf, or calculated by using the specific fuel consumption data reported by CNE (in this priority order). The CNE reports consulted are: "Informe de Precio Nudo Octubre 2008"; "Informe de Precio Nudo Octubre 2009" and "Informe de Precio Nudo Octubre 2010". There all available in Web Page: http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/precios_de_nudo.html. specifically in Frame Nº 6.
Value(s) applied	Please refer to Table 2 in Appendix 1
Choice of data or measurement methods and procedures	Data from CDEC-SIC and CNE represents the most recent and reliable information available.
Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	-

Data/Parameter	**$NCV_{i,y}$**
Unit	For Diesel and Coal: [GJ/kg] and For Natural Gas: [GJ/m3]
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	Calculated based in the information of CNE report “Balance energético 2010” Frame A2 Available in Web Page: http://antiguo.minenergia.cl/minwww/opencms/14_portal_informacion/06_Estadisticas/Balances_Energ.html and in the IPCC Workbook (2006).Available in http://www.ipcc-nggip.iges.or.jp/public/2006gl/.
Value(s) applied	Please refer to Table 4 in Appendix 1
Choice of data or measurement methods and procedures	Data from CNE represent the most reliable information available for national fuels, and IPCC represent the most reliable information available for default values and methodological requirements.

Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	CNE Energy Balance Report includes Gross Calorific Values (GCV) for different types of fuel. These values were corrected to Net Calorific Values (NCV) based on IPCC assumption stating that for liquid and solid fuels NCV is 5% lower than GCV, and for gas fuels NCV is 10% lower than GCV.

Data/Parameter	**$EF_{CO2, i, y}$**
Unit	tCO2/GJ
Description	CO_2 emission factor of fossil fuel type i in year y.
Source of data	IPCC revised guidelines (2006). Available in Web Page: http://www.ipcc-nggip.iges.or.jp/public/2006gl/
Value(s) applied	Please refer to Table 4 in Appendix 1
Choice of data or measurement methods and procedures	No other data is publicly available. For estimating emission factor for different fossil fuel-based generation technologies, IPCC guidelines have been used in a conservative manner.
Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	

Data/Parameter	**Power Plans Date of Build**
Unit	---
Description	Date of build/Operation start of each power plant
Source of data	CDEC-SIC Statistics yearbook 2001-2010 page 30. Available in Web Page: https://www.cdec-sic.cl/datos/anuario2011.pdf);
Value(s) applied	Please refer to Table 3 in Appendix 1
Choice of data or measurement methods and procedures	Data from CNE represent the most reliable information available for national fuels, and IPCC represent the most reliable information available for default values and methodological requirements.
Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	CNE Energy Balance Report includes Gross Calorific Values (GCV) for different types of fuel. These values were corrected to Net Calorific Values (NCV) based on IPCC assumption stating that for liquid and solid fuels NCV is 5% lower than GCV, and for gas fuels NCV is 10% lower than GCV.

Data/Parameter	**η_m**
Unit	%
Description	Efficiency of power plant *m*
Source of data	Defaults values from "Tool to calculate the emission factor for an electricity system v.02.1.1" page 27 Available in Web Page: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf
Value(s) applied	Please refer to Table 2 in Appendix 1
Choice of data or measurement methods and procedures	This data is used to calculate the emission factor of a plant m (as per option A2 of the tool to calculate the emission factor of an electricity system) in case that there is no fuel consumption data available from public national sources like CDEC-SIC (fossil fuel consumption) and CNE (specific fossil fuel consumption).
Purpose of data/parameter	For the calculation of baseline emission factor
Additional comments	

D.2. Data and parameters monitored

<table>
<tr><td>Data/Parameter</td><td>EG _{net, y}</td></tr>
<tr><td>Unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Net electricity supplied by the project to the grid.</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Measured by a bi-directional meter located at the project site</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>180,979.85</td></tr>
<tr><td>Monitoring equipment</td><td>The electricity exported by the project activity to the grid and imported from the grid is continually measured by a bi-directional meter and recorded monthly and the difference between the electricity export and import is considered as net electricity supplied by the project to the grid.

This main meter is monitored via SCADA and the information is stored every 15 minutes and afterwards sent to the grid operator CDEC-SIC (Centro de Despacho Económico de Carga del SIC – Economical National Dispatch Centre of the SIC Grid) every month. Every month, the CDM Manager collects these values and send them to the CDEC-SIC. The CDEC-SICl send backs the values including the line losses corresponding to the power plant, and the CDM Manager prepares the invoice based on the information received form the CDEC-SIC.

Meter Details

Make: Schneider Electric
Model: ION 8600
Serial No. PT 1108A513-01
Accuracy Class: 0.2
Calibration Frequency: Once in 3 years
Date of calibration:
<table>
<tr><td>Date</td><td>Valid till</td></tr>
<tr><td>24/08/2011 (Factory calibration)</td><td>23/08/2014</td></tr>
<tr><td>24/06/2020</td><td>23/06/2023</td></tr>
</table>

