MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 01 - 18/03/2011

Valdivia Biomass Power Plant
UNFCCC 1787
INSERT Monitoring Period #2: 01/01/2010 - 31/12/2010

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The project activity consists in a 550,000 (ADt/year)[1] pulp mill with a 61 MW of surplus power capacity to the grid. This surplus capacity allows the pulp mill to operate as a grid-connected power plant. The mill is located in the X Region of Chile.

The surplus electric power capacity of the mill is a result of the following initiatives:

- The installation of a high capacity biomass power boiler, designed for electric power generation.
- The construction of a more efficient pulp mill, capable of generating surplus electric power to the grid.

The project activity is designed to use black liquor[2] and additional biomass from forest operations (bark and sawdust) for power cogeneration in the new pulp mill facility. The project activity is presented by Celulosa Arauco y Constitución S.A. (from now on, Arauco), a leading forestry and pulp-producing company in Chile.

Though modern pulp mills tend to be self-sufficient in heat and electric power generation, the Valdivia pulp mill was deliberately designed to generate a considerable amount of surplus power to the grid. This surplus is generated by burning black liquor in the recovery boiler and biomass from forest operations (from own and third party sources) in a power boiler, both inside the pulp mill facility. All the biomass consumed by the project activity is generated from sustainable forest operations[3]. The additional electric power generation capacity of the pulp mill is a result of particular modifications of the mill that enable it to generate additional power to the grid. Such capacity would have not been available to the grid with a more conventional business as usual pulp mill design.
The reduction in greenhouse gas emissions is therefore accomplished through the displacement of grid electricity by carbon neutral surplus electricity generated by the pulp mill. An additional reduction of greenhouse gases is accomplished by the additional consumption of biomass from forest operations (a mix of sawdust and bark) to increase the surplus power generation of the mill. In a baseline scenario, this additional amount of biomass would not be used for energy purposes and would be dumped in piles for natural decay or burned in the open air in an uncontrolled manner.

Considering the higher cost of building a pulp mill with surplus power capacity, the decision of building such power plant relied on the possibility of not relying on the SIC grid for electric power, on selling excess power to the grid and on the potential benefits from being a CDM project activity.

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[1] ADt stands for "Air Dry ton".

[2] Black liquor is an organic by-product of the pulp production Kraft cycle and falls under the category of *biomass residue*, according to the "Clarifications of definitions of biomass and consideration of changes in carbon pools due to a CDM project activity", Annex 8, of 20th Executive Board meeting report and the "Biomass residue" definition provided in page Nº2 of the ACM0006 (Version 05) baseline methodology used for this project activity.

[3] All the wood used to generate pulp and energy (heat and power) comes from exotic plantations of Radiata Pine and Eucalyptus. The forestlands are closely supervised by CONAF and must be managed in a sustainable way by law. For more details, please see Annex 4 of the PDD.

The Valdivia project activity assists Chile's sustainable growth by providing electricity to the SIC grid through biomass power generation, which is a clean and renewable energy source. The project proponent believes that biomass power generation constitutes a sustainable source of power generation that brings clear advantages to mitigate global warming. By using the available natural resources in a more efficient way, the Valdivia CDM project activity helps promoting the development of renewable energy sources in Chile, in particular the use of biomass generated as a by-product of the forestry industry, which has a significant potential in the country. The project is a good example to demonstrate the viability of electricity generation as a source of revenue not only to the pulp industry, but also to all forest-related industries. It is worthy to highlight, however, that very few pulp mills in Chile have this additional power generation capacity. This makes the Valdivia pulp mill quite unique and particular in its type.

Relevant dates for the project activity:

Date	**Key events**
September 2001	Construction start date
February 2004	Commissioning start date
01/04/2009 to 31/12/2009	The 1st monitoring period
01/01/2010 to 31/12/2010	The 2nd monitoring period (this report)

Total net emission reductions claimed in the monitored period (from January 1st 2010 to December 31st 2010) are **92.995 tCO_2e.**

A.2. Project Participants

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Name of Party involved	**Private and / or public entity(ies) project participants (*) (as applicable)**	**Party involved considered as project participant**
Chile (Host)	Celulosa Arauco y Constitución S.A.	No
United Kingdom	Inversiones Celco SL	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.3. Location of the project activity:

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The proposed project activity is located in Chile, X Region of Valdivia, commune of San José de la Mariquina, in the province of Valdivia. It is located in km 788 of the 5-Sur highway in the Rucao sector. The Valdivia Region can be directly accessed from Santiago through the 5-Sur or Panamericana Sur highway. The project site is centered at the geographical coordinates 39°33'51'' S and 72°53'41''W.

A.4. Technical description of the project

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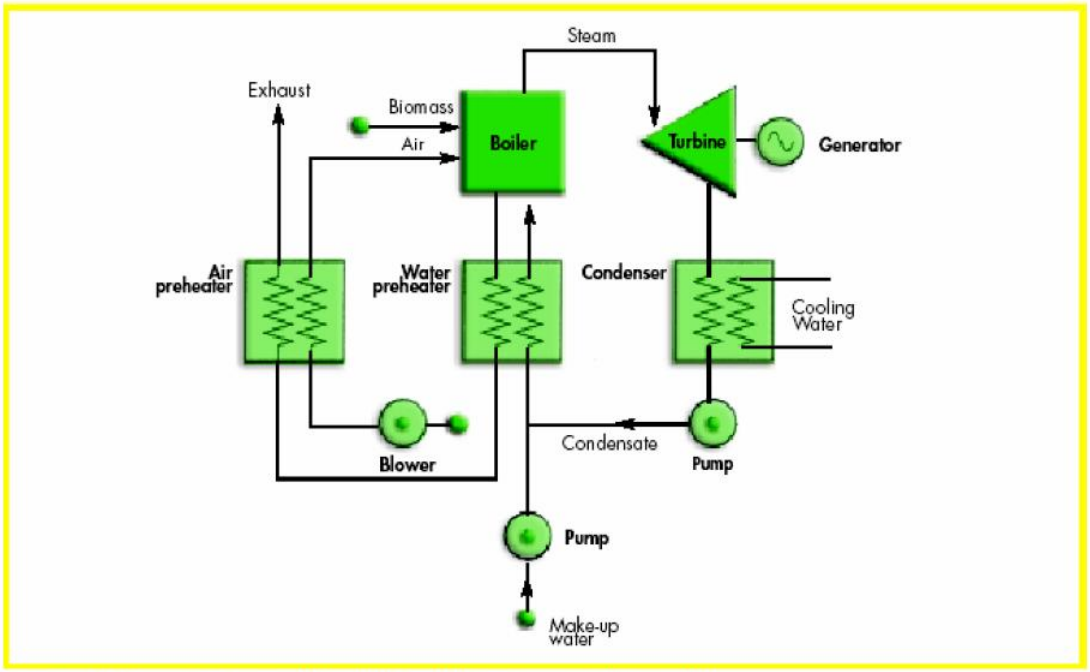
The technology used in this project (which is also the predominant technology everywhere in the world today) for generating megawatt (MW) levels of electricity from biomass is the steam-Rankine cycle, which consists of direct combustion of biomass in a boiler to generate steam, which is then expanded through a turbine. The steam-Rankine technology is a mature technology, having been introduced into commercial use about 100 years ago. Most steam cycle plants are located at industrial sites, where the waste heat from the steam turbine is recovered and used for meeting industrial-process heat needs. Such combined heat and power (CHP), or cogeneration systems provide greater levels of energy services per unit of biomass consumed than systems that generate electric power only.

The steam-Rankine cycle involves heating pressurized water, with the resulting steam expanding to drive a turbine-generator, and then condensing back to water for partial or full recycling to the boiler. A heat exchanger is used in some cases to recover heat from flue gases to preheat combustion air, and a deaerator must be used to remove dissolved oxygen from water before it enters the boiler.

Steam turbines are designed as either "backpressure" or "condensing" turbines. CHP applications typically employ backpressure turbines, wherein steam expands to a pressure that is still substantially above ambient pressure. It leaves the turbine still as a vapor and is sent to satisfy industrial heating needs, where it condenses back to water. It is then partially or fully returned to the boiler. Alternatively, if process steam demands can be met using only a portion of the available steam, a condensing extraction steam turbine (CEST) might be used. This design includes the capability for some steam to be extracted at one or more points along the expansion path for meeting process needs (Figure 1). Steam that is not extracted continues to expand to sub-atmospheric pressures, thereby increasing the amount of electricity generated per unit of steam compared to the backpressure turbine. The non-extracted steam is converted back to liquid water in a condenser that utilizes ambient air and/or a cold water source as the coolant.

Figure 1: Schematic diagram of a biomass-fired steam-Rankine cycle for cogeneration using a condensing-extraction steam turbine.



Source: Williams & Larson, 1993 apud Kartha & Larson, 2000, p. 101.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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The name of the approved baseline methodology applied to the proposed project activity is:

ACM0006 (Version 05), "Consolidated methodology for generation from biomass residues".

The project activity also relies on the following methodologies and tools:

ACM0002 (Version 06), "Consolidated methodology for grid-connected electricity generation from renewable sources".

"Combined tool to identify the baseline scenario and demonstrate additionality"

"Tool for the demonstration and assessment of additionality" (Version 04).

A.6. Registration date of the project activity:

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The project was validated by DNV and registered in April 01, 2009. The Project Design Document, validation report, request for registration and registration approval are available on the UNFCCC website: http://cdm.unfccc.int/Projects/registered.html

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Starting date of the first crediting period:	01/04/2009
End date of the first crediting period:	31/03/2016
Length of the first crediting period:	Seven (7) years
Maximum length of the crediting period:	3 x Seven (7) years

A.8. Name of responsible person(s)/entity(ies):

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Organization:	CELULOSA ARAUCO Y CONSTITUCIÓN S.A.
Street/P.O.Box:	El Golf 150
Building:	--
City:	Santiago
State/Region:	Región Metropolitana
Postfix/ZIP:	
Country:	Chile
Telephone:	56-2- 462 7000
FAX:	56-2-462 7003
E-Mail:	cpatrickson@arauco.cl
URL:	www.arauco.cl
Represented by:	
Title:	Development Manager of Arauco Generación S.A.
Salutation:	Mr.
Last Name:	Patrickson
Middle Name:	Albert
First Name:	Christian
Department:	
Mobile:	56-9158 3483
Direct FAX:	56-2-4623857
Direct tel:	56-2-4623795
Personal E-Mail:	cpatrickson@arauco.cl

Organization:	INVERSIONES CELCO SL
Street/P.O.Box:	Plaza de Pablo Ruiz Picasso 1
Building:	Edificio Torre Picasso
City:	Madrid
State/Region:	Madrid
Postfix/ZIP:	28020
Country:	Spain
Telephone:	34-915-727488

FAX:	34-915-727450
E-Mail:	gtruffello@arauco.cl
URL:	
Represented by:	Gianfranco Truffello
Title:	Attorney in fact
Salutation:	Mr.
Last Name:	Truffello
Middle Name:	

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The project activity has been completed as planned and described in the Project Design Document (PDD). The starting date of the operation of the project activity was 01/04/2009 and it has operated as described in the CDM PDD.

Description of plant operation during the 2nd monitoring period (Jan 01, 2010 – Dec 31, 2010)

An earthquake with an intensity of 8.8 ° in the righter scale occurred approximately at 03:34 am, on February 27th of 2010 affecting the central zone and part of the south zone of the country including the project site. Due to this event, a plant shutdown was done. The Plant confronted the emergency correctly, and after a reasonable time, production was normal again.

The following table shows the shut down/stoppages of the project activity due to regular maintenance program during the monitoring period, and also the irregular stoppages, caused by the earthquake.

Out of service day	Starting day	Number of days shut down/stopagges	Comments
27/02/2010	09/03/2010	11	Shutdown
26/11/2010	10/12/2010	15	Maintenance stoppage

No events or situations occurred during the monitoring period, which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

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The monitoring plan has not been revised.

B.3. Request for deviation applied to this monitoring period

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Since the ACM0006 (Version 05) does not allow the use of more than one baseline scenario, the project proponent presented a request for deviation of the baseline methodology during the validation stage, so that two compatible baseline scenarios (Nº3 and Nº4) could be simultaneously applied to the proposed project activity. The Executive Board accepted this request for deviation in its 36th meeting. The corresponding document submitted for the request for deviation is included in Annex 3 of this PDD.

B.4. Notification or request of approval of changes

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There has not been any notification or request of approval of changes.

SECTION C. Description of the monitoring system

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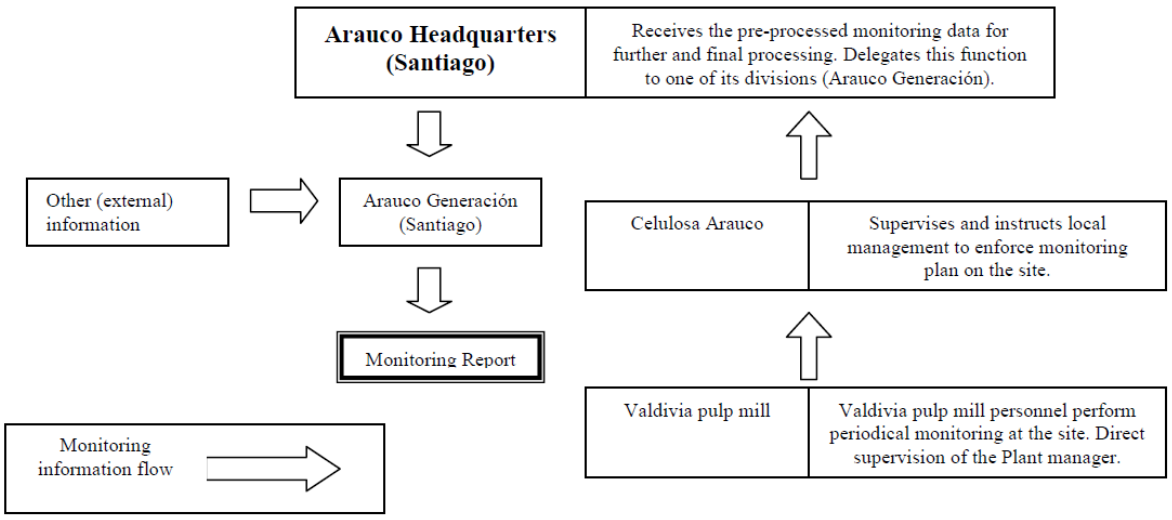
The project proponent, Arauco, has implemented monitoring procedures according to the monitoring methodology chosen for this project activity. This monitoring methodology accounts for emission reductions in an accurate and conservative manner.

