Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Nueva Aldea Biomass Power Plant Phase 1
Reference number of the project activity	0258
Version number of the monitoring report	1
Completion date of the monitoring report	04/09/2013
Registration date of the project activity	31/03/2006
Monitoring period number and duration of this monitoring period	Monitoring Period #6: 01/01/2011 - 31/12/2011
Project participant(s)	Celulosa Arauco y Constitución S.A.
Host Party(ies)	Chile
Sectoral scope(s) and applied methodology(ies)	Sectoral scope 1. Methodologies: ACM0006 (version 1) and ACM0002 (version 4)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	100,486 metric tonnes CO_2 equivalent per annum
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	197,908 metric tonnes CO_2 equivalent

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity consists of a 30 MW biomass cogeneration power plant located inside a forestry complex by Celulosa Arauco y Constitución S.A. (from now on, Arauco): the Nueva Aldea Industrial Complex or the Nueva Aldea Project. Arauco is a leading forestry and pulp-producing company in the world.

The project activity is designed to use own and third party biomass for steam and electric power generation. Biomass from industrial and forestry operations in Chile would be normally dumped in piles for natural decay.

It must be noted that since the common practice in the Sawmill and Plywood industries does not include the cogeneration of electric power, the entire net electric power generation capacity of the new power plant in Phase 1 represents a net increase of clean energy in the grid (known as SIC or "Sistema Interconectado Central"). This is the main idea of the project activity.

The proposed project activity assists Chile's sustainable growth by providing electricity to the Nueva Aldea Industrial Complex and to the SIC through biomass power generation, which is a clean and renewable energy source. The Nueva Aldea project activity participants believe that biomass power generation constitutes a sustainable source of power generation that brings clear advantages to mitigate global warming. Using the available natural resources in a rational way, the Nueva Aldea Phase 1 project activity helps promote the development of renewable energy sources in Chile, in particular the use of biomass generated as a byproduct of the forestry industry, which has a significant potential in the country. The project activity is a good example to demonstrate the viability of electricity generation as a source of revenue not only in the Plywood and Sawmill industries, but in all forest-related industries. Although this technological improvement is consistent with Arauco's internal policies of energy efficiency, it must be recognized as an initiative that goes far beyond the common practice of the Sawmill/ Plywood mill industries in Chile.

The technology used in this project for generating megawatt (MW) levels of electricity from biomass is the steam-Rankine cycle operating in a condensing-extraction turbine. (See section B1 for further details).

Relevant dates for the project activity:

Date (DD/MM/YY)	Key events
June 2004	Approval permits to start construction activities
29/09/2003	Commissioning start date
01/01/2005 to 30/09/2006	The 1st monitoring period
01/10/2006 to 30/09/2007	The 2nd monitoring period
01/10/2007 to 30/09/2008	The 3rd monitoring period
01/10/2008 to 31/12/2009	The 4th monitoring period
01/01/2010 to 31/12/2010	The 5th monitoring period
01/01/2011 to 31/12/2011	The 6th monitoring period (this report)

Total net emission reductions claimed in the 6th monitoring period (from January 1st 2011 to December 31th 2011) are 197,908 tCO_2eq.

A.2. Location of project activity

The project activity is located in the Nueva Aldea Industrial Complex site. The Nueva Aldea Industrial complex is located near the Nueva Aldea community area, Commune of Ranquil, in the province of Ñuble. It is 30 km. west of the Chillan city and 28 km. southeast of the Coelemu city in the VIII Region (Bío-Bío Region), Chile. The project site is located at the geographical coordinates 36°39´18" S and 72°28´31" N.

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Chile	Celulosa Arauco y Constitución S.A.	No

A.4. Reference of applied methodology

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

ACM0006/version 01: "Consolidated methodology for grid-connected electricity generation from biomass residues". Applied baseline scenario for the project activity: Nº 3.

The project activity also relies on the following methodology:

ACM0002/version 04: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

A.5. Crediting period of project activity

1st Crediting period.
Start date: 01/01/2005
End date: 31/12/2011
Type of crediting period: Renewable.
Duration: 7 years

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project activity consists of a 30 MW biomass cogeneration power plant located inside a forestry complex by Arauco: the Nueva Aldea Industrial Complex or the Nueva Aldea Project.