Considering the dates of calibration and the QA/QC procedures (for calibration frequency), it can be concluded that QA/Qc procedures have not been adhered to for the period 24/08/2014 to 23/12/2019.; hence conservative error factor of 0.2% has been applied on the values of electricity export and import for the months August-2014 to December-2019.</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Continuous monitoring and Monthly recording</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Net electricity supplied by the project to grid= Electricity exported – Electricity imported</td></tr>
<tr><td>QA/QC procedures</td><td>Meters are calibrated according to the national standards and recalibrated at appropriate intervals according to manufacturer specification, but at least once every 3 years. The meter will have an accuracy of 0.2%, according with the Chilean regulations “Manual de procedimientos para los sistemas de medicióny sistemas de supervisión en el CDEC-SIC” which is based in the international norm IEC 60687 “Alternating current Watt-meter for active energy Classes 0.2S and 0.5 S”. The measurements will be crosschecked with the electricity sales receipts obtained from the grid operator and the smaller value of the two will be considered in the emission reductions calculation in order to account for the line losses.</td></tr>
<tr><td>Purpose of data/parameter</td><td>For the calculation of baseline emissions</td></tr>
</table>

Additional comments	This data will be kept in electronic form and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later. Any future modification in Chilean regulation will be applied.

Data/Parameter	**$FC_{diesel, y}$**
Unit	m^3
Description	Amount of diesel fuel consumed by the on-site generators
Measured/calculated/ default	Measured
Source of data	The diesel consumption is monitored based on the total operating hours the diesel generators were operated during the monitoring period, which is sourced from the plant records.
Value(s) of monitored parameter	1.472
Monitoring equipment	The amount of diesel consumed by the on-site diesel generators is monitored based on the operational hours. Whenever the diesel generators are operated, the starting and ending time is manually recorded on the Diesel Consumption Report that is kept on site. Based on the operational hours and on the maximum specific diesel consumption at full load of each of the diesel generators (sourced from the diesel engine manufacturers), a conservative estimation of the volume of diesel fuel consumed is obtained. Specifications of DG set Make: GEMAP2 Model: GSA33 TWI Serial No.: 15449 Fuel Combustible: Diesel Nominal Fuel Consumption: 7.7 Litres/Hour Nominal Power (kVA): 30
Measuring/reading/recording frequency	Monthly recording
Calculation method (if applicable)	Not applicable as it is measured directly
QA/QC procedures	The data estimated based on the operational hours can be verified with the Automatic Operating Hours Counter that will be installed in the Diesel Generators
Purpose of data/parameter	For the calculation of project emissions
Additional comments	It is envisaged that the diesel generators will not be operational for more than 12 hours per year, and therefore, the emissions will be lower than 1% of the baseline emissions. The diesel engines will be maintained as per the manufacturer specifications in order to assure its proper functioning and that the specific consumption at full load remains within the limit specified by the manufacturer. Data will be archived and kept at least for two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

D.3. Implementation of sampling plan

Sampling is not applicable in this project activity

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

As described in the section above, the total emission reduction achieved in a year would be
$ER_y = BE_y – PE_y – LE_y$

Where,
ER_y is the Emission reductions during the year y
BE_y is the Baseline emissions during the year y
PE_y is the Project emissions during the year y
LE_y is the Leakage emissions during the year y

Baseline emissions:
The baseline emissions are calculated based on the given formula:
$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$

Where,
$EG_{BL,y}$ is the net electricity supplied to grid by the project activity
$EF_{CO2,grid,y}$ is CO2 emission factor of the grid

$EF_{CO2,grid,y} = 0.655\ tCO_2/MWh$

Net electricity supplied to the grid by the Project during current monitoring period i.e. 24/12/2012 to 23/12/2019 = 180,979.85 MWh (Please refer Spreadsheet for details of calculations)

Baseline emissions,
BE_y= 0.655 tCO2e/MWh x 180,979.85 MWh = 118,541 tCO_2e (Round-down value)

Total Baseline Emissions (BE_y) = 118,541 tCO_2e

E.2. Calculation of project emissions or actual net removals

As per AMS I.D (Version 17), the project emissions are zero.
Paragraph 19 of AMS I.D states that for most renewable energy project activities,
PE_y = 0, and project emissions have to be considered only for geothermal power plants and for water reservoir of hydro power plants.
However, as the project activity have two diesel generators (one located at the power plant to be used for emergency situations and the other located at the intake also for emergency situations), the project emissions due to the diesel fuel consumption will be calculated as per the formula 1 from the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” Version 2.0 from EB 41:
$PE_{FC,j,y} = \sum FC_{i,j,y} X COEF_{i,y}$
Where
Where:
$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr);
$FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i = Are the fuel types combusted in process j during the year y

COEF i,y for diesel is calculated as :
$COEF_{i,y} = NCV_{i,y} X EF_{CO2,i,y}$
$CO_{EFi,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
i = Are the fuel types combusted in process j during the year y
Here, only one fossil fuel (diesel) is used.

Diesel consumption for the project activity during the current monitoring period = 1472 Litres
Density of Diesel = 0.83 kg/Litre (IPCC 2006 value)
NCV of Diesel ($NCV_{i,y}$) = 0.043354 GJ/kg (fixed ex-ante value)
CO_2 Emission Factor of Diesel ($EF_{CO2,i,y}$) = 0.0726 tCO_2/GJ
Hence, Project Emissions (PE_y) = FC i,j,y * Density of Diesel * NCV i,y *EF CO2,i,y
= 1472*0.83*0.043354*0.0726 = 4.00 tCO2(Round-up value)

Therefore,
Project Emissions = 4 tCO_2e

E.3. Calculation of leakage emissions

As per AMS I.D. (Version 17), and leakage emissions are to be taken into account "If the energy generating equipment is transferred from another activity, leakage is to be considered. Since transfer of equipment is not envisaged in the project activity, the leakage emissions will be equal to zero. Therefore,
LE_y = 0 tCO_2e

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/ 2013	From 01/01/ 2013 until 31/12/ 2020	From 01/01/ 2021	Total amount
Total	118,541	4	0	0	118,537	0	118,537

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
118,537	152,450

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

Considering the annual average emission reductions as per the registered PDD which is 21,770 tCO_2e per year, the number of days covered during the current monitoring period comes out to be 2556 days, based upon which the estimated emission reductions attributed to this monitoring period comes out to be 152,450 tCO_2e. The detailed calculation can be referred from the emission reduction sheet.