Arauco counts with on-site personnel (at the project activity site), who are in charge of gathering and registering all the required information described in the monitoring plan. Such duties are incorporated to the personnel's everyday activities to ensure continuity and high-quality standards. Quantity of biomass residue used, fossil fuel consumption, quantity of heat generated and net quantity of electricity generated data is monitored continuously and automatically by the Data Control System (DCS) the data is downloaded by the IP system and inserted automatically in an Excel spreadsheet. The data is recorded daily and then is aggregated monthly Truck load of the trucks used for transportation of biomass is measured by weighbridges installed at the plant entrance. Data about return trip distance between biomass fuel supply sites and the project site and data about on-site use of transport fuel are informed by third parties. The information is partially processed and stored on-site, and is sent to Arauco Bioenergía S.A.(ex-Arauco Generación S.A.) in Santiago for further and final processing (table formats, reports, etc.). With the information at this level, Arauco is then in condition to verify the emission reduction of the Valdivia Biomass Project Plant project activity periodically (i.e. once every year).

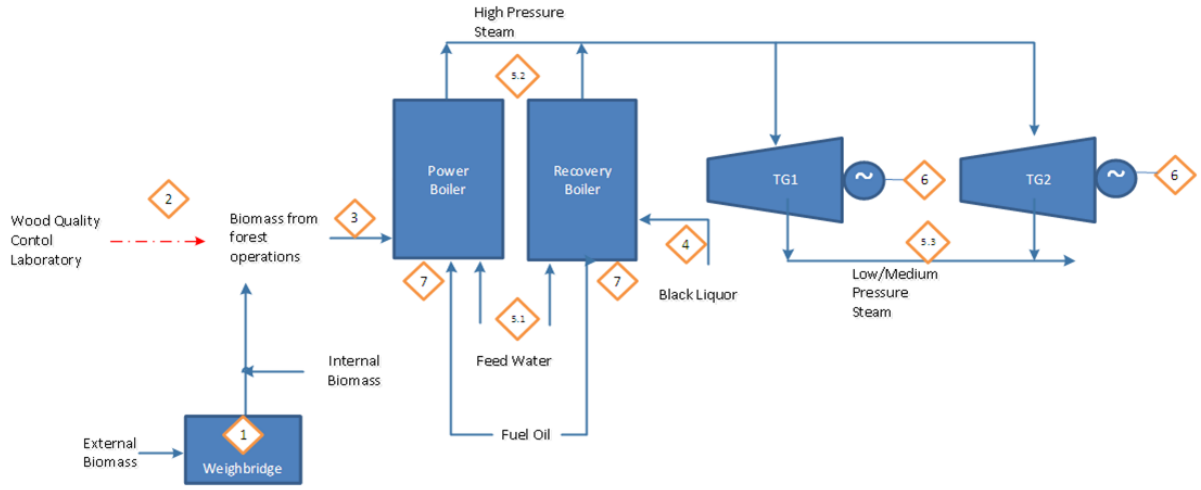
The following table shows the monitoring information flow implemented by Arauco Bioenergia S.A. for the project activity.

Monitoring information flow of Valdivia Power Plant project activity



The following diagram below shows all the relevant monitoring points, including the instruments used to measure the variables that are part of the monitoring plan.

This diagram shows all relevant monitoring points:



ITEM	INSTRUMENT	TAG	VARIABLE
1	Weighbridge #1 South	330-WT-050	TLy
	Weighbridge #2 Center	330-WT-051	TLy
	Weighbridge #3 North	330-WT-052	TLy
2	Digital Scale	310-81-1150	Moisture (BFk,y)
	Digital Scale	310-81-1151	Moisture (BFk,y)
	Digital Scale	310-81-1213	Moisture (BFk,y)
	Drying Oven ULE 700 (400 - 500 L)	310-81-1154	Moisture (BFk,y)
	Drying Oven ULE 700 (400 - 500 L)	310-81-1155	Moisture (BFk,y)
	Drying Oven ULE 700 (400 - 500 L)	310-81-1156	Moisture (BFk,y)
3	Weightmeter	331-WT-005	BFk,y
4	Magnetic Flow Transmitter	352FT433	BFk,y
	Magnetic Flow Transmitter	352FT445	BFk,y
	Temperature Transmitter	352TT430	BFk,y
	Refractometer	352DT435A	Moisture (BFk,y)
	Refractometer	352DT435B	Moisture (BFk,y)
5.1	Pressure Transmitter	362PT980	Qproject plant,y
	Temperature Transmitter	362TT965	Qproject plant,y
5.2	Differential Pressure Flow Transmitter	365FT901	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT902	Qproject plant,y

ITEM	INSTRUMENT	TAG	VARIABLE
5.3	Differential Pressure Flow Transmitter	365FT910	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT913	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT914	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT920	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT923	Qproject plant,y
	Differential Pressure Flow Transmitter	365FT924	Qproject plant,y
6	Energy Meter	368JI101	EGproject plant,y
	Energy Meter	368JI102	EGproject plant,y
	Energy Meter	368JI104	EGproject plant,y
	Energy Meter	368JI105	EGproject plant,y
	Energy Meter	368JI107	EGproject plant,y
	Energy Meter	368JI201	EGproject plant,y
	Energy Meter	368JI203	EGproject plant,y
	Energy Meter	368JI205	EGproject plant,y
7	Mass Flow Transmitter	352FT653	FFproject plant,i,y
	Mass Flow Transmitter	352FT657	FFproject plant,i,y
	Mass Flow Transmitter	352FT681	FFproject plant,i,y
	Mass Flow Transmitter	352FT685	FFproject plant,i,y
	Mass Flow Transmitter	352FT823	FFproject plant,i,y
	Mass Flow Transmitter	363FT507	FFproject plant,i,y
	Mass Flow Transmitter	363FT510	FFproject plant,i,y
	Mass Flow Transmitter	363FT515	FFproject plant,i,y
	Mass Flow Transmitter	363FT518	FFproject plant,i,y

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
Data / Parameter:	**GWP_{CH4}**
Data unit:	(tCO_2e/tCH_4)
Description:	Global Warming Potential for CH_4.
Source of data used:	IPCC
Value(s) :	21 (tCO_2e/tCH_4)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions and project emissions calculations.
Additional comment:	--

Data / Parameter:	**$\varepsilon_{el,reference\ plant}$**
Data unit:	(%)
Description:	Average net energy efficiency of power in the reference power cogeneration plant that would use the biomass residues fired in the project plant in the absence of the project activity.
Source of data used:	The electric efficiency of the Valdivia baseline mill was calculated from the AF Celpap energy / mass balances (Please see section A.4.3 of this PDD). The calculation itself can be found in Annex 3 of this PDD.
Value(s) :	12.09 %
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations.
Additional comment:	The reference pulp mill's electric efficiency of 12.09% was established taking into account the following considerations: • The chosen baseline scenario for the Valdivia biomass power plant project activity that states that the reference pulp mill would be self-sufficient in electric and thermal power generation. Therefore, the baseline efficiency of 12.09% was calculated from the baseline pulp mill design energy / mass balances. The baseline scenario applied to the Valdivia CDM project (self-sufficiency in heat and electric power generation) is consistent with the current BAT (Best Available Technology) for non-integrated bleached pulp mills, like the Valdivia pulp mill[4]. • The electric efficiencies of other (modern and recently built) pulp mills in the country. The electric efficiencies of these pulp mills were in the range of 8.0% to 10.5%, therefore the selection of an efficiency of 12.09% (20% higher than the higher end of the range) ensures a conservative baseline.

[4] Please see table 2.46 of the BREF document (the "European IPPC Bureau. 2001. Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques in the Pulp and Paper Industry, Seville, Spain, p 111.". The link: http://eippcb.jrc.ec.europa.eu/pages/FActivities.htm).

	According to the above, the chosen efficiency of 12.09% was deemed conservative and appropriate.

Data / Parameter:	**Additional electric power consumption of the project mill**
Data unit:	(%)
Description:	This is the additional electric power consumption of the project pulp mill with surplus power capacity generation to the grid with respect to a baseline pulp mill, which does not have surplus electric power capacity to the grid. This marginal higher power consumption is derived from the installation of the equipment that enables the project pulp mill to generate additional power (for example: the installation of a higher biomass capacity power boiler in the project mill, compared to the one that would have been installed in a baseline pulp mill).
Source of data used:	Energy / mass balances of AF Celpap study for the Valdivia mill.
Value(s) :	Constant 4.22% of the total energy consumed by the pulp mill in the project scenario.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations.
Additional comment:	This variable is used to determine the net quantity of electricity generated in the project plant during the year y ($EG_{project\ plant,y}$).

Data / Parameter:	**Fuel oil consumption per unit of combusted biomass in the Valdivia mill power boiler**
Data unit:	(kg of fuel oil/m^3st)
Description:	This parameter refers to the amount of fuel oil that is normally co-fired in a fluidized bed biomass boiler. It considers normal operational reasons such as start-up operations and the wet condition of biomass in winter.
Source of data used:	Historic fossil fuel and biomass consumption data from the Valdivia biomass power plant.
Value(s) :	3.43 (kg of fuel oil/m_3st)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions calculations
Additional comment:	In this case it is used to determine the fossil fuel consumption due to additional consumption of biomass from forest operations (sawdust and bark) in the power boiler.

D.2. Data and parameters monitored	
Data / Parameter:	**$BF_{k,y}$ (and $BF_{T,k,y}$, see comment below)**
Data unit:	Tons of dry mater
Description:	Quantity of biomass residue type k combusted in the project plant during the year y.
Measured /Calculated /Default:	Measured
Source of data:	The black liquor flow to the recovery boiler is measured with flow meters, which transmit the on-line data to the DCS of the pulp mill. This information is stored in the pulp mill's databases. The Operation Manager collects, checks and informs the monitored integrated flow values to the person in charge of calculating the emission reductions of the project activity in Arauco Bioenergía S.A.(ex-Arauco Generación S.A.)

	The biomass from forest operations is directly monitored via an on-line weight meter located at the entrance of the power boiler. This instrument transmits the monitored data to the pulp mill DCS. As in the previous case, the registered values are integrated collected and informed by the Operation Manager to the person in charge of calculating the emission reductions of the project activity in Arauco Bioenergía S.A.(ex-Arauco Generación S.A.). Note that $BF_{T,k,y}$ used in equation Nº4 of the ACM0006 (Version 05) corresponds to the fraction of $BF_{k,y}$ (biomass from forest operations) attributable to the project activity that must be brought in trucks from outside of the plant. This variable is also monitored.
Value(s) of monitored parameter:	Black liquor: 1,010,715 (tDS,tonnes dry solids)). Biomass from forest ops. (sawdust and bark): 117,787 (BDt, bone dry ton) From 117,787 (BDt), 24,422 (BDt) corresponds to biomass attributable to the project activity that was brought to the power plant by trucks
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions and project emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Black liquor</u>: 352FT433 Type: Magnetic Flow Transmitter. ROSEMOUNT 8732CR12N0M4T1L1 Accuracy class: +/- 0.25% Serial number: 0860203276 Calibration frequency: 1 year Calibration dates: 27/04/2009 - 16/03/2010 Date of last calibration: 10/12/2010 Validity: 09/12/2011 352FT445 Type: Magnetic Flow Transmitter. ROSEMOUNT 8732CR12N0M4T1L1 Accuracy class: +/- 0.25% Serial number: 0860145376 Calibration frequency: 1 year Calibration dates: 24/04/2009 - 16/03/2010 Date of last calibration: 10/12/2010 Validity: 09/12/2011 352TT430 Type: Temperature Transmitter. ROSEMOUNT 644HANAJ6C4Q4G5 Accuracy class: +/- 0.21°C Serial number: 230921 Calibration frequency: 1 year Calibration dates: 22/04/2009 - 02/07/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2011

	Biomass from forest operations 331-WT-005 Type: Weightmeter. RAUTE PRECISION WB910 Accuracy class: +/- 0.6kg Serial number: 2472377 Calibration frequency: 1 year Date of penultimate calibration: 11/11/2009 Date of last calibration: 23/11/2010 Validity: 22/11/2011
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	Both biomass types (black liquor and the biomass from forest operations) and quantities were measured by dedicated meters. All meters (weight meters, weighbridges, etc.) are duly calibrated and maintained according to the manufacturer's specifications and/or according to proper industry standards. Maintenances and calibrations were planned according a specific schedule, which is part of the quality system implemented in the pulp mill. Biomass from forest operations (mix of sawdust and bark) was verified against purchases and stock variations. Black liquor consumption was verified with total pulp production in the pulp mill. Biomass consumption (both types) in the power plant was also verified by an annual energy balance of the power plant.