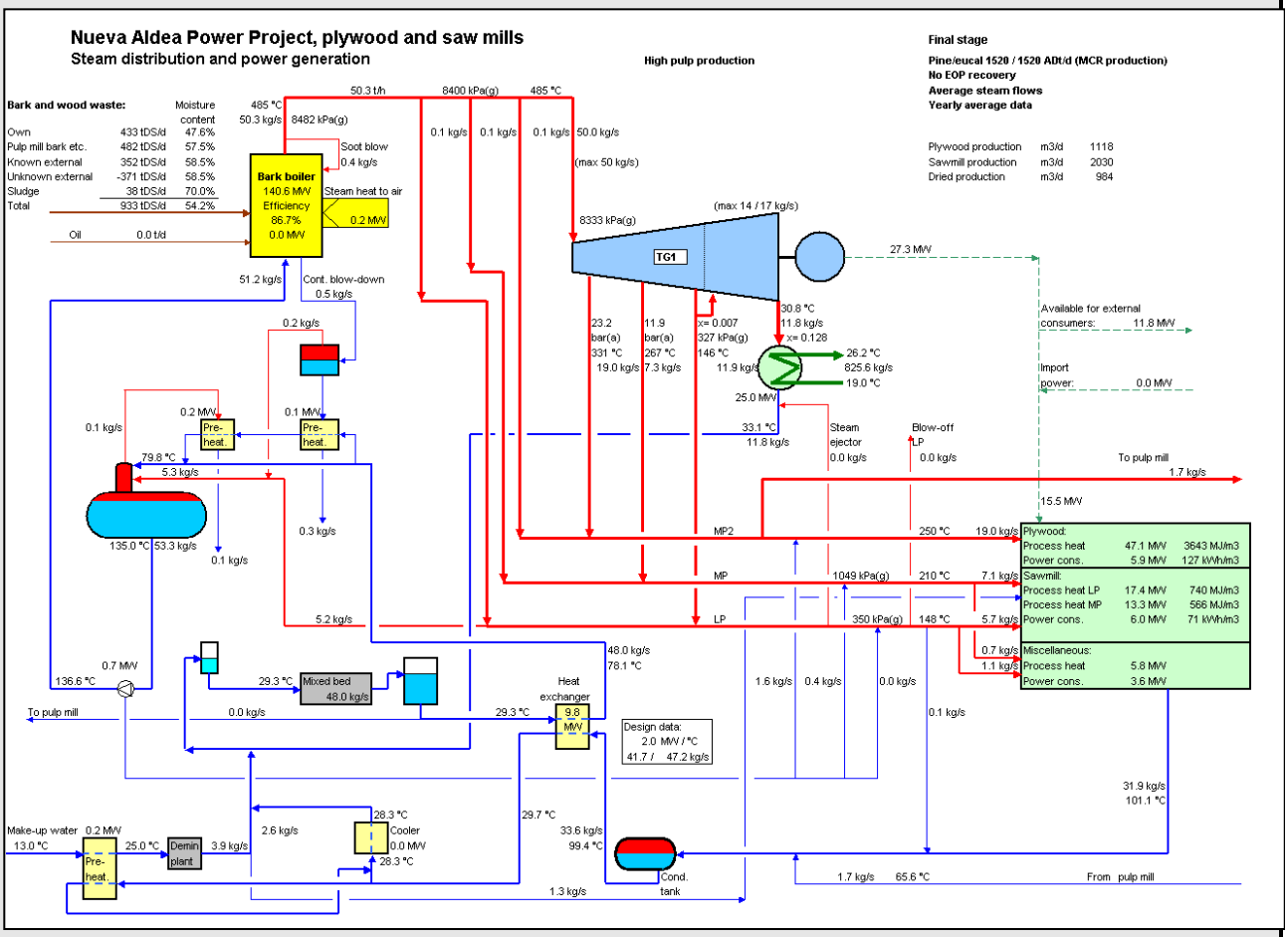
The project activity is designed to use own and third party biomass for steam and electric power generation. Biomass from industrial and forestry operations in Chile is normally dumped in piles for natural decay.
The technology used in this project (which is also the predominant technology everywhere 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. 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 to recover heat from flue gases to preheat combustion air, and a deaerator 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. The Nueva Aldea Power Plant Phase 1, has a condensing-extraction turbine. Steam expands to a pressure that is still substantially above ambient pressure. It leaves the turbine still as steam and is sent to satisfy industrial heating needs, where it condenses back to water. Additionally, the portion of 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 a backpressure turbine. The non-extracted steam is converted back to liquid water in a condenser that utilizes water from a cooling tower as coolant.

The steam extractions used for the mill’s heating needs are two medium pressure steam currents and one low pressure steam current.
The following diagram shows actual steam and water flows in the power plant, as well as their temperature and pressure.

Figure 1: Schematic diagram of the Nueva Aldea Power Plant Phase 1



The following table shows the shutdown/stoppages of the project activity due to regular maintenance program during the monitored period.

Out of service day	Starting day	Number of days shut down/stoppages	Comments
12/01/2011	12/01/2011	0.31	Maintenance stoppage
24/01/2011	24/01/2011	0.11	Maintenance stoppage
03/02/2011	03/02/2011	0.21	Operation stoppage
17/02/2011	18/02/2011	0.04	Maintenance stoppage
24/02/2011	24/02/2011	0.10	Operation stoppage
04/05/2011	04/05/2011	0.05	Maintenance stoppage
12/06/2011	12/06/2011	0.06	Operation stoppage
21/06/2011	21/06/2011	0.05	Maintenance stoppage
02/07/2011	03/07/2011	1.42	Maintenance stoppage
03/07/2011	04/07/2011	0.24	Operation stoppage
05/07/2011	05/07/2011	0.04	Maintenance stoppage
03/08/2011	06/08/2011	2.48	Operation stoppage
07/08/2011	07/08/2011	0.07	Operation stoppage
13/11/2011	15/11/2011	1.84	Maintenance stoppage
04/12/2011	04/12/2011	0.03	Maintenance stoppage
08/12/2011	08/12/2011	0.22	Maintenance stoppage

26/12/2011	26/12/2011	0.06	Maintenance stoppage
26/12/2011	26/12/2011	0.06	Operation stoppage

There was not equipment added and/or replaced during this monitoring period.

B.2. Post registration changes

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

No temporary deviations from the registered monitoring plan have been applied during this monitoring period.

B.2.2. Corrections

No corrections to project information or parameters fixed at validation have been submitted or approved during this monitoring period.

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

The EB 38, paragraph 63 (f) (March, 14th, 2008) instructed the Project Participant to change the monitoring plan, because the Project Participant determined the additional biomass (for electricity generation) by using a specific consumption factor (m^3st of biomass/MWh) calculated directly from the energy / mass balance of the project plant. So, the monitoring plan was revised to include the measurement of net quantity of heat generated in the cogeneration project plant (Q_y), Energy efficiency of the boiler that would be used in the absence of the project activity (ε_{boiler}) and Net calorific value of biomass ($NCV_{Biomass,\ i}$) in accordance to Equation 24 of ACM0006 version 01. The revised monitoring plan was approved by the EB in 17/08/2008.