E.6. Remarks on increase in achieved emission reductions

During this project activity, the actual emission reductions obtained is lower than the estimated value.

E.7. Remarks on scale of small-scale project activity

The project activity remains as a small scale project activity for the entire period.

APPENDIX 1: Determination of Grid Emission Factor

The following information represents the data used to determine the CO_2 emission factor by calculating the Combined Margin as a result of a weighted average of the Operating Margin and the Build Margin of the SIC electricity system.

Table 1: Power Plants type "m" and "k", Energy Generation Data (MWh/year)

Power Plant	**Fuel type**	**Power Plant category**	**Energy Generated**	**Energy Generated**	**Energy Generated**
(name)	***i***	***m or k***	**$EG_{m,2008}$**	**$EG_{m,2009}$**	**$EG_{m,2010}$**
			[MWh/year]	**[MWh/year]**	**[MWh/year]**
Abanico	run off river (hydro)	*k*	341,539	346,329	315,050
Aconcagua	run off river (hydro)	*k*	439,193	409,801	249,805
Alfalfal	run off river (hydro)	*k*	907,392	893,804	845,500
Ancud	Diesel	*m*	6,041	579	834
Antilhue TG	Diesel	*m*	241,149	112,723	71,742
Antuco	Reservoir (Hydro)	*k*	1,440,283	1,610,652	1,448,334
Arauco	biomass	*k*	12,313	11,139	15,232
Biomar	Diesel	*m*	0	0	2
Blanco	run off river (hydro)	*k*	0	0	78,342
Bocamina	coal	*m*	958,128	919,093	215,770
Cabrero	biomass	*k*	0	0	1,358
Campanario	Natural Gas	*m*	18,901	0	106
Campanario Diesel	Diesel	*m*	221,310	104,955	25,858
Candelaria 1	Natural Gas	*m*	22,814	21,114	43,217
Candelaria 1 Diesel	Diesel	*m*	263,505	69,531	48,571
Candelaria 2	Natural Gas	*m*	12,355	7,320	44,494
Candelaria 2 Diesel	Diesel	*m*	277,959	30,257	46,559
Canela	wind	*k*	30,842	29,337	0

Canela 1	wind	*k*	0	8,005	28,375
Canela 2	wind	*k*	0	19,663	122,611
Canutillar	Reservoir (Hydro)	*k*	798,544	910,740	1,162,424
Cañete	Diesel	*m*	4,636	2,860	728
Capullo	run off river (hydro)	*k*	68,605	64,814	72,746
Carbomet	run off river (hydro)	*k*	0	0	20,660
Casablanca 1	Diesel	*m*	4,074	1,075	221
Casablanca 2	Diesel	*m*	56	0	0,310
Cem Bio Bio DIESEL	Diesel	*m*	0	0	0
Cem Bio Bio IFO	IFO 180	*m*	0	0	4,186
Cenizas	Diesel	*m*	865	46,839	26,866
Chacabuquito	run off river (hydro)	*k*	177,060	161,006	136,617
Chiburgo	run off river (hydro)	*k*	98,899	82,554	75,847
Chiloé	Diesel	*m*	111	763	1
Cholguán	biomass	*k*	89,964	76,393	81,600
Chuyaca	Diesel	*m*	83	2,508	5,495
Cipreses	Reservoir (Hydro)	*k*	480,228	498,783	517,338
Colbun	Reservoir (Hydro)	*k*	2,667,367	2,269,765	1,542,401
Colihues DIE	Diesel	*m*	0	0	146
Colihues IFO	IFO 180	*m*	0	0	21,982
Collipulli	Diesel	*m*	7,654	2,228	646
Colmito	Diesel	*m*	4,422	5,203	1,108
Concon	Diesel	*m*	7,211	1,926	418
Confluencia	run off river (hydro)	*k*	0	0	3,935
Constitución	biomass	*k*	58,061	56,363	51,539
Constitución 1	Diesel	*m*	10,755	768	1,887
Constitución 2	Diesel	*m*	0	0	0
Constitución A.	biomass	*k*	43,450	49,323	30,943
Coya	run off river (hydro)	*k*	43,462	91,606	83,304
Curacautin	Diesel	*m*	6,281	2,820	1,565
Curanilahue	Natural	*m*	0	0	52