Data / Parameter:	**Moisture content of the biomass residues**
Data unit:	(%) of water content (humid basis).
Description:	Moisture content of each biomass residue type k.
Measured /Calculated /Default:	Measured
Source of data:	Water content of black liquor is determined by refract meters installed in the pipes that carry the black liquor to the recovery boiler. Additional humidity measurements are carried out (in parallel to the previous one) consisting in taking black liquor samples and determining the solid content in a laboratory, at the pulp mill site. The Superintendence of Electro Control is responsible for the maintenance and operation of the refract meters. The Superintendence of Liquor is responsible of the black liquor sampling, while the Technical Superintendence is responsible for the execution of the solid-content analysis. The biomass from forest operations moisture is monitored and registered by taking daily biomass samples from the feed flow of biomass entering to the power boiler. Humidity content is calculated by evaporating the water of the samples and measuring the weight before and after the water has been evaporated. This process is carried out in dedicated scales. The Superintendence of Liquor is in charge of taking the biomass samples, while the Technical Superintendence is

	responsible for carrying out the humidity content analysis in a lab inside the pulp mill facility.
Value(s) of monitored parameter:	Black liquor: This biomass type is directly measured in dry-solid terms (tDs, "tons of dry solids"). Biomass from forest ops.: Moisture content of the biomass from forest ops: 64.86% (wet basis).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions and project emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Black liquor: 352DT435A Type: Refractometer. K-PATENTS IT-RE-GP Accuracy class: +/- 0.1% Serial number: 2002-D42-5099 Calibration frequency: 2 Years Calibration dates: 26/04/2009 - 17/03/2010 Date of last calibration: 19/10/2010 Validity: 18/10/2012 352DT435B Type: Refractometer. K-PATENTS IT-RE-GP Accuracy class: +/- 0.1% Serial number: 2002-D43-5100 Calibration frequency: 2 Years Calibration dates: 26/04/2009 - 17/03/2010 Date of last calibration: 21/10/2010 Validity: 20/10/2012 Biomass from forest operations 310-81-1150 Type: Digital Scale. METTLER TOLEDO PG12001 Accuracy class: +/- 0.1 g Serial number: 1122192799 Calibration frequency: 6 Months Calibration dates: 21/10/2009 - 18/01/2010 - 16/04/2010 - 19/07/2010 Date of last calibration: 15/04/2011 Validity: 14/10/2011 310-81-1151 Type: Digital Scale. METTLER TOLEDO PG12001 Accuracy class: +/- 0.1 g Serial number: 1122192802 Calibration frequency: 6 Months Calibration dates: 20/10/2009 - 18/01/2010 - 19/04/2010 - 19/07/2010 Date of last calibration: 18/04/2011 Validity: 17/10/2011 310-81-1213 Type: Digital Scale. METTLER TOLEDO AB-204 Accuracy class: +/- 0.1 mg Serial number: 1126350159 Calibration frequency: 6 Months

	Calibration dates: 29/10/2009 - 28/01/2010 - 05/03/2010 - 02/08/2010 Date of last calibration: 27/04/2011 Validity: 26/10/2011 310-81-1154 Type: Drying Oven. MEMMERT ULE700 Accuracy class: +/- 1 °C Serial number: G703.0095 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 310-81-1155 Type: Drying Oven MEMMERT ULE700 Accuracy class: +/- 1 °C Serial number: G703.0096 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 310-81-1156 Type: Drying Oven. MEMMERT ULE700 Accuracy class: +/- 1 °C Serial number: G703.0098 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments.
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	Moisture content measurements were continuously carried out for both biomass types. In case of biomass from forest operations, measurements were carried out several times each month. In case of black liquor, the solid content of biomass was continuously measured by on-line meters. These measurements were verified with some laboratory analysis as well. All instruments received periodic maintenance and calibration according to the manufacturer and/or proper industry standards.

Data / Parameter:	**$EF_{CH4,BF}$**
Data unit:	(tCH_4/GJ)
Description:	CH_4 emission factor for the combustion of biomass residues in the project plant.
Measured /Calculated /Default:	Default
Source of data:	The IPCC default factors are applicable for calculating the CH_4 emission from additional biomass from forest operation consumption. This project emission is calculated as per the equations of the baseline scenario N° 3 of the ACM0006 (Version 05) There are no baseline and project emissions associated to black liquor consumption in this case, since its consumption and burning conditions are the same under the baseline and the project scenarios. This was part of the request for deviation presented for the Valdivia project.
Value(s) of monitored parameter:	30.0 (Kg CH4/TJ) or 0.00003 (tCH4/GJ) for biomass from forest operations, with an associated conservativeness factor of 1.02. This

	results in an adjusted default emission factor of 30.6 (Kg CH4/TJ) or 0.0000306 (tCH4/GJ). The reasons for which the 1.02 conservativeness factor was chosen in this case can be found in section B.6 of the registered PDD.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	In this case, the Project Proponent is using the default factors provided by the ACM0006 (Version 05). The Project Proponent compared this emission factor with other CH_4 emission factor measurements in other boilers of similar technology (fluidized bed boilers) and found that the actual CH_4 concentration in the boiler flue gases was below of that of clean air. In other words the combustion of this type of biomass in a fluidized bed boiler is so efficient that the combustion process in the boiler actually reduces the CH_4 from the clean air (negative project emissions). According to this, the use of a positive CH_4 emission factor in this case ensures the conservativeness in the calculation of the corresponding project emission.

Data / Parameter:	**AVD_y**
Data unit:	(Km)
Description:	Average round trip distance (from and to) between biomass fuel supply sites and the project site.
Measured /Calculated /Default:	Measured
Source of data:	The Superintendence of Fiber determines the distance from biomass supply centers to the pulp mill by from information provided by the transportation subcontractors. The average distance in a period of time (i.e. month) is determined by calculating a weighted average distance considering the amount of biomass and the distance from which each supply center provides biomass to the mill.
Value(s) of monitored parameter:	92.6. km on average (round trip). This is a weighted average (considering round trip distance and the amount of biomass from third parties) since the round trip distance is reported on a monthly basis for emission reduction calculation
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration	Not applicable.

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	The average distance in a period of time (i.e. month) is determined by calculating a weighted average distance considering the amount of biomass and the distance from which each supply center provides biomass to the mill.
QA/QC procedures applied:	Biomass residues from forest operations are mostly brought from known suppliers which have known locations (e.g. road distances to the plant are also known). The Project Proponent verifies the accuracy of distance records using roadmaps.

Data / Parameter:	**N_y**
Data unit:	Nº of trips per month.
Description:	Number of truck trips for the transportation of biomass.
Measured /Calculated /Default:	Calculated
Source of data:	The Superintendence of Fiber monitors and records each raw material dispatched to the mill. This information is stored in the mill's information system and the person in charge of reporting this information extracts the number of trucks that arrived to the mill with biomass fuels (biomass from forest operations) and reports this information to the person in charge of calculating the emissions reductions of the project activity in Arauco Bioenergía S.A.(ex-Arauco Generación S.A.).
Value(s) of monitored parameter:	2,801 round trips.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	Since TL_y and the transported biomass to the plant were monitored, this variable was actually calculated according to equation (4) of the ACM0006 (Version 05). For further details, please refer to the emission reduction calculation section of this Monitoring Report.
QA/QC procedures applied:	The Project Proponent verified the consistency of this variable with the quantity of biomass combusted (e.g. by the relation with previous years).

Data / Parameter:	**TL_y**
Data unit:	(ton/truck)
Description:	Average truckload of the trucks used for the transportation of biomass from forest operations to the pulp mill.
Measured /Calculated /Default:	Measured
Source of data:	The Superintendence of Fiber monitors this variable by measuring the truckloads at the project mill's weighbridges. The value is determined by calculating a weighted average value of the truckloads in tons for

	the trucks that deliver biomass from forest operations to the pulp mill. This variable is monitored continuously and aggregated monthly.
Value(s) of monitored parameter:	24.8 (ton/truck). This is a weighted average (considering truckload of the trucks and the amount of biomass from third parties) since the truck loads are reported on a monthly basis for emission reduction calculation
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	330-WT-050 Type: Weighbridge #1 South METTLER TOLEDO JAGXTREME Accuracy class: +/- 30 kg Serial number: 5311768-5HD Calibration frequency: 1 Year Calibration dates: 06/10/2009 - 09/05/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2011 330-WT-051 Type: Weighbridge #2 Center METTLER TOLEDO JAGXTREME Accuracy class: +/- 30 kg Serial number: 5311767-5HD Calibration frequency: 1 Year Calibration dates: 06/10/2009 - 09/05/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2011 330-WT-052 Type: Weighbridge #3 North METTLER TOLEDO JAGXTREME Accuracy class: +/- 30 kg Serial number: 5311771-5HD Calibration frequency: 1 Year Calibration dates: 06/10/2009 - 09/05/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2011
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Truckloads of each biomass supplier is known in advance and duly registered by the Procurement department. In addition to this, trucks are weighed at the entrance of the pulp mill. The weighbridges at the pulp mill receive periodic maintenance and calibration according to proper industry standards. It must be noted that in some cases proper maintenance and calibration of weighbridges is also a requirement of the local national authority.

Data / Parameter:	**$EF_{km,CO2,y}$**
Data unit:	(tCO_2/km)
Description:	Average CO_2 emission factor for the trucks during year y.
Measured /Calculated /Default:	Calculated

Source of data:	The Project Proponent determines the fuel type and the fuel truck performance (km/lts) from the transportation companies. Then, the Project Proponent calculates CO_2 emissions from fuel consumption by multiplying with appropriate net calorific values and CO_2 emission factors. For net calorific values and CO_2 emission factors, the Project Proponent uses reliable national default values or, if not available, (country-specific, if available) IPCC default values. Alternatively, the Project Proponent might use emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range).
Value(s) of monitored parameter:	1.271 ($kgCO_2$/km).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	This variable is monitored at least annually.
Calculation method (if applicable):	$EF_{km,diesel}$= NCV_{diesel} *Carbon content of diesel* Fraction of carbon oxidized* CO2 / C conversion factor * Diesel Fuel density /Average fuel performance of trucks.
QA/QC procedures applied:	The Project Proponent verified the truck performance with data from fuel invoices from trucking companies whenever the information was available and the comparison was possible. In addition, the Project Proponent, cross-checked the monitored data with emission factors referred to in the literature.

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	(tCO_2/GJ)
Description:	CO_2 emission factor for fossil fuel type i.
Measured /Calculated /Default:	Default/Calculated
Source of data:	No direct measurements are carried out for this factor, since IPCC default factors are used.
Value(s) of monitored parameter:	Diesel: 0.07407 (tCO_2/GJ). Fuel oil: 0.07737 (tCO_2/GJ).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Anually
Calculation method (if applicable):	$COEF_{CO2,diesel}$= NCV_{diesel} *Carbon content of diesel* Fraction of carbon oxidized* CO2 / C conversion factor

	$COEF_{CO2,fuel\ oil}$ = $NCV_{fuel\ oil}$ *Carbon content of fuel oil * Fraction of carbon oxidized* CO2 / C conversion factor
QA/QC procedures applied:	The Project Proponent used the most updated IPCC default factors to calculate the fossil fuel coefficients.

Data / Parameter:	**$FF_{project\ plant,i,y}$**
Data unit:	(ton/year)
Description:	Quantity of fossil fuel type i combusted in the biomass residue fired power plant during the year y.
Measured /Calculated /Default:	Measured
Source of data:	Fossil fuel consumption in the power and recovery boilers is measured using on-line coriolis mass flow meters and verified against purchases and tank level indicators. In the case of flow meters, the information is registered on-line by the pulp mill's DCS and recorded in databases. The pulp mill operator keeps constant track of the reasons for burning fossil fuels in both boilers (e.g. fossil fuel consumption used to enhance surplus power generation to the grid). The Superintendence of Liquor is responsible for collecting this information and for sending it periodically to the person in charge of calculating the emissions reductions of the project activity in Arauco Bioenergía S.A.(ex-Arauco Generación S.A.). Note that in this case, the fossil fuel consumption shown here is the one related to the implementation of the project activity. This is explained in detail in section B.6.1 of the PDD.
Value(s) of monitored parameter:	990.2 (ton) of Fuel Oil burned in the recovery boiler. 3,210.2 (ton) of Fuel Oil burned in the power boiler.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	352FT653 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010822 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 352FT657 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010807 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 352FT681 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010892 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 352FT685

	Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3012133 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 352FT823 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3011047 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 363FT507 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010656 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 363FT510 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010755 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 363FT515 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3012292 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments. 363FT518 Mass Flow Transmitter MICROMOTION 2700R11EBASZAZ Accuracy class: +/- 0.5% Serial number: 3010764 Calibration frequency: Calibration is not required; however, periodics verifications are done for these instruments.
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	The project proponent performed consistency checks through fossil fuel consumption calculation (purchases plus stock differences) and / or energy balance calculations.

Data / Parameter:	**$FF_{project\ site,i,y}$**
Data unit:	(ton)
Description:	Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y.
Measured /Calculated /Default:	Measured
Source of data:	This fuel amount is determined considering the total fuel consumed for on-site transportation of biomass residues from forest operations

	(sawdust and bark). The total fuel amount is reported by the front loader operator (or the corresponding subcontractor) to the person in charge of reporting this information for the calculation of the project activity emission reductions.
Value(s) of monitored parameter:	39.9 (ton) of diesel.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The Project Proponent carried out consistency checks based on monthly or annual operational indices (e.g. check whether front loader fossil fuel consumption divided by the operation hours results in a reasonable index, comparable to the ones observed in previous years).

Data / Parameter:	**$EG_{project\ plant,y}$**
Data unit:	(GWh)
Description:	Net quantity of electricity generated in the project plant during the year y.
Measured /Calculated /Default:	Measured
Source of data:	Electric meters that measure the voltage and current continuously monitor the total electric power generation at the mill. This information is stored in the DCS[5] databases of the pulp mill. The Superintendence of Liquor is responsible to process (i.e. integrate) this information and to send it periodically to the person in charge of calculating the emission reductions of the project activity in Arauco Bioenergía S.A.(ex-Arauco Generación S.A.).
Value(s) of monitored parameter:	584.8(GWh).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	368JI101 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0211A-633-11 Calibration frequency: 7 Years Date of penultimate calibration: 27/11/02 Date of last calibration: 24/04/09 Validity: 23/04/2016 368JI102 Type: Energy Meter POWER MEASUREMENT ION7300

[5] DCS stands for Distributed Control System.

	Accuracy class: +/- 0.5% Serial number: PA-0211A-626-11 Calibration frequency: 7 Years Date of penultimate calibration: 27/11/02 Date of last calibration: 23/04/09 Validity: 22/04/2016 368JI104 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0211A-632-11 Calibration frequency: 7 Years Date of penultimate calibration: 28/11/02 Date of last calibration: 21/04/09 Validity: 20/04/2016 368JI105 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0212A-006-11 Calibration frequency: 7 Years Date of penultimate calibration: 02/12/02 Date of last calibration: 21/04/09 Validity: 20/04/2016 368JI107 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0211A-611-11 Calibration frequency: 7 Years Date of penultimate calibration: 27/11/02 Date of last calibration: 22/04/09 Validity: 21/04/2016 368JI201 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0212A-205-11 Calibration frequency: 7 Years Date of penultimate calibration: 04/12/02 Date of last calibration: 24/04/09 Validity: 23/04/2016 368JI203 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0212A-044-11 Calibration frequency: 7 Years Date of penultimate calibration: 04/12/02 Date of last calibration: 24/04/09 Validity: 23/04/2016 368JI205 Type: Energy Meter POWER MEASUREMENT ION7300 Accuracy class: +/- 0.5% Serial number: PA-0212A-045-11 Calibration frequency: 7 Years

	Date of penultimate calibration: 04/12/02 Date of last calibration: 23/04/09 Validity: 22/04/2016
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	All electricity meters received maintenance and calibration according proper industry standards. The consistency of metered net electricity generation was crosschecked with receipts from electricity sales (whenever available) and historic operational indices of the mill. In addition, the Project Proponent also verified that the total electric power generated was consistent with the energy balance of the biomass power plant.