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

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

B.2.5. Changes to start date of crediting period

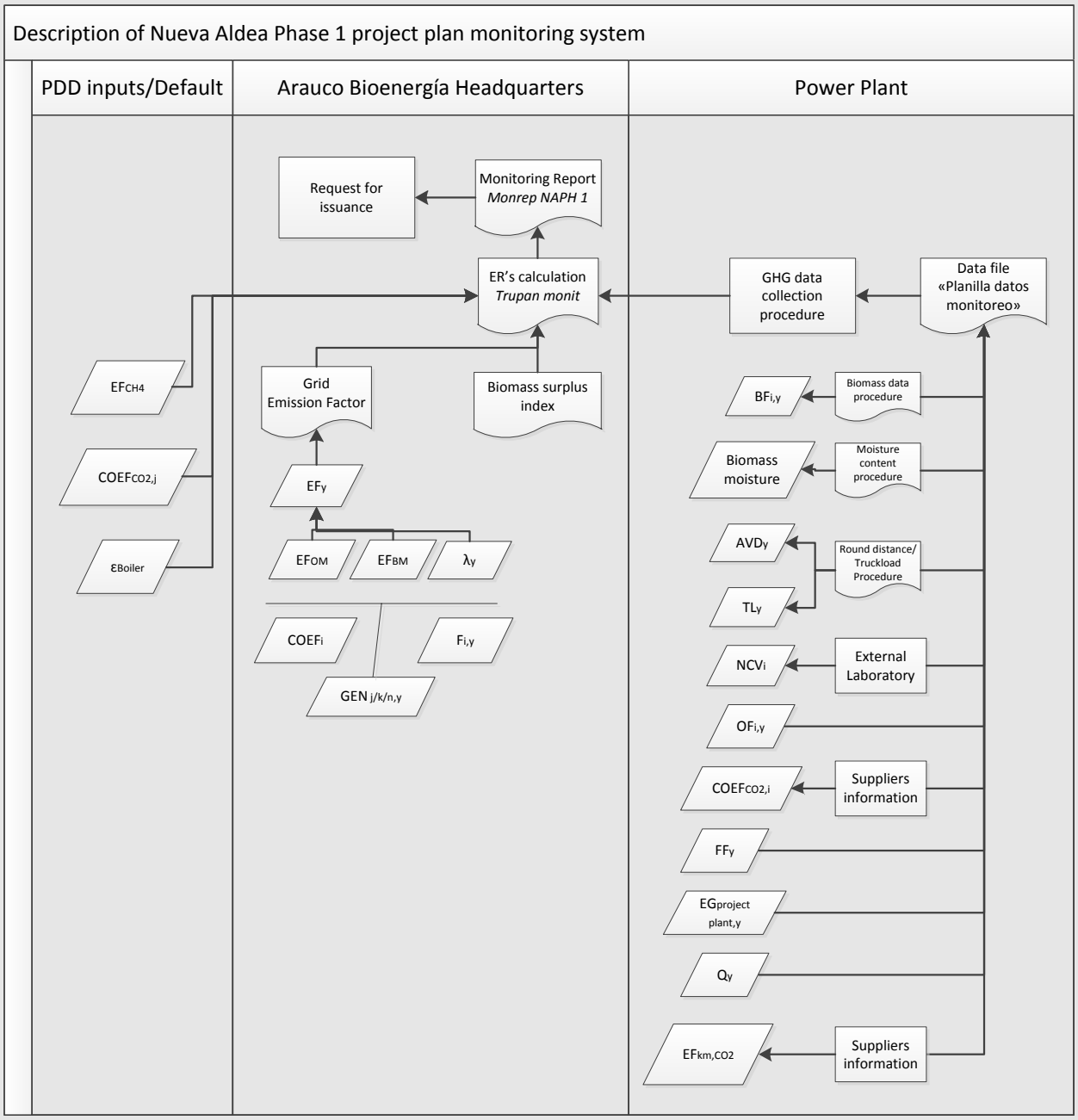
None

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

Not applicable

SECTION C. Description of monitoring system

The Project Participant, 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. The following diagram includes data collection procedure as: Data generation, calculation and reporting.



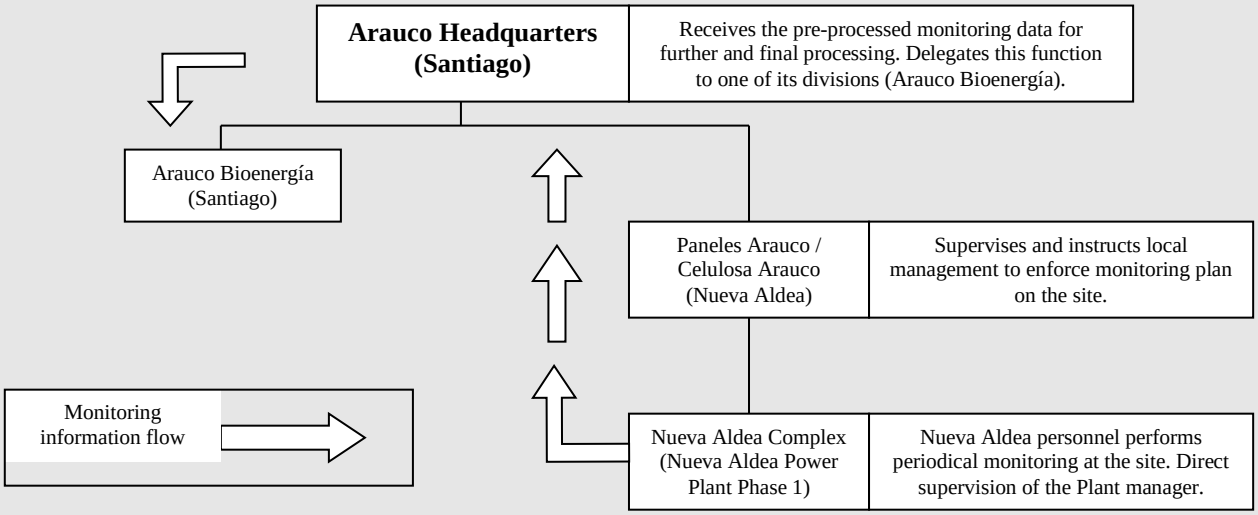
Parameters as Q_y, $EG_{project\ plant,y}$ AVD_y, $OF_{i,y}$, FF_y and $BF_{i,y}$ are aggregated in excel files to obtain a monthly value that is reported in the emission reductions calculation file. All data is recorded in electronic tapes and archived two years following the end of the crediting period as is specified in the current revised monitoring plan. Even though during this monitoring period there were no emergency situations, the monitoring data management system defined in all the procedures the possibility of emergency occurrences (for example, IT failure system). The on-site personnel were instructed to inform opportunely any inconvenient with the monitoring system or the monitoring instrument. Nueva Aldea Phase 1 plant counts with a qualified electronic control area, which were the responsible of the continuity operation of the monitoring instruments.