	Gas				
Curauma	Diesel	*m*	5,903	1,703	480
Curicó	coal	*m*	0	0	385
Curillinque	run off river (hydro)	*k*	604,620	616,641	621, 357
D,, Almagro	Diesel	*m*	58,083	24,735	442
Degan	Diesel	*m*	68,292	42,087	41,051
Eagon	Diesel	*m*	0	4	15
El Indio TG	Diesel	*m*	0	0	0
El Manzano	run off river (hydro)	*k*	0	26,688	27,498
El Peñón	Diesel	*m*	0	11,433	57,821
El Rincón	run off river (hydro)	*k*	2,536	2,145	2,447
El Salvador	Diesel	*m*	0	0	297
El Tártaro	run off river (hydro)	*k*	0	0	138
El Toro	Reservoir (Hydro)	*k*	1,204,900	1,515,426	1,784,247
Emelda	IFO 180	*m*	0	0	1,186
Escuadrón (ex FPC)	biomass	*k*	77,223	77,883	90,536
Esperanza 1	Diesel	*m*	4,548	1,477	1,020
Esperanza 2	Diesel	*m*	4,450	877	804
Esperanza TG	Diesel	*m*	3,581	9	15
Eyzaguirre	run off river (hydro)	*k*	8,746	8,273	6,686
Florida	run off river (hydro)	*k*	154,578	143,168	118,661
Guacolda 1	coal	*m*	1,244,834	1,266,852	1,138,228
Guacolda 2	coal	*m*	1,285,397	1,217,009	1,109,295
Guacolda 3	coal	*m*	0	723,012	1,199,067
Guacolda 4	coal	*m*	0	0	1,036,429
Guayacán	run off river (hydro)	*k*	0	0	20,806
Horcones Diesel	Diesel	*m*	6,806	1,475	6,260
Horcones TG	Natural Gas	*m*	0	90	313
Hornitos	run off river (hydro)	*k*	256,416	269,732	195,559
Huasco TG	Diesel	*m*	364	561	927
Huasco TG IFO	IFO 180	*m*	160,423	23,566	142

Huasco TV	coal	*m*	0	0	0
Isla	run off river (hydro)	*k*	493,629	446,085	488,228
Juncal	run off river (hydro)	*k*	0	0	39,806
Juncalito	run off river (hydro)	*k*	0	0	1,263
Itata	biomass	*k*	0	0	0
L,Verde	coal	*m*	247,403	20,180	284
L,Verde TG	Diesel	*m*	38,912	19,161	4,211
La Higuera	run off river (hydro)	*k*	0	0	168,758
La Paloma	run off river (hydro)	*k*	0	0	3,983
Laja	biomass	*k*	53,897	46,299	44,715
Las Vegas	Diesel	*m*	6,074	1,462	673
Lebu	Diesel	*m*	4,470	1,778	56
Lebu (CrisToro)	wind	*k*	0	3,794	6,800
Licantén	biomass	*k*	13,018	20,270	21,497
Linares Norte	Diesel	*m*	0	158	142
Lircay	run off river (hydro)	*k*	32,931	121,976	121,921
Loma Alta	run off river (hydro)	*k*	256,009	271,785	270,328
Loma Los Colorados	biomass	*k*	0	0	7,914
Los Corrales	run off river (hydro)	*k*	0	0	171
Los Espinos	Diesel	*m*	0	27,238	14,201
Los Molles	run off river (hydro)	*k*	67,830	47,987	28,343
Los Morros	run off river (hydro)	*k*	18,439	19,136	17,354
Los Pinos	Diesel	*m*	7,118	108,097	174,311
Los Quilos	run off river (hydro)	*k*	282,242	262,678	213,571
Los Sauces	Diesel	*m*	4,720	4,097	1,107
Los Vientos TG	Diesel	*m*	380,794	155,101	49,180
Louisiana Pacific	Diesel	*m*	0	4	0

Machicura	Reservoir (Hydro)	*k*	566,464	506,593	340,602
Maitenes	run off river (hydro)	*k*	136,808	130,467	129,722
Malleco	Diesel	*m*	0	0	0
Mampil	run off river (hydro)	*k*	163,278	177,339	106,542
Mariposas	run off river (hydro)	*k*	0	0	602
Maule	Diesel	*m*	5,197	318	647
Monte Patria	Diesel	*m*	17,085	6,526	172
Monte Redondo	wind	*k*	0	6,065	82,791
Multiexport I	Diesel	*m*	0	0	0
Multiexport II	Diesel	*m*	0	3	0
Nehuenco	Natural Gas	*m*	0	111,629	199,755
Nehuenco Diesel	Diesel	*m*	312,172	937,297	673,473
Nehuenco II	Natural Gas	*m*	189,566	12,755	979,119
Nehuenco II Diesel	Diesel	*m*	2,202,942	1,525,926	1,547,613
Nehuenco TG 9B	Natural Gas	*m*	98,052	25,002	6,628
Nehuenco TG 9B Diesel	Diesel	*m*	137,101	17,238	580
Newen Diesel	Diesel	*m*	0	2,333	600
Newen Natural Gas	Natural Gas	*m*	0	926	29,865
Newen LPG	LPG	*m*	0	1,160	8,325
Nueva Aldea	biomass	*k*	107,481	103,086	93,894
Nueva Aldea 2	Diesel	*m*	37	0	0
Nueva Aldea 3	biomass	*k*	209,769	266,840	192,853
Nueva Renca	Natural Gas	*m*	945	18,916	611,541
Nueva Renca Diesel	Diesel	*m*	1,501,792	1,257,488	1,300,008
Nueva Ventanas	coal	*m*	0	117,212	1,997,870
Ojos de Agua	run off river (hydro)	*k*	18,759	37,059	49,805
Olivos	Diesel	*m*	28,296	52,873	4,019
Palmucho	run off river (hydro)	*k*	225,076	244,092	232,351
Pangue	Reservoir (Hydro)	*k*	1,792,612	2,139,157	1,630,702
Pehuenche	Reservo	*k*	2,752,905	2,728,707	2,091,261