Data / Parameter:	$\mathbf{Q}_{\text{project plant,y}}$
Data unit:	(GJ)
Description:	Net quantity of heat generated from firing biomass in the project mill.
Measured /Calculated /Default:	Measured
Source of data:	High-pressure steam generated at the project plant is measured as well as the total heat to process from the turbogenerator extractions. The process heat that would have been generated by the power boiler in the baseline case scenario is calculated multiplying the fraction of total high-pressure steam (% of tons) generated by the power boiler in the project plant by the total process heat (GJ) obtained from the turbogenerator extractions. This algorithm was part of the request for deviation presented with the Valdivia project activity and was approved by the Executive Board. The Superintendence of Liquor is in charge of monitoring this variable. A mill operator is in charge of aggregating and sending this information to Arauco Bioenergía S.A.(ex-Arauco Generación S.A.), where it is used in the emission reduction calculation. This variable is monitored continuously and aggregated monthly.
Value(s) of monitored parameter:	1,155,191 (GJ) of heat generated in the power boiler.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	365FT901 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 6408030356 Calibration frequency: 3 Years Calibration dates: 09/06/2009 - 05/05/2010 Date of last calibration: 01/12/2010 Validity: 30/11/2013

	365FT902 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 5003010902 Calibration frequency: 3 Years Calibration dates: 23/04/2009 - 04/05/2010 Date of last calibration: 30/11/2010 Validity:29/11/2013 365FT910 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 5003010903 Calibration frequency: 3 Years Calibration dates: 22/04/2009 - 22/04/2010 Date of last calibration: 30/11/2010 Validity:29/11/2013 365FT913 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 5003010904 Calibration frequency: 3 Years Calibration dates: 22/04/2009 - 22/04/2010 Date of last calibration: 30/11/2010 Validity:29/11/2013 365FT914 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 6404025150 Calibration frequency: 3 Years Calibration dates: 22/04/2009 - 26/04/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2013 365FT920 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 5003010906 Calibration frequency: 3 Years Calibration dates: 22/04/09 - 27/04/10 Date of last calibration: 30/11/2010 Validity:29/11/2013 365FT923 Type: Differential Pressure Flow Transmitter ABB 2600T Accuracy class: +/- 0.075% Serial number: 5003010907 Calibration frequency: 3 Years Calibration dates: 23/04/09 - 23/04/10 Date of last calibration: 30/11/10 Validity:29/11/2013 365FT924 Type: Differential Pressure Flow Transmitter ABB 2600T

	Accuracy class: +/- 0.075% Serial number: 5003010908 Calibration frequency: 3 Years Calibration dates: 22/04/2009 - 23/04/2010 Date of last calibration: 30/11/2010 Validity: 29/11/2013 362PT980 Type: Pressure Transmitter ROSEMOUNT 3051S2TG4A2E11F1AAO1B4 Accuracy class: +/- 0.025% of span Serial number: 0075788 Calibration frequency: 5 Years Calibration dates: 23/04/09 - 27/04/10 Date of last calibration: 30/11/10 Validity:29/11/2015 362TT965 Type: Temperature Transmitter ROSEMOUNT 3244MV Accuracy class: +/- 0.10 °C Serial number: 430676 Calibration frequency: 1 Year Date of penultimate calibration: 12/06/2009 Date of last calibration: 09/06/2010 Validity:08/06/2011
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	The algorithm used is shown in the section E.1 Baseline emissions calculation
QA/QC procedures applied:	All relevant heat meters received maintenance and calibration according to proper industry standards. In addition, the Project Proponent checked the consistency of metered heat flows with a monthly / annual energy balance of the project power plant and with historical operational indices of the mill.

Data / Parameter:	**NCV_i**
Data unit:	(GJ/ton)
Description:	Net calorific value of the fossil fuel type i.
Measured /Calculated /Default:	Measured
Source of data:	The Technical Superintendence requests reputed local laboratories to determine the net calorific values of the fossil fuels used in the plant. Alternatively, the Superintendence can evaluate the possibility of carrying out these measurements on site, in the pulp mill laboratory. In all cases, these measurements are carried out according to proper industry standards. In case the above is not feasible, fuel supplier's information is used instead, since they normally carry out net calorific measurements of all the fuels they sell. This parameter is part of the specifications of the fuel that is sold to the mill. Monitoring frequency: In case of direct measurements, at least every six months, taking at least three samples for each measurement. In

	case of other data sources: Review the appropriateness of the data annually.
Value(s) of monitored parameter:	First semester measurements: Diesel: 42.99(GJ/ton) Fuel Oil: 40.74 (GJ/ton) Second semester measurements: Diesel: 42.82(GJ/ton) Fuel Oil: 40.60 (GJ/ton)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Every six months, taking at least three samples for each measurement
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The Project Proponent checked the consistency of measurements with similar data of other CDM biomass projects in Chile, with local / national data and with default values by the IPCC. The used values were found to be correct.

Data / Parameter:	**NCV_k**
Data unit:	(GJ/ton)
Description:	Net calorific value of biomass residue type k.
Measured /Calculated /Default:	Measured
Source of data:	The Technical Superintendence carries out measurements at reputed local laboratories and according to relevant international standards. Alternatively, the Superintendence can evaluate the possibility of carrying out these measurements on site, in the pulp mill laboratory. Measurements of NCV are all based on dry biomass and are carried out according to proper industry standards. Monitoring frequency: This variable is monitored at least every six months, taking at least three samples for each measurement.
Value(s) of monitored parameter:	First semester measurements: Black liquor: 12.01 (GJ/ton) Sawdust & bark mix: 16.53 (GJ/ton) Second semester measurements: Black liquor: 12.22 (GJ/ton) Sawdust & bark mix: 18.83 (GJ/ton)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and Project emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last	Not applicable

calibration, validity)	
Measuring/ Reading/ Recording frequency:	Every six months, taking at least three samples for each measurement
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The Project Proponent checked the consistency of the measured values with measurements of previous years, similar measurements in other biomass CDM projects, values in the literature and default values by the IPCC. In this case, the measured values were consistent with all the references pointed out above. All NCV were determined on dry biomass.

Data / Parameter:	**$EF_{burning,CH4,k,y}$**
Data unit:	(tCH4/GJ)
Description:	CH4 emission factor for uncontrolled burning of the biomass residue type k during year y.
Measured /Calculated /Default:	Measured
Source of data:	According to the registered PDD, the Project Proponent should use the default factor provided in page 42/63 of the baseline methodology. Though the Project Proponent originally intended to use measured values for this variable, an accurate and representative value was not available at the starting date of the project activity. As a result, the Project Proponent had to use the default emission factors provided in the baseline methodology. However, in order to accomplish a higher accuracy in the baseline emission calculations, the Project Proponent conducted a local measurement of this factor in March, 2009 in order to replace the default factors provided in the methodology for more accurate and specific emission factors.
Value(s) of monitored parameter:	Biomass residues from forest operations (sawdust and bark mix from sawmills, pulp mills, etc.): 0.0008742 (tCH_4/GJ) or 874.2 (Kg CH_4/TJ). This value includes the adjustment of a conservativeness factor of 0.94
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The Project Proponent made sure to carry out the measurements under conditions that led to very conservative and representative CH_4 emission factors. The results were fully consistent with past measurements carried out by the Project Proponent and also with emission factors found in the literature. For more details, please see the measurement report issued by the USDA Forest Service, who was the entity that carried out the measurements.

Data / Parameter:	ε_{boiler}
Data unit:	**(%)**
Description:	Average net energy efficiency of heat generation in the boiler that would generate heat in the absence of the project activity.
Measured /Calculated /Default:	Measured
Source of data:	Measurements carried out by Arauco according to ASME PTC 4.1 standard .
Value(s) of monitored parameter:	85%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	This efficiency value was determined based on the efficiency calculation of a real low-pressure boiler installed in one of the Arauco industrial facilities. The efficiency was calculated in accordance with the ASME PTC 4.1 standard and was further validated by an expert opinion from a highly reputed consulting company, in the field of heat and power generation.

Data / Parameter:	--
Data unit:	(m^3st)
Description:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region.
Measured /Calculated /Default:	Calculated
Source of data:	Arauco Generación S.A. is responsible for carrying out the necessary research and studies. This variable is monitored annually.
Value(s) of monitored parameter:	See table in the leakage section of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Not applicable.

QA/QC procedures applied:	The relevant biomass quantities were obtained from multiple official sources and the values were crosschecked, whenever possible.

Data / Parameter:	--
Data unit:	(m^3st)
Description:	Quantity of available biomass residues of type k in the region.
Measured /Calculated /Default:	Calculated
Source of data:	Arauco Generación S.A. is responsible for carrying out the necessary research and studies. This variable is monitored annually.
Value(s) of monitored parameter:	See table in the leakage section of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	The relevant biomass quantities were obtained from multiple official sources and the values were crosschecked, whenever possible.

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	(MWh/yr).
Description:	On-site electricity consumption attributable to the project activity during the year y.
Measured /Calculated /Default:	Measured
Source of data:	There was no on-site electricity consumption attributable to the project activity during the monitored period.
Value(s) of monitored parameter:	0 (MWh/yr).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Continuously
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	There was no on-site electricity consumption attributable to the project activity during the monitored period.

Data / Parameter:	**$EF_{grid,y}$**
Data unit:	(tCO_2/MWh)
Description:	CO_2 emission factor for grid electricity during the year y-
Measured /Calculated /Default:	Calculated.
Source of data:	Relevant dispatch center, electric power companies' public information, host country government official information and IPPC values.
Value(s) of monitored parameter:	905.8 (tCO_2/GWh)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Calculated using equation N° 10 of the ACM0002 (Version 06), as the average of the OM and BM emission factors. The calculation of this emission factor is in the Annex of this Monitoring Report.
QA/QC procedures applied:	The Project Proponent applied the procedures in ACM0002. All the information for calculating the grid emission factor came from official sources: CDEC SIC dispatch data and power generators company information.

Data / Parameter:	**EG_y**
Data unit:	(GWh).
Description:	Electricity supplied to the grid by the project during the year y.
Measured /Calculated /Default:	Calculated
Source of data:	According to the registered PDD, this variable is determined according to a modified version of equation Nº 14 of the ACM0006 (Version 05). This modification was part of the request for deviation presented with the Valdivia project activity and was approved by the Executive Board.
Value(s) of monitored parameter:	103.6. (GWh).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	This variable is determined according to a modified version of equation Nº 14 of the ACM0006 (Version 05).
QA/QC procedures applied:	The Project Proponent verified the accuracy of the electricity supplied

	by the project activity to the grid with the corresponding receipts of sales. In addition, this value was also checked against the monthly global electricity balance carried out by the CDEC-SIC dispatch Center.

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	(tCO_2/GWh)
Description:	CO_2 Operating Margin emission factor of the grid.
Measured /Calculated /Default:	Calculated
Source of data:	Relevant dispatch center, electric power companies' public information, host country government official information and IPPC values.
Value(s) of monitored parameter:	896.8 (tCO_2/GWh)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	In this case, the OM emission factor is calculated using the simple – adjusted method equation, N° 4 of the ACM0002 (Version 06). The justification for the chosen OM calculation method is presented in detail in page 48 of the registered PDD. All the information required for the calculation of this emission factor is provided in the Annex of this Monitoring Report.
QA/QC procedures applied:	The Project Proponent applied the procedures in ACM0002. All the information for calculating the OM grid emission factor came from official sources: CDEC SIC dispatch data and power generators company information. The data and results were found consistent with other official statistics and studies (e.g. IEA studies).

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	(tCO_2/GWh)
Description:	CO_2 Build Margin emission factor of the grid.
Measured /Calculated /Default:	Calculated.
Source of data:	Relevant dispatch center, electric power companies' public information, host country government official information and IPPC.
Value(s) of monitored parameter:	914.8 (tCO_2/GWh)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration	Not Applicable.

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	This variable is calculated according to equation N° 9 of the ACM0002 (Version 06). All the information required for the calculation of this emission factor is provided in the Annex of this Monitoring Report. This variable is monitored annually.
QA/QC procedures applied:	The Project Proponent applied the procedures in ACM0002. All the information for calculating the BM grid emission factor came from official sources: CDEC SIC dispatch data and power generators company information. The data and results were found consistent with other official statistics and studies (e.g. IEA studies).

Data / Parameter:	**$F_{i,y}$**
Data unit:	See tables in the Annex, at the end of this Monitoring Report.
Description:	Amount of each fossil fuel consumed by each power source / plant.
Measured /Calculated /Default:	Measured
Source of data:	Relevant dispatch center, electric power companies' public information and host country government official information.
Value(s) of monitored parameter:	See tables in the Annex, at the end of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	All the information came from official sources: CDEC SIC dispatch data and power generators company information. The data and results were found consistent with other official statistics and studies (e.g. IEA studies).

Data / Parameter:	**$COEF_i$**
Data unit:	Units in (tCO_2/000ton) except Nat. Gas (tCO_2/MMm^3)
Description:	Emission factor coefficient of each fossil fuel type consumed by each power plant / source in the relevant grid.
Measured /Calculated /Default:	Calculated.
Source of data:	This factor was calculated using IPCC default values (Carbon content and fraction of carbon oxidized) and local national data (Net calorific values of the corresponding fossil fuels).
Value(s) of monitored parameter:	Coal: 2,814 (tCO_2/000ton) Petcoke: 2,857 (tCO_2/000ton) Diesel: 3,378 (tCO_2/000ton)

	Nat. Gas: 2,193 (tCO_2/MMm^3) IFO 180: 3,401 (tCO_2/000ton)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	$COEF_{CO2,i}$= NCV_i *Carbon content of fuel type i * CO_2 / C conversion factor
QA/QC procedures applied:	The Project Proponent used information from official sources: CNE (National Energy Commission), CDEC SIC dispatch data and power generators company information. The data and results were found consistent with other official statistics and studies (e.g. IEA studies, national GHG inventories, etc.).