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 used, fossil fuel consumption and net quantity of electricity generated data is monitored continuously and automatically by the Data Control System (DCS). The data is recorded daily and then is aggregated monthly. The information is partially processed and stored on-site, and is sent periodically (monthly) to Arauco Bioenergía S.A. in Santiago for further and final processing (table formats, reports, etc.). With the information at this level, Arauco carries out the external verifications to verify the emission reduction of the Nueva Aldea Power Plant Phase 1 project activity periodically (i.e. once every year).

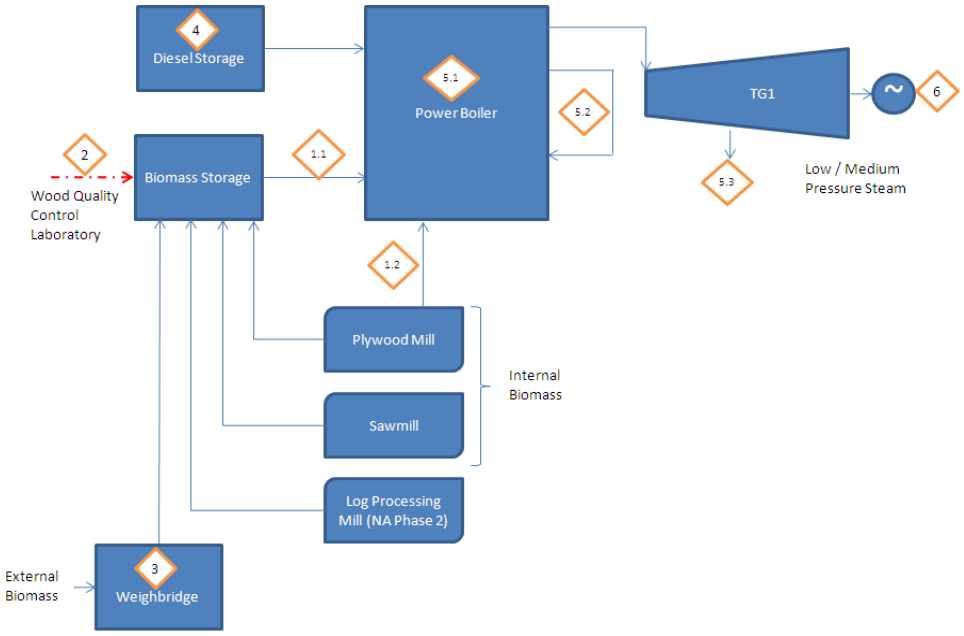
The following table shows the monitoring information flow implemented by Arauco Bioenergía S.A. for the project activity.

Monitoring information flow of Nueva Aldea Power Plant Phase 1 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.

Line Diagram of the Instruments



ITEM	TAG	INSTRUMENT
1.1	431-FIQ-916	Biomass Mix Conveyor Belt weight meter
1.2	463-FIQ-174	Sander Dust Conveyor Belt weight meter
2	N/A	Electronic Moisture Analyzer
3	N/A	Weighbridge 1
	N/A	Weighbridge 2
	N/A	Weighbridge 3
4	461-LT-0460	Level Transmitter
5.1	463-PT-0106	Pressure Transmiter Feed Water
	463-TT-0110	Temperature Transmiter Feed Water
5.2	463-FT-0402	Steam Flow Meter 85 bar (Soot blower)
	463-PT-0403	Pressure Transmiter 85 bar (Soot blower)
	463-TT-0406	Temperature Transmitter 85 bar (Soot blower)
5.3	465-FT-9027	Steam Flow Meter 19 bar (Plywood Mill)
	565-FT-0965	Steam Flow Meter 19 bar (Pulp Mill)
	465-PIT-9000-A	Pressure
	465-PIT-9000-B	Pressure Transmitter 19 bar (Main line)
	465-TT-9028	Temperature Transmitter 19 bar (Pulp Mill)
	465-FT-9025	Steam Flow Meter 11.5 bar (AASA)
	465-PIT-9001-A	Pressure
	465-PIT-9001-B	Pressure
	465-TT-9026	Temperature Transmitter 11.5 bar
	465-FT-9019	Steam Flow Meter 5.5 bar (AASA)
	465-FT-9023	Steam Flow Meter 5.5 bar (Boiler)
	462-FT-9150	Steam Flow Meter 5.5 bar (Deaerator)
	465-PIT-9002-A	Pressure
	465-PIT-9002-B	Pressure
	465-PIT-9002-C	Pressure
	465-TT-9024	Temperature Transmitter 5.5 bar
6	468-PM-008	Energy Meter Switchgear 1-8
	468-PM-006	Energy Meter Switchgear 1-6

Note: Internal and external biomass (excluding sander dust, for security reasons) is deposited and mixed in the zone called "Biomass storage". The biomass combusted in the power boiler is measured by conveyor belt weight meters (in the diagram: 1.1, 1.2). The average residence time of the biomass in the storage is one week.

SECTION D. Data and parameters

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

Data / Parameter:	ε_{Boiler}
Unit:	(%)
Description:	Boiler energy efficiency in the absence of the project activity.
Source of data	This is the energy efficiency of the boiler that would be used in the absence of the project activity. This parameter is used in equation N°24 of the ACM0006/version 01. The efficiency of the boiler that would have been installed in the absence of the project activity is 85%. 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.
Value(s) applied:	85%
Purpose of data:	Baseline emissions calculations.
Additional comment:	

Data / Parameter:	GWP_{CH4}
Unit:	(tCO_2e/tCH_4)
Description:	Global Warming Potential of methane.
Source of data:	IPCC.
Value(s) applied):	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Purpose of data:	Baseline emissions calculations.
Additional comment:	Until the next COP/MOP decision, it is the accepted value for emission reduction calculations in CDM project activities.