	ir (Hydro)				
Pehui	run off river (hydro)	*k*	0	3,634	7,134
Petropower	Fuel Oil	*m*	493,911	482,252	65,525
Peuchén	run off river	*k*	242,581	269,135	166,451
	(hydro)				
Pilmaiquén	run off river (hydro)	*k*	243,614	248,859	263,127
Placilla	Diesel	*m*	3,020	2,954	1,121
Puclaro	run off river (hydro)	*k*	32,635	41,022	24,379
Pullinque	run off river (hydro)	*k*	219,906	229,045	209,844
Punitaqui	Diesel	*m*	18,090	7,922	283
Punta Colorada	Fuel Oil	*m*	0	0	5,114
Puntilla	run off river (hydro)	*k*	148,554	148,986	146,903
Quellon	Diesel	*m*	10,477	1,463	758
Quellon II	Diesel	*m*	3,551	15,339	14,376
Queltehues	run off river (hydro)	*k*	358,880	342,934	357,686
Quidico	Diesel	*m*	0	0	43
Quilleco	run off river (hydro)	*k*	362,816	414,463	387,240
Quintay	Diesel	*m*	3,237	3,039	935
Quintero	Diesel	*m*	0	7,100	16,757
Quintero GNL	Natural Gas	*m*	0	15,186	245,838
Ralco	Reservoir (Hydro)	*k*	2,578,244	3,128,046	2,220,597
Rapel	Reservoir (Hydro)	*k*	1,030,368	730,402	469,720
Renca	Diesel	*m*	12,399	338	2,661
Rucue	run off river (hydro)	*k*	888,122	1,017,020	943,174
Salmofood I	Diesel	*m*	0	0	0
Salmofood II	Diesel	*m*	0	22	76
San Clemente	run off river	*k*	0	0	5,924

	(hydro)				
San Fco, Mostazal	Diesel	*m*	32,569	2,172	630
San Gregorio	Diesel	*m*	0	72.880	264.640
San Ignacio	run off river (hydro)	*k*	212,802	201,921	122,229
San Isidro	Natural Gas	*m*	795,472	398,588	31,297
San Isidro GNL	Natural Gas	*m*	0	695,498	2,160,912
San Isidro Diesel	Diesel	*m*	590,216	585,447	43,974
San Isidro II	Natural Gas	*m*	998	115,958	16,930
San Isidro II GNL	Natural Gas	*m*	0	268,841	2,846,079
San Isidro II Diesel	Diesel	*m*	1,646,927	1,415,122	87,600
San Lorenzo de D, de Almagro	Diesel	*m*	0	635	309
Santa Lidia	Diesel	*m*	525	10,455	49,516
Sauce Andes	run off river (hydro)	*k*	7,876	7,271	6,334
Sauzal 50Hz	run off river (hydro)	*k*	489,979	472,301	423,943
Sauzal 60Hz	run off river (hydro)	*k*	16	0	0
Sauzalito	run off river (hydro)	*k*	84,807	81,879	72,404
Skretting	Diesel	*m*	0	2	59
Taltal 1	Natural Gas	*m*	17,444	116,564	19,280
Taltal 1 Diesel	Diesel	*m*	332,668	118,814	34,900
Taltal 1 GNL	Natural Gas	*m*	0	0	1,661
Taltal 2	Natural Gas	*m*	87,023	123,272	36,508
Taltal 2 GNL	Natural Gas	*m*	0	0	39
Taltal 2 Diesel	Diesel	*m*	602,651	83,818	55,707
Tapihue	Natural Gas	*m*	0	1,187	1,050
Teno	Diesel	*m*	0	2,076	58,042
Termopacífico	Diesel	*m*	0	4,899	19,786
TG_Coronel	Natural Gas	*m*	685	3,075	29,037
TG_Coronel Diesel	Diesel	*m*	73,903	23,418	63,493

Tierra Amarilla	Diesel	*m*	0	23,655	2,181
Totoral	Diesel	*m*	3,431	2,418	429
Totoral (eólica)	wind	*k*	0	4,018	84,686
Traigen	Diesel	*m*	2,592	4,023	1,115
Trongol	Diesel	*m*	0	0	0
Trapén	Diesel	*m*	0	47,835	42,690
Trueno	run off river (hydro)	*k*	0	0	19,652
Truful Truful	run off river (hydro)	*k*	0	0	36
Valdivia	biomass	*k*	218,900	258,711	225,050
Ventanas 1	coal	*m*	941,608	883,371	914,403
Ventanas 2	coal	*m*	1,633,583	1,667,410	1,157,329
Victoria	Diesel	*m*	0	0	0
Volcan	run off river (hydro)	*k*	101,150	102,729	107,659
Watts	Diesel	*m*	0	0.10	0