Data / Parameter:	**$GEN_{j/k/n,y}$**
Data unit:	(MWh) See tables in the Annex, at the end of this Monitoring Report.
Description:	Electricity generation of each power source / plant j, k or n.
Measured /Calculated /Default:	Measured
Source of data:	This information was directly obtained by the CDEC-SIC Dispatch Center.
Value(s) of monitored parameter:	See tables in the Annex, at the end of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	The Project Proponent used official data from the CDEC-SIC dispatch center. The data was found to be consistent with official studies (e.g. IEA, etc.).

Data / Parameter:	--
Data unit:	(Text)
Description:	Identification of power source / plant for the OM.
Measured /Calculated /Default:	Determined based on official data.
Source of data:	This information was directly obtained by the CDEC-SIC Dispatch Center.
Value(s) of monitored	Please see the tables for the OM calculation provided in the Annex, at

parameter:	the end of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	The Project Proponent used official data from the CDEC-SIC dispatch center. The data was found to be consistent with official studies (e.g. IEA, etc.).

Data / Parameter:	--
Data unit:	Text.
Description:	Identification of power source / plant for the BM.
Measured /Calculated /Default:	Determined based on official data.
Source of data:	This information was directly obtained by the CDEC-SIC Dispatch Center.
Value(s) of monitored parameter:	Please see the tables for the BM calculation provided in the Annex, at the end of this Monitoring Report.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	The Project Proponent used official data from the CDEC-SIC dispatch center. In some cases that information was complemented with specific power company information. The data was found to be consistent with official studies (e.g. IEA, etc.).

Data / Parameter:	λ_y
Data unit:	(Number)
Description:	Fraction of time during which low-cost / must-run sources are on the margin.
Measured /Calculated /Default:	Calculated.
Source of data:	This factor was calculated from information directly obtained from the CDEC-SIC Dispatch Center.
Value(s) of monitored parameter:	0.006506849
Indicate what the data are	Baseline emission calculations.

used for (Baseline/ Project/ Leakage emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	As per the corresponding methodology (ACM0002).
QA/QC procedures applied:	The Project Proponent followed the calculation procedures of the ACM0002.

Data / Parameter:	**$GEN_{j/k/ll,y\ IMPORTS}$**
Data unit:	(KWh)
Description:	Electricity imports to the project electricity system.
Measured /Calculated /Default:	Not applicable.
Source of data:	This information was directly obtained by the CDEC-SIC Dispatch Center.
Value(s) of monitored parameter:	0 (KWh).To date, the SIC system is not interconnected with any other transmission system, either of Chile or of any other country.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.
QA/QC procedures applied:	To date, the SIC system is not interconnected with any other transmission system, either of Chile or of any other country.

Data / Parameter:	**$COEF_{j/k/ll,y\ IMPORTS}$**
Data unit:	(tCO_2/ton) or (tCO_2/m^3)
Description:	CO_2 emission coefficient of fuels used in connected electricity systems (if imports occur).
Measured /Calculated /Default:	Not applicable
Source of data:	This information was directly obtained by the CDEC-SIC Dispatch Center.
Value(s) of monitored parameter:	0 (tCO_2/ton) or 0 (tCO_2/m^3) .Since there are no imports in the SIC, this variable is currently not used in the emission reduction calculation.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial	Not applicable

number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Not applicable
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	To date, the SIC system is not interconnected with any other transmission system, either of Chile or of any other country.

Data / Parameter:	**$EF_{CO2,LE}$**
Data unit:	(tCO_2/GJ)
Description:	CO_2 emission factor of the most carbon intensive fuel used in the country.
Measured /Calculated /Default:	Default:
Source of data:	The most carbon intensive fuel type can be obtained from official national communication sources (e.g. CNE, CDEC-SIC). In case such information is not available, IPCC default values will be used instead.
Value(s) of monitored parameter:	Since leakage was 0 during the monitored period, this parameter was not considered in the corresponding emission reduction calculation.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Not applicable
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The Project Proponent had no need to use this variable, since it was possible to show that the project activity did not cause leakage in the influence area of the power plant.

SECTION E. Emission reductions calculation

Please note the following:

- Differences in baseline and project emission calculations included in tables below are due to the fact that all calculations are done directly in excel spreadsheets, which implies a decimal precision that is not carried over onto word formatted tables because decimals are truncated and rounded down. Exact resulting values can be viewed directly in emission reduction calculation spreadsheet.

E.1. Baseline emissions calculation

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1. Baseline emissions due to electricity displacement

In this case, the Project Proponent is supposed to use a modified version of equation N° 14 of the ACM0006 (Version 05) to determine the net quantity of increased electricity as a result of the project activity. This modification was part of a request for deviation that pursued the simultaneous application of baseline scenarios N° 3 and N° 4 to this project activity, which was approved by the Executive Board in December 13th, 2007.

$$EG_y = EG_{project\ plant} - \varepsilon_{el,other\ plant\ (s)} * \left(\frac{1}{3.6}\right) * \sum (BF_{k,y} * NCV_k)$$

Where:

EG_y :	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during year y (MWh).
$EG_{project\ plant}$:	Net quantity of electricity generated in the project plant during year (MWh)
$\varepsilon_{el,\ other\ plant(s)}$:	Average net energy efficiency of electricity generation in (the) other power plant(s) that would use the biomass residues fired in the project plant in the absence of the project activity ($MWh_{el}/MWh_{biomass}$).
$BF_{k,y}$:	Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or litter)
NCV_k :	Net calorific value of the biomass residue type k (GJ/ton of dry matter of GJ/liter).

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

Data:

(1) Gross electricity generated by the project plant	600.6 (GWh/yr)
(2) Total internal electricity consumption	373.7 (GWh/yr)
(3) Additional power consumption percentage due to the project activity	4.22 (%)
(4) Average net energy efficiency of electricity generation in the baseline plant	12.09 (%)
(5) Quantity of black liquor combusted in the project plant (dry basis)	1,010,715 (tDS/yr)
(6) Quantity of biomass from forest ops. combusted in the project scenario (dry basis)	117,787 (BDt/yr)
(7) Net calorific value of black liquor (dry basis) (See note)	12.12(TJ/000ton)
(8) Net calorific value of biomass from forest operations (dry basis) (See note)	17.67(TJ/000ton)

Note: Net calorific values of biomass must be monitored twice a year. For simplicity,a weighted average (considering net calorific values and the amount of biomass) was used here.

Calculations:

(9) Net electricity generated by the project plant	(1)-(2)*(3)	584.8 (GWh/yr)
(10) Electric power generated in the baseline mill	(4)*((5)*(7)+(6)*(8))* (1/3,600)	481.2 (GWh/yr)
(11) Net quantity of increased electricity due to p.a.	**(9)-(10)**	103.6 (GWh/yr)

Using the values of the net quantity of increased electricity generation and the CO_2 emission factor of the grid, it is possible to calculate the emission reductions due to displacement of electricity for the year 2009 using equation N° 9 of the ACM0006 (Version 05):

$$ER_{electricity\ ,y} = EG_y * EF_{electricity\ ,y}$$

Where:

EG_y : Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh).

$ER_{electricity,y}$: Emission reductions due to displacement of electricity during the year y (tCO_2/yr).

$EF_{electricity,y}$: CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh).

Data:

(1) Combined margin for the SIC grid in 2010	905.8(tCO2/GWh)
(2) Electricity displaced by the project activity	103.6 (GWh/yr)

Calculations:

(3) Total grid emission savings	**(1)*(2)**	**93.878(tCO2/yr)**

2. Baseline emissions due to burning of anthropogenic sources of biomass residues

To calculate this emission source, it is necessary first to calculate the quantity of biomass residues used as a result of the project activity. In this case, this is done using equation N° 30 of the ACM0006 (Version 05). As mentioned before, the proposed project activity only involves additional use of biomass from forest operations in the power boiler.

$$BF_{PJ,k,y} = BF_{k,y} - \frac{Q_{projectplant\ ,y}}{\varepsilon_{boiler} * NCV_k}$$

Where:

$BF_{PJ,k,y}$: Incremental quantity of biomass residue type k used as a result of the project activity in the project plant during the year y (tons of dry matter or liter).

$BF_{k,y}$: Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or liter).

$Q_{project\ plant,y}$: Quantity of heat generated in the cogeneration project plant from firing biomass residues during year y (GJ).

ε_{boiler} : Energy efficiency of the boiler that would be used in the absence of the project activity.

Since in the project mill, the power boiler and the recovery boiler generate high-pressure steam at the same thermodynamic conditions, the best way to determine the heat that is attributable to the power boiler, is to multiply the total amount of heat generated in the mill by the fraction of high-pressure steam generated by the power boiler with respect to the total high-pressure steam generated in the mill by both

boilers. This algorithm was part of the request for deviation approved by the Executive Board for the Valdivia project activity.

$$Q_{\text{project plant},y} = [(\text{HP Steam PB})/(\text{HP Steam PB} + \text{HP Steam RB})] * \text{Process heat}$$

Where:

HP Steam PB : Total high-pressure steam generated in the power boiler (tons/time unit).
HP Steam RB: Total high-pressure steam generated in the recovery boiler (tons/time unit).
Process heat : Total heat consumed in the pulping process (GJ/time unit).

Data:

(1) Total high-pressure steam generated by the recovery boiler	3.472.612 (ton)
(2) Total high-pressure steam generated by the power boiler	635.596 (ton)
(3) Total biomass residues from forest operations combusted in the power boiler.	117.787 (BDt)
(4) Net calorific value of biomass from forest operations (dry basis) (See note).	17,67 (GJ/ton)
(5) Quantity of process heat generated in the cogeneration project plant.	7.466.644 (GJ)
(6) Energy efficiency of the boiler used in the absence of the project activity.	85%

Note: Net calorific values of biomass must be monitored twice a year. For simplicity, a weighted average (considering net calorific values and the amount of biomass) was used here.

Calculations:

(7) Process heat attributable to the power boiler	[(2)/(1)+(2)]*(5)	1.155.191 (GJ)
(8) Biomass from forest operations used to generate heat	(7)/((4)*(6))	76.920(BDt/yr)
(9) Incremental biomass use	**(3)-(8)**	40.867 (BDt/yr)

With the above calculation, it is possible to calculate the baseline emissions due to uncontrolled burning of anthropogenic sources of biomass residues using equation N° 34 of the ACM0006 (Version 05):

$$BE_{\text{Biomass},y} = GWP_{CH4} * \sum BF_{PJ,k,y} * NCV_k * EF_{\text{burning},CH4,k,y}$$

Where,

$BE_{biomass,y}$: Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr).
GWP_{CH4} : Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4).
$BF_{PJ,k,y}$: Incremental quantity of biomass residue type k used as a result of the project activity in the project plant during the year y (tons of dry matter or liter).
NCV_k : Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter)
$EF_{burning,CH4,k,y}$: CH_4 emission factor for uncontrolled burning of the biomass residue type k during the year y (tCH_4/GJ).

Data:

(1) Additional biomass from forest operations due to the project activity	40,867 (BDt/yr)
(2) Adjusted CH_4 emission factor for uncontrolled burning of biomass (See note)	324 ($tCO_2/000ton$)

Note: The Project Proponent used an adjustment factor of 0.94 for the measured CH_4 emission factor. The adjustment factor was chosen following the indication of Table N° 6 of the ACM0006 (Version 05). Since the

emission factor must consider the NCV of the biomass which is measured twice a year, an average CH_4 emission factor was chosen here for simplicity.

Calculations:

(6) Emissions	**(1)*(2)* (ton/1000 kg)**	**13,256 (tCO_2eq)**

Total baseline emissions

Emission sources	(tCO_2eq)
Carbon dioxide emissions due to electricity displacement	93.878
Methane emissions due to uncontrolled biomass burning avoidance	13,256
Total	**107.134**

E.2. Project emissions calculation

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Project emissions are calculated through the following equation:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{Biomass\ ,CH4,y}$$

Where:

PET_y: CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2/yr).

$PEFF_y$: CO_2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO_2/yr).

$PE_{EC,y}$: CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO_2/yr).

GWP_{CH4}: Global Warming Potential for methane valid for the relevant commitment period.

$PE_{Biomass,CH4,y}$: CH_4 emissions from the combustion of biomass residues during the year y (tCH_4/yr).

1. Carbon dioxide emissions from biomass residues transportation to the power plant

This emission source is calculated using equation N° 4 of the ACM0006 (Version 05).

$$PET_y = \frac{\sum_k BF_{k,y}}{TL_y} * AVD_y * EF_{km,CO2,y}$$

Where:

PET_y: CO_2 emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2/yr)

N_y: Number of truck trips during the year *y*

AVD_y: Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year *y* (km)

$EF_{km,CO2,y}$: Average CO_2 emission factor for the trucks measured during the year *y* (tCO_2/km)

$BF_{k,y}$: Quantity of biomass residue type *k* combusted in the project plant during the year *y*
(tons of dry matter or liter)

TL_y: Average truck load of the trucks used (tons or liter)during the year y.

Data:

(1) Biomass attributable to the project and brought from 3rd parties (dry)	24,422 (BDt)
(2) Biomass average humidity (wet basis)	64.86 %
(3) Approximate load for 1 trip	24.8 (ton/truck)
(4) Average round trip between the biomass supply sites and the plant	92.6 (km)
(5) Emission factor for heavy truck transportation (See note)	1.271 ($kgCO_2$/km)

Note: This parameter was calculated using the Diesel CO_2 emission factor and the monitored performance index of the trucks (2.1 Km/lt), provided by the transportation subcontractors.

Calculations:

(6) Biomass transported (wet)	(1)/[1 – (2)]	69,501 (wet ton)
(7) Number of trips needed for the Plant per year	(6) / (3)	2,805 (trips)
(8) Total distance traveled, considering round trip	(4)*(7)	259,603 (km)
(9) Total emissions	**(5)*(8)* (1ton/1,000kg)**	**330 (tCO_2)**

2. Carbon dioxide emissions from on-site consumption of fossil fuels

This emission source is calculated using equation N° 6 of the ACM0006 (Version 05).

$$PEFF_y = \sum (FF_{project\ \ plant\ ,i,y} + FF_{project\ \ site\ ,i,y}) * NCV_i * COEF_i$$

Where:

$FF_{project\ plant,i,y}$: Quantity of fossil fuel type i combusted in the biomass residue fired power plant during the year y (mass or volume unit per year).