Data / Parameter:	$EF_{burning\ CH4,i}$
Unit:	(tCH_4/TJ)
Description:	CH_4 emission factor for uncontrolled burning of the biomass type i.
Source of data:	Local measured value.
Value(s) applied):	696.07
Purpose of data:	Baseline emissions calculations.

Additional comment:	According to the baseline methodology ACM0006 / Version 01, page 33, the Project Participant may undertake measurements or use referenced default values to calculate the CH_4 baseline emissions from uncontrolled burning of biomass. Given that by the time the PDD was written there were no local measurements available, the validator indicated the Project Participant to use the IPCC default factor corrected by the lowest conservativeness factor (Table Nº4, page 34 of the ACM0006/version 01). This generated extremely conservative CH_4 baseline emissions for the project activity, since when the biomass residues are burned in piles in the open air, the combustion occurs under very low oxygen conditions and therefore is very inefficient. Inefficient combustion leads to high CH_4 emissions. As a result, the Project Participant explicitly mentioned in page 66 of the registered PDD that a local CH_4 measurement would be attempted in the future in order to have a more accurate and fair estimation of the baseline emissions from this source. During September 2006, the Project Participant hired the U.S. Forest Service of Missoula, USA to conduct a local measurement of the CH_4 emission factor for uncontrolled burning of biomass in the nearby area of the Power Plant. The result of this measurement indicated a CH_4 emission factor for uncontrolled burning of the same type of biomass used in the Nueva Aldea Power Plant Phase 1 of 740.5 (Kg CH_4/TJ), with an associated standard deviation of 162.2 (Kg CH_4/TJ). According to Table 4 of the ACM0006/version 01 baseline methodology, this led to a conservativeness factor of 0.94, resulting in an adjusted CH_4 baseline emission factor for uncontrolled burning of biomass of 696.1 (Kg CH_4/TJ). The CH_4 emission factor was measured again during March 2009(summer time). The result of this measurement indicated a CH4 emission factor for uncontrolled burning of 930 (Kg CH_4/TJ), with an associated standard deviation of 173 (Kg CH_4/TJ). Considering that the 2009 measurement was carried out under very conservative conditions (summer season, when the biomass residues are drier), the lower methane emission factor used for the emission reduction calculation in this case is certainly conservative.

D.2. Data and parameters monitored

Data / Parameter:	**$BF_{i,y}$**
Unit:	(BDt/year)
Description:	Quantity of Biomass type *i* combusted in the project plant during the year y.
Measured/ Calculated / Default:	Measured.

Source of data:	Power Plant's procurement department. This variable was directly monitored in wet basis using weight meters at the entrance of the power boiler. Then is transformed to a dry basis using the monitored biomass moisture (ID number 26, of the current revised monitoring plan).
Value(s) of monitored parameter:	425,958 (BDt)
Monitoring equipment:	431-FIQ-916 Type: Biomass Mix Conveyor Belt weight meter Accumass BW500 Accuracy class: +/- 0.5% Serial number: PBD/W6020051PJ Calibration frequency: 6 months Dates of calibration: 14/12/2010-02/07/2011-03/11/2011-13/12/2011 Validity: 13/06/2012 463-FIQ-174 Type: Sander dust Conveyor Belt weight meter KCM/SWB-600 Accuracy class: +/- 1% Serial number: 965691 Calibration frequency: 6 months Dates of calibration: 29/12/2010-02/06/2011-13/12/2011 Validity: 13/06/2012
Measuring/ Reading/ Recording frequency:	Continuously. Sawdust and bark are measured by a weight meter installed in the feed conveyor belt. Sander dust is measured by a weight meter installed in the feed closed piping. Sander dust is a highly flammable material and must be transported separately for safety reasons.
Calculation method (if applicable):	In order to obtain the amount of biomass consumed in the project plant on a dry basis (reported value), moisture content is deducted from the total amount of biomass consumed on a wet basis (measured by the weight meters). Dry biomass (BDt) = Wet biomass (t) x (1 - % moisture)

QA/QC procedures:	All instruments involved in the measurement of biomass flows received maintenance and calibration according to the manufacturer's manual and / or proper industry standards, respecting the frequencies recommended by the supplier. The calibration results were according to the instruments' maximum permissible error, and no corrections were needed. Since the Nueva Aldea Complex (as well as most of Arauco facilities) uses the SAP systems, there are periodic and continuous consistency checks between the information that is loaded in SAP and the receipts from all suppliers including biomass. This is necessary not only to ensure the accuracy of the information used to calculate the Nueva Aldea Phase 1 net emission reductions, but also to ensure the good quality of the information used for accounting and tax-reporting purposes. This further ensures the good quality of the information used to calculate the emission reductions of the Nueva Aldea Phase 1 project. In addition to the above, the Project Participant carried out an annual energy balance as a consistency crosschecking measure, and the result was 86.6% for the efficiency of the power boiler. All biomass values were consistent with the efficiency of the power plant (The manufacturer reference indicates 87%). The Project Participant also crosschecked the measurements through stock variations (i.e. topographic variations) and purchases. The average difference between the weighted biomass mix (measured by instrument TAG 431-FIQ-916) and the stock variations biomass mix (measured by topographic methods) was 9.57%. This difference can be explained by the following reasons: 1.- As was declared below, the associated error to the topographic method is +/- 7%. 2.- The annual energy balance to assure the quality of the biomass measure is consistent with the expected efficiency of the power boiler (86.6% obtained efficiency compared to 87%, efficiency declared by the manufacturer). Then the Project Participant can assure that the biomass mix measurement was accurate.
Purpose of data:	Baseline and project emissions calculations.
Additional comment:	There exist gaps in calibration frequency for the equipment: • 431-FIQ-916 between 14/06/2011 and 02/07/2011, • 463-FIQ-174 between 02/12/2011 and 13/12/2011. According EB52 annex 60, Project Participant applied the maximum permissible error, in a conservative manner, to the measured values taken during the period between the scheduled calibration date and the last calibration date.

Data / Parameter:	**NCV_i**
Unit:	(GJ/ton)
Description:	Net calorific value of biomass type i.