Table 2: Power Plants “m”, Fuel type, Yearly Fuel Consumption and Efficiency

Power Plant	**Fuel type**	**Fuel Consumption**			**Efficiency**
m	**i**	**$FC_{i,m,2008}$**	**$FC_{i,m,2009}$**	**$FC_{i,m,2010}$**	**(for option A2)**
		[kg; m3 (gas)]	[kg; m3 (gas)]	[kg; m3 (gas)]	[%]
Ancud	Diesel	1,350,000	140,045	201,901	-
Antilhue TG	Diesel	54,990,000	28,780,000	18,530,000	-
Biomar	Diesel	0	0	-	39.5%
Bocamina	coal	399,250,000	370,080,000	81,990,000	-
Campanario	Natural Gas	5,330,000	0	0	39.5%
Campanario Diesel	Diesel	54,540,000	30,550,000	6,450,000	-

Power Plant	Fuel type	Fuel Consumption			Efficiency
Candelaria 1	Natural Gas	7,609,208	6,838,993	14,283,965	-
Candelaria 1 Diesel	Diesel	71,615,834	19,370,684	13,688,516	60.0%
Candelaria 2	Natural Gas	4,120,792	2,371,007	14,706,035	-
Candelaria 2 Diesel	Diesel	75,544,166	8,429,316	13,121,484	60.0%
Cañete	Diesel	1,190,000	650,000	190,000	39.5%
Casablanca 1	Diesel	-	320,000	49,930	39.5%
Casablanca 2	Diesel	-	0	70	39.5%
Cem Bio Bio DIESEL	Diesel	0	0	0	39.5%
Cem Bio Bio IFO	IFO 180	0	0	-	39.5%
Cenizas	Diesel	207,690	1,720,000	980,000	-
Chiloé	Diesel	20,000	210,000	296	-
Chuyaca	Diesel	-	590,000	1,390,000	39.5%
Colihues DIE	Diesel	0	0	31,137	-
Colihues IFO	IFO 180	0	0	-	39.5%
Collipulli	Diesel	1,700,000	490,000	-	39.5%
Colmito	Diesel	1,317,839	1,550,530	330,205	39.5%
Concon	Diesel	1,670,635	460,000	180,000	-
Constitución 1	Diesel	2,120,000	220,000	430,000	-
Constitución 2	Diesel	0	0	0	-
Curacautin	Diesel	1,450,000	660,000	360,000	39.5%
Curanilahue	Natural Gas	0	0	-	39.5%
Curauma	Diesel	-	470,000	160,000	39.5%
Curicó	coal	0	0	-	39.0%
D. Almagro	Diesel	21,010,000	10,430,000	190,000	-

Power Plant	Fuel type	Fuel Consumption			Efficiency
Degan	Diesel	14,400,000	8,960,000	8,740,000	-
Eagon	Diesel	0	-	-	39.5%
El Indio TG	Diesel	0	0	0	-
El Peñón	Diesel	0	2,280,000	12,250,000	39.5%
El Salvador	Diesel	0	0	100,000	-
Emelda	IFO 180	0	0	-	39.5 %
Esperanza 1	Diesel	1,551,834	343,634	238,556	-
Esperanza 2	Diesel	971,967	204,179	187,958	-
Esperanza TG	Diesel	810,554	2,188	3,485	-
Guacolda 1	coal	579,920,000	626,520,000	438,910,000	-
Guacolda 2	coal	607,110,000	595,200,000	423,280,000	-
Guacolda 3	coal	0	307,760,000	437,800,000	-
Guacolda 4	coal	0	0	326,270,000	-
Horcones Diesel	Diesel	2,370,000	770,000	3,270,000	-
Horcones TG	Natural Gas	0	0	120,000	39.5 %
Huasco TG	Diesel	134,790	236,472	537,643	-
Huasco TG IFO	IFO 180	59,405,210	9,933,528	82,357	-
Huasco TV	coal	0	0	0	-
L.Verde	coal	171,400,000	14,420,000	133,480	-
L.Verde TG	Diesel	9,800,000	4,970,000	1,030,000	-
Las Vegas	Diesel	1,403,618	370,000	140,000	-
Lebu	Diesel	990,000	390,000	10,000	39.5 %
Linares Norte	Diesel	0	30,000	30,000	-
Los Espinos	Diesel	0	6,025,134	3,030,000	39.5 %
Los Pinos	Diesel	-	22,570,000	36,780,000	39.5 %
Los Sauces	Diesel	1,030,000	870,000	240,000	39.5 %
Los Vientos TG	Diesel	102,020,000	41,500,000	14,010,000	-
Louisiana Pacific	Diesel	0	-	-	39.5 %
Malleco	Diesel	0	0	0	39.5 %