$FF_{project\ site,\ i,y}$: Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y (mass or volume unit per year).

NCV_i: Net calorific value of fossil fuel type i (GJ / mass or volume unit).

$COEF_i$: CO_2 emission factor for fossil fuel type i (tCO_2/GJ).

The proposed project activity implies additional fossil fuel consumption due to:

Fossil fuel consumption in the recovery boiler: In this case, the fossil fuel consumption associated to the project activity is related to additional electric power generation of the power plant.

Data:

(1) Fuel oil consumption due to power generation reasons	990.2 (ton)
(2) Fuel oil net calorific value (average)	40.67 (GJ/ton)
(3) CO_2 emission factor	0,07737 (tCO2/GJ)

Calculations:

(4) Total emissions	**(1)*(2)*(3)**	**3,116 (tCO_2)**

Fossil fuel consumption in the power boiler: In this case, there is fuel oil consumption associated to the project activity due to operational reasons and due to power generation reasons.

Data:

(5) Fuel oil used due to operational reasons	839.2 (ton)
(6) Fuel oil consumption due to power generation reasons	2,371.0 (ton)
(7) Fuel oil net calorific value (average)	40.67 (GJ/ton)
(8) CO_2 emission factor	0,07737 (tCO2/GJ)

Calculations:

(9) Total emissions	**[(5)+(6)]*(7)*(8)**	**10,101 (tCO_2)**

Fossil fuel consumption due to on-site biomass residues from forest operations transportation: This fossil fuel consumption is related to the transportation of the additional biomass from forest operation (mix of sawdust and bark) that is attributed to the project activity (e.g. generation of additional power).

Data:

(10) Diesel used in the transportation of the biomass residues	39.9 (ton)
(11) Diesel net calorific value (average)	42.90 (GJ/ton)
(12) CO_2 emission factor	0,07407 (tCO_2/GJ)

Calculations:

(13) Total emissions	**(10)*(11)*(12)**	**127 (tCO_2)**

Fossil fuel consumption due to on-site mechanical preparation of biomass: Since there was no mechanical preparation of biomass residues (sawdust and bark) during the monitored period, this emission source was nil.

According to the calculations above, the carbon dioxide emissions from on-site consumption of fossil fuels attributable to the implementation of the project activity can be summarized in the table below:

Carbon dioxide emissions from on-site consumption of fossil fuels	**(tCO_2)**
Fossil fuel consumption in the recovery boiler	3,116
Fossil fuel consumption in the power boiler	10,101
Fossil fuel consumption due to on-site biomass from forest operations transportation	127
Fossil fuel consumption due to on-site mechanical preparation of biomass	0
Total emissions	**13,344**

3. Carbon dioxide emissions from electricity consumption

This emission source is calculated using equation N° 7 of the ACM0006 (Version 05). However, during the monitored period, there was no electricity consumption associated to the project activity, therefore the total emissions related to this source is zero.

$$PE_{EC,y} = 0$$

4. Methane emissions from combustion of biomass residues

This emission source is calculated using equation N° 8 of the ACM0006 (Version 05).

$$PE_{Biomass\ ,CH\,4,y} = EF_{CH\,4,BF} * \sum BF_{k,y} * NCV_k$$

Where:

$BF_{k,y}$: Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or liter).

NCV_k : Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter).

$EF_{CH4,BF}$: CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ).

Since the project activity implies additional biomass from forest operations consumption in the power boiler, the only source of methane emissions attributed to the project activity is the one related to this additional consumption under controlled burning conditions.

Data:

(1) Biomass related to the project activity burned in the power boiler	40,867 (BDt)
(2) Net calorific value of biomass from forest operations (dry basis) (See note).	17.67 (GJ/ton)
(3) Biomass methane emission factor under controlled burning conditions	30.0 ($KgCH_4/TJ$)
(4) Conservativeness factor	1.02
(5) Global Warming Potential of CH_4	21

Note: Net calorific values of biomass must be monitored twice a year. For simplicity, an average was used here.

Calculations:

(6) Total emissions	**(1)*(2)*(1TJ/1,000GJ)*(3)*(4)*(5) *(1 ton/1,000kg)**	**464 (tCO_2eq)**

Total project emissions

Emission sources	(tCO_2eq)
Carbon dioxide emissions from biomass residues transportation to the power plant	330
Carbon dioxide emissions from on-site consumption of fossil fuels	13,344
Carbon dioxide emissions from electricity consumption	0
Methane emissions from combustion of biomass residues	464
Total	**14,138**

E.3. Leakage calculation

>>

Since the project activity contemplates the utilization of additional biomass from forest operations (sawdust and bark), it is required to assess if the project displaced current use of biomass as a fuel. If the project actually drove current users of biomass to resort to more carbon-intensive fuels, the emission related to that fuel must be deducted from the project's emission reductions.

There are two sources of biomass that can be used in the Valdivia biomass power plant:

1. Biomass from industrial operations, consisting basically in biomass generated by local sawmills. Currently, part of this biomass is used by the same sawmills for heat generation purposes, however, a considerable surplus still remains.

2. Biomass from forestry operations, consisting basically in operations of harvesting, pruning and thinning in managed forestlands. Currently this biomass has very little use.

Arauco performed a biomass availability study for 2010, using official bulletins from INFOR[6] as well as other (whenever available) official sources to calculate the biomass supply and demand in the Valdivia power plant influence area[7]. This study is part of the monitoring plan of the Valdivia project activity and was carried out according approach L2 of the baseline methodology. A detailed Excel spreadsheet with the monitored data and the calculation of the forest biomass supply / demand situation was provided to the DOE to establish the quality and validity of the data sources and the accuracy of the calculated numbers. The following table summarizes the results of this study:

Supply / Demand situation in the Valdivia power plant influence area
(Estimation for year 2010)

Biomass residues generation

Biomass from industrial operations	(m^3st/yr)	3.149.335

Biomass residues demand

Demand from industrial operations	**(m^3st/yr)**	2.153.213

Sources: Infor official bulletins and studies.
* Demand from forestry operations not available for year 2010

Valdivia power plant surplus index
(estimation for year 2010)

This index was calculated using criteria "L2" of the ACM0006

Industrial supply / Industrial demand	1,4626

According to the table above, it is clear that the quantity of available biomass in the influence area of the project activity is greater than the 25% threshold established in option L2 of the consolidated baseline methodology. These results are consistent with the fact that in the last years the existing biomass power plants in the area / region continue to function without restriction and that new biomass based projects are being considered in the area[8].

From the above analysis, it is possible to conclude that the Valdivia biomass power plant has not caused a biomass supply shortage in its influence area, and therefore has not caused other biomass consumers to switch from biomass fuels to fossil fuel sources. For these reasons, the associated leakage to the Valdivia project activity is considered to be zero.

$$L_y = 0$$

E.4. Emission reductions calculation / table

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As presented in the PDD and according to the baseline methodology, the net emission reduction calculation formula for the Valdivia project is:

[6] INFOR stands for “Instituto Nacional Forestal” or “National Forestry Institute” in English.

[7] The Valdivia project influence area is defined in page 129 of the registered PDD.

[8] Including some prospective CDM biomass projects.

Project Activity Net Emission savings = Baseline Emissions – Project Activity Emissions – Leakage

or

$$ER_y = (ER_{electricity\ ,y} + BE_{biomass\ ,y}) - PE_y - L_y$$

Where:

ER_y :	Emission reductions of the project activity during the year y (tCO_2/yr).
$ER_{electricity,y}$:	Emission reductions due to displacement of electricity during the year y (Baseline emissions due to electricity displacement) (tCO_2/yr).
$BE_{biomass,y}$:	Baseline emissions due to anthropogenic sources of biomass residues during year y (tCO_2e/yr).
PE_y :	Project emissions during the year y (tCO_2/yr).
L_y :	Leakage emissions during the year y (tCO_2/yr).

Net emission reductions for the monitored period

		2010
Baseline emissions	(tCO_2eq)	107.134
Project emissions	(tCO_2eq)	14,138
Leakage	(tCO_2eq)	0
Net emission reductions	**(tCO_2eq)**	**92,995**

Summary of the monthly emission reductions for the monitored period

For the calculation of the net emission reductions of the Valdivia biomass power plant project activity, an Excel spreadsheet with the monitored data and the monthly calculation of the net emission reductions was provided to the DOE for the verification of the calculated numbers. For informative purposes, this monitoring report provides a table that shows the monthly net emission reduction of the Valdivia project activity:

Net emission savings

		Baseline emissions		Project activity emissions					
	Net emission savings	Grid emissions	Methane emissions	Methane in P.B.	Fossil fuel in P.B.	Fossil fuel in R.B.	Transport onsite	Transport to P. Plant	Leakage
Year 2010	(tCO_2eq/yr)	(tCO_2/yr)	(tCO_2eq/yr)	(tCO_2eq/yr)	(tCO_2/yr)	(tCO_2/yr)	(tCO_2/yr)	(tCO_2/yr)	(tCO_2/yr)
2nd verif (Jan 2010 - Dec 2010)	92.995,8	93.878,0	13.255,6	464,0	10.101,3	3.115,8	126,7	330,0	0
Total emissions claimed	**92.995**	**93.878**	**13.256**	**464**	**10.101**	**3.116**	**127**	**330**	**0**

Note: Net emission savings = Baseline emissions - Project activity emissions - Leakage.

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**133,533**	**92,995**

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

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According to the project PDD, the estimated emission reductions for the period covered by this monitoring report should have been **133,533 CERs**. The monitored emissions are **30.38 %** lower than the estimated emissions in the PDD.

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History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		

ANNEX

POWER GENERATION 2010

Power plants	POWER OUTPUT (KW)	PLANT TYPE	FUEL TYPE	UNIT	FUEL OIL CONSUMPTION	LOW COST / MUST RUN	SIC EMISSION FACTOR 2010
Los Molles	18	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Sauce Andes	1,1	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Aconcagua	74	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Aconcagua Ubianco							
Aconcagua Lijuncal							
Los Quilos	39,3	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Florida	28,5	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Maitenes	31	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Alfalfal	178	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Queltehues	49	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Puntilla	22	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Volcan	13	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Los Morros	3,1	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Sauzal 50Hz	76,8	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Sauzal 60Hz	76,8	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Sauzalito	12	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Curillinque	89	Run of the river	Hydro	N.C.	0,0	Yes	0,0
San Ignacio	37	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Loma Alta	40	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Rucue	178,4	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Pullinque	51,4	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Pilmaiquén	39	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Capullo	11	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Peuchén	80	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Mampil	49	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Chacabuquito	25,5	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Antuco	320	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Abanico	136	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Isla	68	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Machicura	95	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Eyzaguirre	2,1	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Quilleco	70,8	Run of the river	Hydro	N.C.	0,0	Yes	0,0
El Rincón	0,28	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Chiburgo	19,4	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Palmucho	32	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Hornitos	55	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Puclaro	6	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Ojos de Agua	9	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Coya	10,8	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Lircay	19	Run of the river	Hydro	N.C.	0,0	Yes	0,0
El Manzano	4,85	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Pehui	1,1	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Truful Truful	0,5	Run of the river	Hydro	N.C.	0,0	Yes	0,0
La Paloma	5,4	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Trueno	5,6	Run of the river	Hydro	N.C.	0,0	Yes	0,0
San Clemente	5,5	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Carbomet	0	Run of the river	Hydro	N.C.	0,0	Yes	0,0
La Higuera	154,7	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Juncalito	1,5	Run of the river	Hydro	N.C.	0,0	Yes	0,0
El Tártaro	0	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Guayacán	12	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Confluencia	155	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Mariposas	6	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Los Corrales	0,8	Run of the river	Hydro	N.C.	0,0	Yes	0,0
Taltal 2 GNL	122,45	Open Cycle	LNG	MM m³-std/yr	0,0	No	39,4
Taltal 2	122,45	Open Cycle	Natural Gas	MM m³-std/yr	11,5	No	25.297,9
Taltal 2 Diesel	122,45	Open Cycle	Diesel	000' tons/yr.	14,1	No	47.795,2
Taltal 1 GNL	122,45	Open Cycle	LNG	MM m³-std/yr	0,5	No	1.677,3
Taltal 1	122,45	Open Cycle	Natural Gas	MM m³-std/yr	6,1	No	13.359,9
Taltal 1 Diesel	122,45	Open Cycle	Diesel	000' tons/yr.	8,9	No	29.943,3
D. Almagro	23,8	Open Cycle	Diesel	000' tons/yr.	0,1	No	503,1
El Salvador	23,8	Open Cycle	Diesel	000' tons/yr.	0,1	No	338,1
Guacolda 1	152	Coal/Steam	Coal	000' tons/yr.	409,8	No	1.152.906,8
Guacolda 2	152	Coal/Steam	Coal	000' tons/yr.	399,3	No	1.123.445,7
Guacolda 3	152	Coal/Steam	Coal	000' tons/yr.	419,7	No	1.180.794,4
Guacolda 4	152	Coal/Steam	Coal	000' tons/yr.	362,8	No	1.020.784,1
Huasco TV	16	Coal/Steam	Coal	000' tons/yr.	0,0	No	0,0
Huasco TG	64,23	Open Cycle	Diesel	000' tons/yr.	0,3	No	1.133,5
Huasco TG IFO	64,23	Open Cycle	IFO 180	000' tons/yr.	0,1	No	174,8
L.Verde TG	18,8	Open Cycle	Diesel	000' tons/yr.	1,1	No	3.755,2
Los Vientos TG	132	Open Cycle	Diesel	000' tons/yr.	13,1	No	44.354,5
Nehuenco	368,4	Combined Cycle	Natural Gas	MM m³-std/yr	0,8	No	1.772,1
Nehuenco Diesel	368,4	Combined Cycle	Diesel	000' tons/yr.	107,5	No	363.073,1
Nehuenco GNL	368,4	Combined Cycle	LNG	MM m³-std/yr	38,7	No	125.749,6
Nehuenco TG 9B	108	Open Cycle	Natural Gas	MM m³-std/yr	0,9	No	2.025,9
Nehuenco TG 9B Diesel	108	Open Cycle	Diesel	000' tons/yr.	0,2	No	557,9
Nehuenco TG 9B GNL	108	Open Cycle	LNG	MM m³-std/yr	1,2	No	3.802,3
Nehuenco II	398,3	Combined Cycle	Natural Gas	MM m³-std/yr	43,3	No	94.908,8
Nehuenco II Diesel	398,3	Combined Cycle	Diesel	000' tons/yr.	245,7	No	829.935,7
Nehuenco II GNL	398,3	Combined Cycle	LNG	MM m³-std/yr	138,6	No	450.325,9
San Isidro	379	Combined Cycle	Natural Gas	MM m³-std/yr	6,4	No	13.929,9
San Isidro Diesel	379	Combined Cycle	Diesel	000' tons/yr.	8,1	No	25.527,8
San Isidro GNL	379	Combined Cycle	LNG	MM m³-std/yr	728,3	No	2.366.052,9
San Isidro II	353	Combined Cycle	Natural Gas	MM m³-std/yr	3,1	No	6.830,0
San Isidro II Diesel	353	Combined Cycle	Diesel	000' tons/yr.	14,8	No	50.083,1
San Isidro II GNL	353	Combined Cycle	LNG	MM m³-std/yr	959,2	No	3.116.044,6
Ventanas 1	120	Coal/Steam	Coal	000' tons/yr.	379,4	No	1.067.586,5
Ventanas 2	220	Coal/Steam	Coal	000' tons/yr.	459,4	No	1.292.671,0
Nueva Ventanas	272	Coal/Steam	Coal	000' tons/yr.	759,3	No	2.136.349,9
L.Verde	54,7	Coal/Steam	Coal	000' tons/yr.	0,1	No	375,6
Nueva Renca	379	Combined Cycle	Natural Gas	MM m³-std/yr	113,7	No	249.394,2
Nueva Renca Diesel	379	Combined Cycle	Diesel	000' tons/yr.	222,3	No	750.901,9
Renca	100	Diesel/Steam	Diesel	000' tons/yr.	1,0	No	3.270,9
Constitución	11,1	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Constitución A.	8	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Petropower	75	Petcoke/steam	Petcoke	000' tons/yr.	24,4	Yes	69.796,5
Laja	12,7	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Bocamina	128	Coal/Steam	Coal	000' tons/yr.	82,0	No	230.694,4
Arauco	9	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
San Fco. Mostazal	24	Open Cycle	Diesel	000' tons/yr.	0,2	No	646,9
Cholguán	13	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Licantén	4	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Valdivia	61	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Antilhue TG	101,3	Open Cycle	Diesel	000' tons/yr.	16,5	No	55.775,6
Horcones TG	24,3	Open Cycle	Natural Gas	MM m³-std/yr	0,1	No	257,5
Horcones Diesel	24,3	Open Cycle	Diesel	000' tons/yr.	2,2	No	7.424,9
TG_Coronel	46,7	Open Cycle	Natural Gas	MM m³-std/yr	7,1	No	15.597,8
TG_Coronel Diesel	46,7	Open Cycle	Diesel	000' tons/yr.	13,2	No	44.646,1
Nueva Aldea	14	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Nueva Aldea 2	10	Open Cycle	Diesel	000' tons/yr.	0,0	No	0,0
Nueva Aldea 3	37	Biomass/steam	Biomass	N.C.	0,0	Yes	0,0
Candelaria 1	125,3	Open Cycle	Natural Gas	MM m³-std/yr	11,1	No	24.245,4
Candelaria 1 Diesel	125,3	Open Cycle	Diesel	000' tons/yr.	13,1	No	44.335,2
Candelaria 1 GNL	125,3	Open Cycle	LNG	MM m³-std/yr	2,6	No	8.360,4
Candelaria 2	128,6	Open Cycle	Natural Gas	MM m³-std/yr	12,9	No	28.354,8
Candelaria 2 Diesel	128,6	Open Cycle	Diesel	000' tons/yr.	12,2	No	41.309,7
Candelaria 2 GNL	128,6	Open Cycle	LNG	MM m³-std/yr	1,0	No	3.360,3