Measured/ Calculated / Default:	Measured.
Source of data:	This variable is measured in a specialized laboratory. The measurement is carried out according to proper industry standards. The Power Plant's procurement department is responsible for ordering NCV analyses and communicating results.
Value(s) of monitored parameter:	16.47 (GJ/ton)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually, according to the definition in the methodology ACM0006/Version 01, page 40.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	During the monitored period, the NCV of the biomass type combusted in the power boiler was measured, presenting minimum differences with values obtained in previous years:

Year	NCV_i Kcal/Kg	Date
2005	4,296	11/07//2005
2006	4,265	31/08/2006
2007	4,297	16/08/2007
2008	4,294	05/03/2008
2009	4,298	07/05/2009
2010	4,052	17/05/2010
2011	3,937	30/11/2011

Also, the measured net calorific value of the biomass was consistent with the values of net calorific values found for Wood/Wood Waste in Table 1.2, Volume 2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

	Net Calorific value (TJ/Gg)	Lower	Upper
IPCC Factor	15.6	7.9	31
Average NCVi Project	17.6		
2011 NAPh 1	16.47		

Purpose of data:	Baseline emissions calculations.
Additional comment:	

Data / Parameter:	EF_{CH4}
Unit:	(Kg CH_4/TJ)
Description:	Methane emission factor for combustion of biomass in the project plant.

Measured/ Calculated / Default:	Default.
Source of data:	IPCC default value. (2006 IPCC Guidelines for National Greenhouse Gas Inventories).
Value(s) of monitored parameter:	30.6 Kg CH_4/TJ
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	In this case, the Project Participant used the default factor provided by IPCC Guidelines for National GHG Inventories.
Purpose of data:	Project emissions calculations.
Additional comment:	The Project Participant requested the U.S. Forest Service of Montana to carry out two CH_4 emission factor measurements for biomass controlled burning: One in Nueva Aldea Phase 1 boiler and the other one in a fluidized bed boiler similar to the one used in Nueva Aldea Phase 1 power plant. The results of the measurements indicated that the CH_4 concentration in the flue gases (in ppm) was actually lower than the concentration of CH_4 found in the clean air. Considering this result and that the Project Participant is using a positive IPCC default factor for controlled burning of biomass (30.0 Kg CH_4/TJ) applying a conservativeness factor of 1.02 as per ACM0006/version 1 (30.6 (Kg CH_4/TJ)) to calculate this project emission source, the result is conservative.

Data / Parameter:	**AVD_y**
Unit:	(Km)
Description:	Average return trip distance between biomass fuel supply sites and the project site.
Measured/ Calculated / Default:	Measured.
Source of data:	Power Plant's procurement department. Distances from biomass suppliers to the Plant were continuously monitored and recorded.
Value(s) of monitored parameter:	92.1 (Km)
Monitoring equipment:	Not applicable.

Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	Since the location of each biomass supplier is known (100% of third party biomass comes from permanent type sawmills in the nearby area), distances were obtained from the transportation subcontractors and verified with regional roadmaps. The distances are defined by Forestal Celco and it is not possible that a truck proceeding from other supplier can enter the power plant. The distances are verified between Forestal Celco and Nueva Aldea Phase 1 power plant. No differences or errors were detected.
Purpose of data:	Project emissions calculations.
Additional comment:	

Data / Parameter:	**TL_y**
Unit:	(ton)
Description:	Average truck load of the trucks used for transportation of biomass.
Measured/ Calculated / Default:	Measured
Source of data:	Power Plant's procurement department.
Value(s) of monitored parameter:	25.2 (ton)
Monitoring equipment:	Type: Weighbridge 1: North entrance JAGXTREME Accuracy class: Class III (+/- 30 kg) Serial number: 5437967-5GF Calibration frequency: Biannual Dates of calibration: 26/07/2010-25/01/2011-27/07/2011 Validity: 27/01/2012* Type: Weighbridge 2: South entrance JAGXTREME Accuracy class: Class III (+/- 30 kg) Serial number: 5429421-5EF Calibration frequency: Biannual Dates of calibration: 26/07/2010-25/01/2011-27/07/2011 Validity: 27/01/2012 Type: Weighbridge 3: Truck exit JAGXTREME Accuracy class: Class III (+/- 30 kg) Serial number: 5437969-5GF Calibration frequency: Biannual Dates of calibration: 26/07/2010-25/01/2011-27/07/2011 Validity: 27/01/2012
Measuring/ Reading/ Recording frequency:	Continuously. Every truck that transported biomass to the Power plant were properly weighted at calibrated Weighbridge gates, and informed in data system.

Calculation method (if applicable):	This parameter is determined monthly dividing the total amount of biomass received by the total number of trucks. The obtained average is recorded on a monthly basis for the calculation of the emission reductions.
QA/QC procedures:	Trucks that transport biomass are all of known (recorded) sizes. This variable was obtained from measured data (weight and volume of the cargo). Weighbridges meters received periodic maintenance and calibration as per instructed by the equipment manufacturer and according proper industry standards, respecting the frequencies recommended by the supplier. The calibration results were according the instruments maximum permissible error, and no corrections were needed.
Purpose of data:	Project emissions calculations.
Additional comment:	*The recommended biannual frequency of calibration means twice a year and not necessarily once every six months.

Data / Parameter:	**$EF_{Km,CO2}$**
Unit:	(tCO_2/Km)
Description:	Average CO_2 emission factor for transportation of biomass with trucks.
Measured/ Calculated / Default:	Calculated.
Source of data:	CO_2 emission factor was calculated using the following data: - Average fuel consumption obtained from the transportation subcontractors. - Net calorific values and diesel fuel density obtained from measures declared by the local supplier. - Diesel carbon content obtained from IPCC factors.
Value(s) of monitored parameter:	0.001351 (tCO_2/Km)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually. Average CO_2 emission factor for transportation of biomass with trucks was calculated in accordance to methodology, using: - The fuel performance data provided by the subcontractors for all the trucks that transported biomass to the power plant. - NCV_{diesel} and Diesel density obtained from the local supplier. - Carbon content of diesel, Fraction of carbon oxidized and CO_2/C conversion factor obtained from IPCC factors. This variable was calculated once a year, and recorded in electronic files.
Calculation method (if applicable):	$EF_{km,diesel}$= NCV_{diesel} *Carbon content of diesel* Fraction of carbon oxidized* CO_2 / C conversion factor * Diesel Fuel density /Average fuel performance of trucks.