Maule	Diesel	1,030,000	90,000	120,000	-
Monte Patria	Diesel	3,810,000	1,840,000	40,000	39.5 %
Multiexport I	Diesel	0	0	0	39.5 %
Multiexport II	Diesel	0	-	0	39.5 %
Nehuenco	Natural Gas	0	22,600,000	39,750,000	-
Nehuenco Diesel	Diesel	50,800,000	152,900,000	111,170,000	-
Nehuenco II	Natural Gas	35,920,000	2,340,000	139,760,000	-
Nehuenco II Diesel	Diesel	365,270,000	246,420,000	252,940,000	-
Nehuenco TG 9B	Natural Gas	32,700,000	8,350,000	1,580,000	39.5 %
Nehuenco TG 9B Diesel	Diesel	39,610,000	5,310,000	180,000	-
Newen Diesel	Diesel	0	20,000	-	39.5 %
Newen Natural Gas	Natural Gas	0	-	-	39.5 %
Newen LPG	LPG	0	-	-	39.5 %
Nueva Aldea 2	Diesel	10,607	0	0	-
Nueva Renca	Natural Gas	225,874	4,521,295	116,180,000	-
Nueva Renca Diesel	Diesel	258,530,000	211,940,000	227,200,000	-
Nueva Ventanas	coal	0	40,770,000	745,350,000	-
Olivos	Diesel	6,440,000	11,830,000	910,000	-
Petropower	Fuel Oil	-	-	26,680,000	37.5 %
Placilla	Diesel	700,272	660,000	230,000	-
Punitaqui	Diesel	3,890,000	2,230,000	90,000	39.5 %
Punta Colorada	Fuel Oil	0	0	-	39.5 %
Quellon	Diesel	2,280,000	310,000	-	39.5 %
Quellon II	Diesel	730,000	3,440,000	3,230,000	-
Quidico	Diesel	0	0	-	39.5 %
Quintay	Diesel	750,444	660,000	210,000	-
Quintero	Diesel	0	770,000	4,050,000	-
Quintero GNL	Natural Gas	0	4,950,000	67,840,00	-

				0	
Renca	Diesel	4,780,000	123,370	790,000	-
Salmofood I	Diesel	0	0	0	39.5 %
Salmofood II	Diesel	0	-	-	39.5 %
San Fco. Mostazal	Diesel	10,900,000	740,000	280,000	39.5 %
San Gregorio	Diesel	0	15,305	60,000	-
San Isidro	Natural Gas	165,600,000	81,730,000	6,350,000	-
San Isidro GNL	Natural Gas	0	137,490,000	437,270,000	-
San Isidro Diesel	Diesel	102,580,000	102,170,000	7,870,000	-
San Isidro II	Natural Gas	-	-	3,110,000	39.5 %
San Isidro II GNL	Natural Gas	0	82,030,000	522,330,000	-
San Isidro II Diesel	Diesel	288,570,000	244,520,000	14,840,000	-
San Lorenzo de D. de Almagro	Diesel	0	360,000	180,000	-
Santa Lidia	Diesel	-	2,850,000	12,860,000	39.5 %
Skretting	Diesel	0	-	-	39.5 %
Taltal 1	Natural Gas	5,820,000	37,860,000	5,840,000	-
Taltal 1 Diesel	Diesel	91,664,124	32,607,123	8,862,991	-
Taltal 1 GNL	Natural Gas	0	0	500,000	-
Taltal 2	Natural Gas	28,300,000	40,040,000	11,060,000	-
Taltal 2 GNL	Natural Gas	0	0	10,000	-
Taltal 2 Diesel	Diesel	166,055,876	23,002,877	14,147,009	-
Tapihue	Natural Gas	0	-	-	39.5 %
Teno	Diesel	0	500,000	12,827,304	-
Termopacífico	Diesel	0	1,102,217	4,451,949	-
TG_Coronel	Natural Gas	200,000	340,000	3,210,000	-
TG_Coronel Diesel	Diesel	16,800,000	6,130,000	16,600,000	-
Tierra Amarilla	Diesel	0	7,640,000	740,000	-
Totoral	Diesel	794,840	530,000	90,000	-
Traigen	Diesel	580,000	840,000	230,000	39.5 %
Trongol	Diesel	0	0	0	39.5

					%
Trapén	Diesel	0	10,280,000	8,920,000	-
Ventanas 1	coal	350,720,000	331,140,000	346,790,000	-
Ventanas 2	coal	607,140,000	635,740,000	450,450,000	-
Victoria	Diesel	0	0	0	39.5 %
Watts	Diesel	0	-	0	39.5 %

Table 3: Build Margin Calculation Data

Power Plant Date of Build	Power Plant	Fuel type	Energy Generated	Emission Factor	Emissions
	m	i	$EG_{m.2010}$	$EF_{CO2.m}$	$EG_{m.2010} * EF_{CO2.m}$
	.	.	[MWh]	[tCO2/MWh]	[tCO2]
2010	Cabrero	biomass	1,358	0.000	0.0
2010	Cem Bio Bio DIESEL	Diesel	0	0.000	0.0
2010	Cem Bio Bio IFO	IFO 180	4,186	0.688	2,880.1
2010	Nueva Ventanas	coal	1,997,870	0.930	1,857,321.8
2010	Colihues DIE	Diesel	146	0.674	98.0
2010	Colihues IFO	IFO 180	21,982	0.688	15,125.8
2010	El Salvador	Diesel	297	1.060	314.8
2010	El Tártaro	run off river (hydro)	138	0.000	0.0
2010	Emelda	IFO 180	1,186	0.688	816.4
2010	Guacolda 4	coal	1,036,429	0.784	813,025.3
2010	Juncalito	run off river (hydro)	1,263	0.000	0.0
2010	Los Corrales	run off river (hydro)	171	0.000	0.0
2010	Mariposas	run off river (hydro)	602	0.000	0.0
2010	Punta Colorada	Fuel Oil	5,114	0.688	3,518.7
2010	Quidico	Diesel	43	0.662	28.5
2009	Biomar	Diesel	2	0.662	1.2
2009	Curicó	coal	385	0.826	317.9
2009	Canela 2	wind	122,611	0.000	0.0
2009	Eagon	Diesel	15	0.662	9.6
2009	El Peñón	Diesel	57,821	0.667	38,557.2
2009	Guacolda 3	coal	1,199,067	0.910	1,090,944.5
2009	Linares Norte	Diesel	142	0.664	94.4
2009	Los Espinos	Diesel	14,201	0.672	9,537.0
2009	Louisiana Pacific	Diesel	0	0.662	0.3
2009	Multiexport I	Diesel	0	0.000	0.0
2009	Multiexport II	Diesel	0	0.000	0.0