Power plants	POWER OUTPUT (KW)	PLANT TYPE	FUEL TYPE	UNIT	FUEL OIL CONSUMPTION	LOW COST / MUST RUN	SIC EMISSION FACTOR 2010
Curanilahue	2,1	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Lebu	0	Diesel engine	Diesel	000' tons/yr.	0,0	No	45,7
Cañete	3	Diesel engine	Diesel	000' tons/yr.	0,2	No	597,0
Los Sauces	3	Diesel engine	Diesel	000' tons/yr.	0,3	No	904,7
Traiguen	3	Diesel engine	Diesel	000' tons/yr.	0,3	No	902,0
Victoria	0	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Curacautin	3	Diesel engine	Diesel	000' tons/yr.	0,3	No	1.148,2
Ancud	3,3	Diesel engine	Diesel	000' tons/yr.	0,2	No	682,0
Collipulli	3	Diesel engine	Diesel	000' tons/yr.	0,2	No	525,5
Quellon	4,99	Diesel engine	Diesel	000' tons/yr.	0,1	No	252,6
Campanario Gas 1	60	Open Cycle	Natural Gas	MM m³-std/yr	0,0	No	0,0
Campanario Gas 2	60	Open Cycle	Natural Gas	MM m³-std/yr	0,0	No	0,0
Campanario Gas 3	60	Open Cycle	Natural Gas	MM m³-std/yr	0,0	No	11,2
Campanario Diesel 1	60	Open Cycle	Diesel	000' tons/yr.	1,4	No	4.650,2
Campanario Diesel 2	60	Open Cycle	Diesel	000' tons/yr.	1,5	No	5.208,7
Campanario Diesel 3	60	Open Cycle	Diesel	000' tons/yr.	2,9	No	9.711,4
Campanario Diesel 4	40	Open Cycle	Diesel	000' tons/yr.	0,6	No	2.051,8
Casablanca 1	1,2	Diesel engine	Diesel	000' tons/yr.	0,1	No	172,7
Casablanca 2	0	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,3
Las Vegas	2	Diesel engine	Diesel	000' tons/yr.	0,2	No	542,6
Curauma	2	Diesel engine	Diesel	000' tons/yr.	0,1	No	443,6
Concon	2,2	Diesel engine	Diesel	000' tons/yr.	0,1	No	327,5
Escuadrón (ex FPC)	14,2	Biomass/steam	Biomass	N.C.	0,0	No	0,0
FPC + FPC 2						No	
Constitución 1	9	Diesel engine	Diesel	000' tons/yr.	0,5	No	1.797,5
Maule	6	Diesel engine	Diesel	000' tons/yr.	0,2	No	616,0
Monte Patria	9	Diesel engine	Diesel	000' tons/yr.	0,0	No	101,5
Punitaqui	9	Diesel engine	Diesel	000' tons/yr.	0,1	No	181,1
Esperanza 1	1,6	Diesel engine	Diesel	000' tons/yr.	0,3	No	1.174,8
Esperanza 2	1,8	Diesel engine	Diesel	000' tons/yr.	0,2	No	592,8
Esperanza TG	18,8	Open Cycle	Diesel	000' tons/yr.	0,0	No	11,4
Degan	39,6	Diesel engine	Diesel	000' tons/yr.	9,0	No	30.367,6
Olivos	96	Open Cycle	Diesel	000' tons/yr.	0,9	No	3.054,5
Totoral	3	Open Cycle	Diesel	000' tons/yr.	0,1	No	338,4
Quintay	3	Open Cycle	Diesel	000' tons/yr.	0,2	No	737,7
Placilla	3	Open Cycle	Diesel	000' tons/yr.	0,3	No	884,0
Chiloé	9	Diesel engine	Diesel	000' tons/yr.	0,0	No	1,0
Quellon II	10	Diesel engine	Diesel	000' tons/yr.	3,2	No	10.795,6
Colmito	55	Open Cycle	Diesel	000' tons/yr.	0,3	No	1.115,4
Los Pinos	92,1	Open Cycle	Diesel	000' tons/yr.	33,2	No	112.271,9
Chuyaca	2,5	Diesel engine	Diesel	000' tons/yr.	1,2	No	4.097,8
Chuyaca 2	17,5	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Skretting	2,7	Diesel engine	Diesel	000' tons/yr.	0,0	No	44,1
Cenizas	16,5	Diesel engine	Diesel	000' tons/yr.	6,2	No	20.872,2
Santa Lidia	136	Open Cycle	Diesel	000' tons/yr.	12,8	No	43.320,0
Trapén	90	Diesel engine	Diesel	000' tons/yr.	9,3	No	31.435,6
Los Espinos	122	Diesel engine	Diesel	000' tons/yr.	3,1	No	10.601,4
San Gregorio	0,5	Diesel engine	Diesel	000' tons/yr.	0,1	No	197,5
Linares Norte	0,5	Diesel engine	Diesel	000' tons/yr.	0,0	No	106,2
Biomar	2,4	Diesel engine	Diesel	000' tons/yr.	0,0	No	1,3
Eagon	2,4	Diesel engine	Diesel	000' tons/yr.	0,0	No	10,8
Salmofood I	1,6	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Salmofood II	1,6	Diesel engine	Diesel	000' tons/yr.	0,0	No	56,1
Teno	50	Diesel engine	Diesel	000' tons/yr.	12,6	No	43.328,8
Newen Diesel	15	Open Cycle	Diesel	000' tons/yr.	0,2	No	587,5
Newen Butano	15	Open Cycle	Butane	000' tons/yr.	0,0	No	0,0
Newen Propano	15	Open Cycle	Propane	000' tons/yr.	3,6	No	7.970,6
Newen Gas Natural	15	Open Cycle	Natural Gas	MM m³-std/yr	9,9	No	21.608,6
Newen Mezcla Butano/Propano	15	Open Cycle	Butane/Propane	000' tons/yr.	0,0	No	0,0
Watts	2,64	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Multiexport I	1,6	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Multiexport II	1,6	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Tierra Amarilla	142	Diesel engine	Diesel	000' tons/yr.	0,5	No	1.760,5
Quintero	240	Open Cycle	Diesel	000' tons/yr.	4,1	No	13.697,9
Quintero DIESEL A						No	
Quintero DIESEL B						No	
Quintero GNL	240	Open Cyle	LNG	MM m³-std/yr	67,9	No	220.416,8
Quintero GNL A						No	
Quintero GNL B						No	
Lousiana Pacific	2,9	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,3
El Peñón	80	Diesel engine	Diesel	000' tons/yr.	12,6	No	42.513,5
San Lorenzo de D. De Almagro	60	Diesel engine	Diesel	000' tons/yr.	0,1	No	379,7
San Lorenzo de D. de Almagro U1				0	0,0	No	
San Lorenzo de D. de Almagro U2				0	0,0	No	
Tapihue	6,4	Diesel engine	Diesel	000' tons/yr.	0,3	No	1.003,5
Termopacífico	96	Diesel engine	Diesel	000' tons/yr.	4,5	No	15.038,0
Quidico	0	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
Loma Los Colorados	14	Biomass/engine	Biomass	N.C.	0,0	No	0,0
Emelda	72	Open Cycle	IFO 180	000' tons/yr.	0,3	No	1.182,5
Emelda U1				0	0,0	No	
Emelda U2				0	0,0	No	
Colihues IFO	22	Diesel engine	IFO 180	000' tons/yr.	4,7	No	16.000,2
Colihues DIE	22	Diesel engine	Diesel	000' tons/yr.	0,0	No	108,1
Curicó	0	0	0		0,0	No	0,0
Punta Colorada	16,3	Diesel engine	Diesel	000' tons/yr.	1,5	No	5.213,0
Cabrero	11	Biomass/steam	Biomass	N.C.	0,0	No	0,0
Cem Bio Bio IFO	13,6	Diesel engine	IFO 180	000' tons/yr.	0,9	No	3.083,4
Cem Bio Bio DIESEL	13,6	Diesel engine	Diesel	000' tons/yr.	0,0	No	0,0
El Toro	450	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Rapel	377	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Canutillar	172	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Cipreses	106	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Colbun	478	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Pehuenche	570	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Pangue	467	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Ralco	690	Reservoirs	Hydro	N.C.	0,0	Yes	0,0
Canela 1	18,2	Aeolics	Wind	N.C.	0,0	Yes	0,0
Canela 2	60	Aeolics	Wind	N.C.	0,0	Yes	0,0
Lebu (Cristoro)	3,6	Aeolics	Wind	N.C.	0,0	Yes	0,0
Totoral (eólica)	46	Aeolics	Wind	N.C.	0,0	Yes	0,0
Monte Redondo	48	Aeolics	Wind	N.C.	0,0	Yes	0,0
SIC Total Emission							**18.869.132,8**

Total emissions from non-low cost / must run power plants **18.799.336,3**

Total emissions from low cost / must run power plants **69.796,5**

OPERATING MARGIN CALCULATION

(ACCORDING TO THE ACM0002 (VERSION 06)

Each year in which the project generation occurs.

		2010
Total emissions from non-low cost / must run power plants	(tCO_2/yr)	18.799.336
Total emissions from low-cost / must-run power plants	(tCO_2/yr)	69.796
Total energy generated in the SIC	(GWh/yr)	43.193
Total energy by non-Low cost / must run power plants	(GWh/yr)	20.826
Total energy by low cost / must run power plants	(GWh/yr)	22.367
Factor λ	(number)	0,0065068493
Operating Margin	**(tCO_2/GWh)**	**896,84**

Notes:

- Low cost / must run units present very low GHG emissions, since they are basically hydro plants and very few biomass
- Registered CDM plants are not included in the OM factor calculation.