QA/QC procedures:

Values used to obtain the average CO_2 emission factor for transportation of biomass with trucks, were checked as follows:
- The average fuel performance of trucks was compared with historical values.

Year	Average Fuel performance Km/l*
2007	2.06
2008	1.84
2009	1.95
2010	2.03
2011	1.98

*Average for past Monitoring periods equal to 1.97. Obtained value in 2011 is between the minimum and maximum value in this crediting period.

- Local values of NCV_{diesel} were compared with IPCC values and found to be in the range published by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories:

	Net Calorific value TJ/Gg	Lower	Upper
NCV_{diesel} IPCC	43.0	41.4	43.3
NCV_{diesel} Project	42.79		

- Diesel fuel density was compared with official values provided by the National Energy Commission (Energy Balance 2010, CNE).

	Density
CNE Diesel Density 2011	0.840
Project Density 2011	0.8443

Finally, the emission factor of trucks was compared with that obtained in previous years for the Nueva Aldea Phase 1 and similar projects by Arauco:

	CO_2 emission factor of trucks (kg CO_2/km).		
Year	Nueva Aldea Phase 1	Valdivia Project Plant Ref:1787	Trupán Biomass Power Plant Ref:0259
2011	1.351	1.251	1.172
2010	1.317	1.271	1.130
2009	1.351	1.260	1.348
2008	1.451	-	1.397
2007	1.291	-	1.431

Then, the final value is in the expected range.

Purpose of data:	Project emissions calculations.
Additional comment:	

Data / Parameter:	**$F_{Trans,i,y}$ (in the PDD, this variable appears as $OF_{i,y}$)**
Unit:	(l)
Description:	Fuel consumption of fuel type i used for transportation of biomass.
Measured/ Calculated / Default:	Measured
Source of data:	Power Plant's procurement department.
Value(s) of monitored parameter:	95,259 (L)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Continuously. This variable was obtained from the transportation subcontractors' information, and monitored continuously. For the calculation of the emission reductions, this variable was aggregated and recorded monthly.
Calculation method (if applicable):	In order to determine the amount of fossil fuel used for the transportation of biomass which is attributable to the project activity, the total amount of fossil fuel (monitored value) is multiplied by the ratio: biomass attributable to the baseline scenario / total biomass consumed. This provides the amount of fossil fuel that would have been consumed in the baseline scenario for biomass transportation within the project site. By subtracting total fossil fuel from fossil fuel consumed in the baseline scenario, fossil fuel consumption attributable to the project activity is obtained. 95,259 (L) x 182,065 (BDt) / 425,958 (BDt) = 40,716 (L) 95,259 (L) – 40,176 (L) = 54,543 (L) attributable to the project activity.

QA/QC procedures:

According to the current Revised Monitoring plan, front loaders fuel consumption was crosschecked against hourly fuel consumption rates.

Front loaders Additional Fossil Fuel consumption** [l]	Front loaders measured Fossil Fuel consumption [l]	Front loaders expected* Fossil Fuel consumption [l]	Difference [%]
54,543	95,259	93,346	2.05%

*According to the past hourly fuel consumption rates
** Only front loader consumption indicated in this case

Internal truck consumption was checked using the index: number of internal trips/biomass consumed in the power boiler (BDt)

	Biomass (BDt)	Number of truck trips	Index (trips / BDt)
January	40,949	185	0.0045
February	33,423	154	0.0046
March	39,444	165	0.0042
April	35,632	157	0.0044
May	33,317	158	0.0047
June	30,224	148	0.0049
July	37,566	147	0.0039
August	34,538	162	0.0047
September	35,276	160	0.0045
October	37,204	162	0.0044
November	32,525	150	0.0046
December	35,860	147	0.0041
Total	425,958	1,895	
Average			0.0045

As shown, results were consistent from month to month.

It is important to note that the biomass transportation inside the plant is an outsourced service.

Purpose of data:	Project emission calculations.
Additional comment:	

Data / Parameter:	**$COEF_{CO2,i,}$**
Unit:	(tCO_2/ton)
Description:	CO_2 emission factor for the fuel type i.
Measured/ Calculated / Default:	Calculated.

Source of data:	These emission factors were determined using the net calorific values measured by the local suppliers. Carbon content and fraction of carbon oxidized of the corresponding fossil fuels are values supported by the IPCC.
Value(s) of monitored parameter:	3.169 (tCO_2/ton)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	$COEF_{CO_2,diesel}$= NCV_{diesel} *Carbon content of diesel* Fraction of carbon oxidized* CO_2 / C conversion factor.
QA/QC procedures:	The values used by the Project Participant are provided by Local supplier's measurements, and compared with the ranges defined by the IPCC. The final values are in the expected range.
Purpose of data:	Project emissions calculations.
Additional comment:	

NCV_{diesel} by the provider TJ/ 000 ton	NCV_{diesel} from IPCC TJ/ 000 ton		
	Default	Lower	Upper
42.79	43	41.4	43.3

Data / Parameter:	**$FF_{project\ plant,i,y}$ (in the PDD, this variable appears as FF_y)**
Unit:	(l)
Description:	On-site fossil fuel consumption of fuel type i for co-firing in the project plant.
Measured/ Calculated / Default:	Measured.
Source of data:	Fossil fuel consumption in the power boiler is measured by dedicated meters.
Value(s) of monitored parameter:	Diesel: 1,515,690 (l) LPG: 520 (l) (see comments at the bottom of this table)