2009	Newen Diesel	Diesel	600	0.662	396.8
2009	Newen Natural Gas	Natural Gas	29,865	0.495	14,779.9
2009	Newen LPG	LPG	8,325	0.561	4,673.8
2009	Pehui	run off river (hydro)	7,134	0.000	0.0
2009	Quintero	Diesel	16,757	0.761	12,747.5
2009	Quintero GNL	Natural Gas	245,838	0.527	129,659.3
2009	Salmofood I	Diesel	0	0.000	0.0
2009	Salmofood II	Diesel	76	0.662	50.0
2009	San Gregorio	Diesel	265	0.714	188.9
2009	San Lorenzo de D, de Almagro	Diesel	309	1.832	566.6
2009	Tapihue	Natural Gas	1,050	0.495	519.5
2009	Teno	Diesel	58,042	0.696	40,374.2
2009	Termopacífico	Diesel	19,786	0.708	14,012.6
2009	Tierra Amarilla	Diesel	2,181	1.068	2,329.2
2009	Trapén	Diesel	42,690	0.658	28,075.9
2009	Truful Truful	run off river (hydro)	36	0.000	0.0
2009	Watts	Diesel	0	0.000	0.0
2008	Cenizas	Diesel	26,866	0.115	3,084.6
2008	Chiloé	Diesel	1	0.847	0.9
2008	Chuyaca	Diesel	5,495	0.796	4,375.1
2008	Colmito	Diesel	1,108	0.938	1,039.3
2008	Coya	run off river (hydro)	83,304	0.000	0.0
2008	Curanilahue	Natural Gas	52	0.495	25.6
2008	Los Pinos	Diesel	174,311	0.664	115,765.9
2008	Olivos	Diesel	4,019	0.713	2,864.2
2008	Placilla	Diesel	1,121	0.646	723.9
2008	Quellon II	Diesel	14,376	0.707	10,166.5
2008	Quintay	Diesel	935	0.707	661.0
2008	Santa Lidia	Diesel	49,516	0.817	40,477.1
2008	Skretting	Diesel	59	0.662	39.3
2008	Totoral	Diesel	429	0.660	283.3
2008	Victoria	Diesel	0	0.000	0.0
28.nov.2007	Palmucho	run off river (hydro)	232,351	0.000	0.0
22.ago.2007	Esperanza TG	Diesel	15	0.736	11.0
19.jul.2007	Chiburgo	run off river (hydro)	75,847	0.000	0.0
12.jul.2007	Monte Patria	Diesel	172	0.730	125.9
6.jul.2007	Punitaqui	Diesel	283	1.001	283.3
4.jul.2007	Degan	Diesel	41,051	0.670	27,509.4
29.jun.2007	Esperanza 1	Diesel	1,020	0.736	750.9
27.jun.2007	Esperanza 2	Diesel	804	0.736	591.6
7.jun.2007	Maule	Diesel	647	0.584	377.7

6.jun.2007	Constitución 1	Diesel	1,887	0.717	1,353.4
1.may.2007	Collipulli	Diesel	646	0.662	427.6
1.may.2007	Curacautin	Diesel	1,565	0.724	1,133.1
1.may.2007	Traigen	Diesel	1,115	0.649	723.9
1.may.2007	Lebu	Diesel	56	0.563	31.5
1.may.2007	Los Sauces	Diesel	1,107	0.683	755.4
1.may.2007	Cañete	Diesel	728	0.821	598.0
23.abr.2007	Concon	Diesel	418	1.354	566.6
23.abr.2007	San Isidro II	Natural Gas	16,930	0.351	5,944.0
23.abr.2007	San Isidro II Diesel	Diesel	87,600	0.533	46,709.2
23.abr.2007	San Isidro GNL	Natural Gas	2,160,912	0.387	835,733.1
23.abr.2007	San Isidro II GNL	Natural Gas	2,846,079	0.351	998,304.2
Total			**10,730,807**	**-**	**6,182,402**

Table 4. Fossil Fuel Data

Fuel Type i	**CO_2 Emission Factor $EF_{CO2,i,y}$ [tCO2/GJ]**	**Gross calorific Value $GCV_{i,y}$ [Kcal/Kg; Kcal/m^3 (gas)]**	**GCV to NCV conversion factor according to IPCC guidelines**	**Net Calorific Value $NCV_{i,y}$ [GJ/kg; GJ/m^3 (gas)]**
Coal	0.0895	7,000	0.95	0.027842
Diesel	0.0726	10,900	0.95	0.043354
Natural Gas	0.0543	9,341	0.90	0.035198
IFO 180	0.0755	10,500	0.95	0.041763
Residual Fuel Oil	0.0755	10,500	0.95	0.041763
LPG	0.0616	12,100	0.95	0.048127

Document information

Version	*Date*	*Description*
09.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).
08.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.

Version	*Date*	*Description*
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 GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, 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).
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