BUILD MARGIN CALCULATION 2010

Power plants	POWER OUTPUT (MW)	PLANT TYPE	FUEL TYPE	START OPERATION	CDM PROYECT	TOTAL GEN IN 2010 (GWh)	SIC EMISSION FACTOR 2010 tCO2/yr
Confluencia	155	Run of the river	Hydro	Dic-10	No	3.9	0.00
Mariposas	6	Run of the river	Hydro	Dic-10	No	0.0	0.00
Cem Bio Bio IFO	13.6	Diesel engine	IFO 180	Dic-10	No	4.1	748.29
Cem Bio Bio DIESEL	13.6	Diesel engine	Diesel	Dic-10	No	0.0	648.55
Cabrero	11	Biomass/steam	Biomass	Nov-10	No	1.3	0.00
Los Corrales	0.8	Run of the river	Hydro	Sep-10	No	0.2	0.00
La Higuera	154.7	Run of the river	Hydro	Sep-10	Yes	0.0	0.00
Juncalito	1.5	Run of the river	Hydro	Sep-10	No	1.3	0.00
El Tártaro	0	Run of the river	Hydro	Sep-10	No	0.1	0.00
Guayacán	12	Run of the river	Hydro	Sep-10	No	20.8	0.00
Carbomet	0	Run of the river	Hydro	Ago-10	No	20.7	0.00
El Salvador	23.8	Open Cycle	Diesel	Ago-10	No	0.3	1136.34
San Clemente	5.5	Run of the river	Hydro	Jul-10	No	5.9	0.00
Curicó	0	0	0	Jul-10	No	0.4	0.00
Punta Colorada	16.3	Diesel engine	Diesel	Jul-10	No	8.0	651.93
Trueno	5.6	Run of the river	Hydro	Jun-10	No	19.7	0.00
Emelda	72	Open Cycle	IFO 180	Jun-10	No	1.2	996.72
Colihues IFO	22	Diesel engine	IFO 180	Jun-10	No	22.0	727.88
Colihues DIE	22	Diesel engine	Diesel	Jun-10	No	0.1	743.13
La Paloma	5.4	Run of the river	Hydro	May-10	No	4.0	0.00
Loma Los Colorados	14	Biomass/engine	Biomass	Abr-10	No	7.4	0.00
Quidico	0	Diesel engine	Diesel	Mar-10	No	0.0	0.00
Campanario Diesel 4	40	Open Cycle	Diesel	Feb-10	No	2.3	898.51
Guacolda 4	152	Coal/Steam	Coal	Ene-10	No	1036.6	984.76
Totoral (eólica)	46	Aeolics	Wind	Ene-10	No	84.7	0.00
Monte Redondo	48	Aeolics	Wind	Ene-10	No	82.8	0.00
Quintero GNL	240	Open Cyle	LNG	Nov-09	No	245.8	896.55
Canela 2	60	Aeolics	Wind	Nov-09	Yes	0.0	0.00
Taphue	6.4	Diesel engine	Diesel	Oct-09	No	1.0	955.91
Termopacífico	96	Diesel engine	Diesel	Oct-09	No	19.8	760.02
Truful Truful	0.5	Run of the river	Hydro	Oct-09	No	0.0	0.00
Nueva Ventanas	272	Coal/Steam	Coal	Oct-09	No	1998.1	1069.17
San Lorenzo de D. De Almagro	60	Diesel engine	Diesel	Sep-09	No	0.3	1227.85
Louisiana Pacific	2.9	Diesel engine	Diesel	Jul-09	No	0.0	747.18
El Peñón	80	Diesel engine	Diesel	Jul-09	No	57.7	736.37
Pehui	1.1	Run of the river	Hydro	Jun-09	No	7.1	0.00
Biomar	2.4	Diesel engine	Diesel	Jun-09	No	0.0	749.55
Eagon	2.4	Diesel engine	Diesel	Jun-09	No	0.0	747.52
Salmofood I	1.6	Diesel engine	Diesel	Jun-09	No	0.0	776.91
Salmofood II	1.6	Diesel engine	Diesel	Jun-09	No	0.1	743.13
Teno	50	Diesel engine	Diesel	Jun-09	No	58.0	746.51
Newen Diesel	15	Open Cycle	Diesel	Jun-09	No	0.6	979.58
Newen Butano	15	Open Cycle	Butane	Jun-09	No	0.0	997.32
Newen Propano	15	Open Cycle	Propane	Jun-09	No	8.3	957.43
Newen Gas Natural	15	Open Cycle	Natural Gas	Jun-09	No	29.9	723.54
Newen Mezcla Butano/Propano	15	Open Cycle	Butane/Propan	Jun-09	No	0.0	977.38
Watts	2.64	Diesel engine	Diesel	Jun-09	Yes	0.0	747.18
Multiexport I	1.6	Diesel engine	Diesel	Jun-09	No	0.0	747.18
Multiexport II	1.6	Diesel engine	Diesel	Jun-09	No	0.0	747.18
Tierra Amarilla	142	Diesel engine	Diesel	Jun-09	No	2.2	807.31
Quintero	240	Open Cycle	Diesel	Jun-09	No	16.8	817.44
Lebu (Cristoro)	3.6	Aeolics	Wind	Jun-09	No	6.8	0.00
Guacolda 3	152	Coal/Steam	Coal	Abr-09	No	1199.1	984.76
San Gregorio	0.5	Diesel engine	Diesel	Mar-09	No	0.3	746.24
Linares Norte	0.5	Diesel engine	Diesel	Mar-09	No	0.1	746.24
Chuyaca 2	17.5	Diesel engine	Diesel	Feb-09	No	0.0	709.35
Trapén	90	Diesel engine	Diesel	Feb-09	No	42.7	736.37
Los Espinos	122	Diesel engine	Diesel	Feb-09	No	14.2	746.51
Lircay	19	Run of the river	Hydro	Ene-09	No	121.8	0.00
Santa Lidia	136	Open Cycle	Diesel	Dic-08	No	49.5	874.86
El Manzano	4.85	Run of the river	Hydro	Dic-08	No	27.5	0.00
Chuyaca	2.5	Diesel engine	Diesel	Oct-08	No	5.5	749.88
Skretting	2.7	Diesel engine	Diesel	Oct-08	No	0.1	743.13
Cenizas	16.5	Diesel engine	Diesel	Oct-08	No	26.9	776.91
Los Pinos	92.1	Open Cycle	Diesel	Sep-08	No	174.3	644.09
Colmito	55	Open Cycle	Diesel	Ago-08	No	1.1	1006.60
Chiloé	9	Diesel engine	Diesel	Jul-08	No	0.0	908.64
Coya	10.8	Run of the river	Hydro	Jul-08	No	83.3	0.00
Ojos de Agua	9	Run of the river	Hydro	Jun-08	Yes	0.0	0.00
Puclaro	6	Run of the river	Hydro	May-08	Yes	0.0	0.00
Totoral	3	Open Cycle	Diesel	Abr-08	No	0.4	788.80
Quintay	3	Open Cycle	Diesel	Abr-08	No	0.9	788.80
Placilla	3	Open Cycle	Diesel	Abr-08	No	1.1	788.80
Olivos	96	Open Cycle	Diesel	Feb-08	No	4.0	760.02
Campanario Gas 3	60	Open Cycle	Natural Gas	Ene-08	No	0.1	105.83
Campanario Diesel 3	60	Open Cycle	Diesel	Ene-08	No	11.7	827.57
Quellon II	10	Diesel engine	Diesel	Ene-08	No	14.4	749.88
Nueva Aldea 3	37	Biomass/steam	Biomass	Ene-08	Yes	0.0	0.00
Canela 1	18.2	Aeolics	Wind	Sep-07	Yes	0.0	0.00
Hornitos	55	Run of the river	Hydro	Sep-07	Yes	0.0	0.00
Palmucho	32	Run of the river	Hydro	Sep-07	No	232.4	0.00
Esperanza TG	18.8	Open Cycle	Diesel	Ago-07	No	0.0	763.26
Constitución 1	9	Diesel engine	Diesel	Jul-07	No	1.9	952.56
Maule	6	Diesel engine	Diesel	Jul-07	No	0.6	952.56
Monte Patria	9	Diesel engine	Diesel	Jul-07	No	0.2	588.98
Punitaqui	9	Diesel engine	Diesel	Jul-07	No	0.3	639.84
Chiburgo	19.4	Run of the river	Hydro	Jul-07	No	75.8	0.00
Curanilahue	2.1	Diesel engine	Diesel	Jul-07	No	0.1	0.00
Degan	39.6	Diesel engine	Diesel	Jul-07	No	41.1	739.75
Escuadrón (ex FPC)	14.2	Biomass/steam	Biomass	Jun-07	No	90.5	0.00
Esperanza 1	1.6	Diesel engine	Diesel	Jun-07	No	1.0	1151.98
Esperanza 2	1.8	Diesel engine	Diesel	Jun-07	No	0.8	737.72
San Isidro II	353	Combined Cycle	Natural Gas	Abr-07	No	16.9	403.43
San Isidro II Diesel	353	Combined Cycle	Diesel	Abr-07	No	87.2	574.24
San Isidro II GNL	353	Combined Cycle	LNG	Abr-07	No	2846.3	1094.75
Quilleco	70.8	Run of the river	Hydro	Abr-07	Yes	0.0	0.00
El Rincón	0.28	Run of the river	Hydro	Abr-07	No	2.4	0.00
Casablanca 1	1.2	Diesel engine	Diesel	Abr-07	No	0.2	781.14
Casablanca 2	0	Diesel engine	Diesel	Abr-07	No	0.0	939.18

Power plants	POWER OUTPUT (MW)	PLANT TYPE	FUEL TYPE	START OPERATION	CDM PROYECT	TOTAL GEN IN 2010 (GWh)	SIC EMISSION FACTOR 2010 tCO2/yr
Las Vegas	2	Diesel engine	Diesel	Abr-07	No	0.7	805.82
Curauma	2	Diesel engine	Diesel	Abr-07	No	0.5	924.18
Concon	2.2	Diesel engine	Diesel	Abr-07	No	0.4	805.82
Eyzaguirre	2.1	Run of the river	Hydro	Mar-07	No	6.7	0.00
Campanario Gas 1	60	Open Cycle	Natural Gas	Mar-07	No	0.0	105.83
Campanario Gas 2	60	Open Cycle	Natural Gas	Mar-07	No	0.0	105.83
Campanario Diesel 1	60	Open Cycle	Diesel	Mar-07	No	5.6	830.95
Campanario Diesel 2	60	Open Cycle	Diesel	Mar-07	No	6.2	834.33
Los Vientos TG	132	Open Cycle	Diesel	Ene-07	No	49.2	901.89
Cañete	3	Diesel engine	Diesel	Ene-07	No	0.7	817.44
Los Sauces	3	Diesel engine	Diesel	Ene-07	No	1.1	817.44
Traiguen	3	Diesel engine	Diesel	Ene-07	No	1.1	816.09
Curacautin	3	Diesel engine	Diesel	Ene-07	No	1.6	743.13
Collipulli	3	Diesel engine	Diesel	Ene-07	No	0.6	817.44
Nueva Aldea 2	10	Open Cycle	Diesel	2006	No	0.0	978.90
Ancud	3.3	Diesel engine	Diesel	2006	No	0.8	817.44
Quellon	4.99	Diesel engine	Diesel	2006	No	0.8	333.36
Antilhue TG	101,3	Open Cycle	Diesel	2005	No	71.7	777.45
TG_Coronel	46.7	Open Cycle	Natural Gas	2005	No	29.0	537.17
TG_Coronel Diesel	46.7	Open Cycle	Diesel	2005	No	63.2	705.97
Nueva Aldea	14	Biomass/steam	Biomass	2005	Yes	0.0	0.00
Candelaria 1	125.3	Open Cycle	Natural Gas	2005	No	35.2	688.46
Candelaria 1 Diesel	125.3	Open Cycle	Diesel	2005	No	48.6	912.79
Candelaria 1 GNL	125.3	Open Cycle	LNG	2005	No	8.0	1045.05
Candelaria 2	128.6	Open Cycle	Natural Gas	2005	No	41.2	688.46
Candelaria 2 Diesel	128.6	Open Cycle	Diesel	2005	No	46.6	887.25
Candelaria 2 GNL	128.6	Open Cycle	LNG	2005	No	3.3	1015.81
L.Verde TG	18.8	Open Cycle	Diesel	2004	No	4.2	891.75
Licantén	4	Biomass/steam	Biomass	2004	No	21.5	0.00
Valdivia	61	Biomass/steam	Biomass	2004	Yes	0.0	0.00
Horcones TG	24.3	Open Cycle	Natural Gas	2004	No	0.3	823.70
Horcones Diesel	24.3	Open Cycle	Diesel	2004	No	6.3	1186.03
Ralco	690	Reservoirs	Hydro	2004	No	2220.6	0.00
Nehuenco II	398.3	Combined Cycle	Natural Gas	2003	No	213.2	445.09
Nehuenco II Diesel	398.3	Combined Cycle	Diesel	2003	No	1547.6	536.27
Nehuenco II GNL	398.3	Combined Cycle	LNG	2003	No	765.9	587.98
Cholguán	13	Biomass/steam	Biomass	2003	Yes	0.0	0.00
Chacabuquito	25.5	Run of the river	Hydro	2002	Yes	0.0	0.00
Nehuenco TG 9B	108	Open Cycle	Natural Gas	2002	No	2.9	692.84
Nehuenco TG 9B Diesel	108	Open Cycle	Diesel	2002	No	0.6	961.80
Nehuenco TG 9B GNL	108	Open Cycle	LNG	2002	No	3.7	1026.53
San Fco. Mostazal	24	Open Cycle	Diesel	2002	No	0.6	1043.76
Peuchén	80	Run of the river	Hydro	2000	No	166.5	0.00
Mampil	49	Run of the river	Hydro	2000	No	106.5	0.00
Taltal 2 GNL	122.45	Open Cycle	LNG	2000	No	0.0	1009.84
Taltal 2	122.45	Open Cycle	Natural Gas	2000	No	36.5	692.94
Taltal 2 Diesel	122.45	Open Cycle	Diesel	2000	No	55.7	857.98
Taltal 1 GNL	122.45	Open Cycle	LNG	2000	No	1.7	1009.84
Taltal 1	122.45	Open Cycle	Natural Gas	2000	No	19.3	692.94
Taltal 1 Diesel	122.45	Open Cycle	Diesel	2000	No	34.9	857.98

TOTAL GEN. PER YEAR	(GWh / yr)		43.192,7
20% OF GEN. PER YEAR	(GWh / yr)		8.638,5
5 MOST RECENT PLANT GEN	(GWh / yr)		9,4

EMISSION FACTOR 5 PLANTS	(tCO2/GWh)		326,86
EMISSION FACTOR 20% GEN	(tCO2/GWh)		914,79

BUILD MARGIN	(tCO2/GWh)		914,79

COMBINED MARGIN CALCULATION 2010

(ACCORDING TO THE ACM0002 (VERSION 06)

OM: Calculated ex post (Option 2, the year in which the emissions occur)
BM: Calculated ex-post (Option 2, updated annually from the date the first emissions occur)

		2010
Operating Margin	(tCO_2/GWh)	896,84
Build Margin	(tCO_2/GWh)	914,79
Combined Margin	**(tCO_2/GWh)**	**905,81**