Monitoring equipment:	461-LT-0460 Type: Level transmitter 264HCHRBEFSSA1/E6/L1/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404010868 Calibration frequency: 12 months Dates of calibration: 11/12/2010-07/06/2011 Validity: 07/06/2012 Type: Propane tank level transmitter ROCHESTER GAUGES 6283-J21-41-J01 Serial number: Not Available. Calibration: Though this instrument is property of the propane supplier and not belong to the Project Participant, calibrations must be done in order to comply with the Chilean law "Reglamento de servicio de gas de red"	
Measuring/ Reading/ Recording frequency:	This variable is continuously monitored.	
Calculation method (if applicable):	In order to determine the amount of fossil fuel consumed in the power boiler which is attributable to the project activity, the total amount of fossil fuel (measured/monitored value) is multiplied by the ratio: biomass attributable to the baseline scenario / total biomass consumed. This provides the amount of fossil fuel that would have been consumed by the power boiler in the baseline scenario. By subtracting total fossil fuel from fossil fuel consumed in the baseline scenario, fossil fuel consumption attributable to the project activity is obtained. Diesel: 1,515,690 (L) x 182,065 (BDt) / 452,958 (BDt) = 647,846 (L) 1,515,690 (L) – 647,846 (L) = 867,844 (L) attributable to the project activity. LPG 520 (L) x 182,065 (BDt) / 452,958 (BDt) = 222 (L) 520 (L) – 222 (L) = 298 (L) attributable to the project activity.	

QA/QC procedures:	Fuel meters received periodic maintenance and calibration as per instructed by the equipment manufacturer and according proper industry standards, respecting the frequencies recommended by the supplier. The calibration results were according the instruments maximum permissible error, and no corrections were needed. The consistency of metered fuel consumption was checked with purchase dispatch bills, as follows: Initial stock (January 2011): 191,590 (l) Final stock (December 2011): 211,600 (l) Purchases: 1,535,700 (l) 2011 consumption: 1,515,690 (l) The difference between total purchases and the fuel balance (initial stock + purchases – final stock) was 0.02%.
Purpose of data:	Project emissions calculations.
Additional comment:	LPG is used only occasionally during plant start-ups.

Month 2011	Purchase bills quantities	Quantity per truck [l]	Fossil fuel Purchase quantity
January	4	32,000	128,000
February	1		32,000
March	1		32,000
April	0		0
May	0		0
June	3		96,000
July	5		160,000
August	9		256,000
September	22		672,000
October	0		0
November	4		128,000
December	2		64,000

Data / Parameter:	**$EG_{project\ plant,y}$**
Unit:	(MWh)
Description:	Net quantity of electricity generated in the project plant during the year y[1].
Measured/ Calculated / Default:	Measured.
Source of data:	Power Plant electric meters. This variable was monitored using electric meters that are standard in the electric power industry in Chile.
Value(s) of monitored parameter:	206,937 (MWh)

[1] According to page 24 of the current methodology ACM0006/Version 01, in scenario 3, $EG_y = EG_{project\ plant,y}$, and page 21, Equation 8, specified that EG_y is the net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh.

<table>
<tr><td>Monitoring equipment:</td><td>468-PM-006
Type: Energy Meter Switchgear (1-6) Power Measurement ION 7330 V277
Accuracy class: +/- 0.5%
Serial number: PB-0401A178-11
Calibration frequency: 7 years
Date of last calibration: 12/12/2010[2]
Validity: until 2013

468-PM-008
Type: Energy Meter Switchgear (1-8) Power Measurement ION 7330 V277
Accuracy class: +/- 0.5%
Serial number: PB-0401A161-11
Calibration frequency: 7 years
Date of last calibration: 12/12/2010
Validity: until 2013</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Continuously. Energy values are recorded every 15 minutes and aggregated monthly.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Not applicable.</td></tr>
<tr><td>QA/QC procedures:</td><td>Electricity meters received periodic maintenance and calibration as per instructed by the equipment manufacturer. In 12/12/2010 the ION 7330 supplier (Schneider electric) extended the useful life of these instruments applying a validity control check. The validity report recommended changes the equipment during the year 2013. During the validity control check both equipment approve all the measurements validations.

In addition, the Nueva Aldea Phase 1 administration performed periodic (monthly) consistency checks in the substation electric bus where the Nueva Aldea Biomass Power Plant Phase 1 connects to the SIC grid. The consistency of metered net electricity generation was also crosschecked with receipts from electricity.

<table>
<tr><td colspan="4">Monthly consistency between the electric meters in power plant and the connection electric substation*</td></tr>
<tr><td>January</td><td>6.82%</td><td>July</td><td>1.54%</td></tr>
<tr><td>February</td><td>7.93%</td><td>August</td><td>-3.13%</td></tr>
<tr><td>March</td><td>6.75%</td><td>September</td><td>0.86%</td></tr>
<tr><td>April</td><td>6.08%</td><td>October</td><td>0.84%</td></tr>
<tr><td>May</td><td>5.31%</td><td>November</td><td>-1.24%</td></tr>
<tr><td>June</td><td>4.38%</td><td>December</td><td>1.44%</td></tr>
</table>
* The difference can be between +/-7% due to electricity losses in the net.

<table>
<tr><td>Sold electricity (Mwh) - Invoices</td><td>Net Sold electricity (Mwh) - Metered</td><td>% Deviation</td></tr>
<tr><td>93,729</td><td>96,929</td><td>3.41%</td></tr>
</table>
</td></tr>
</table>

[2] In 12/12/2010 the ION 7330 supplier (Schneider electric) extended the useful life of the equipment applying a validity control check. The validity report recommended changes the equipment during the year 2013.

	Finally, the plant manager also performed consistency checks between the electricity generated by the cogeneration plant and the amount of fuels combusted in the power plant during the monitored period (The annual energy balance checks whether the electricity generation divided by the quantity of biomass fired results in a reasonable efficiency that is comparable to previous years). Results were as follows: Year | Mwh/m^3st 2007 | 0.10 2008 | 0.10 2009 | 0.10 2010 | 0.09 2011 | 0.09
Purpose of data:	Baseline emissions calculations.
Additional comment:	To calculate the net electric power generation of the Nueva Aldea Power Plant Phase 1, only the additional internal power plant electric power consumption is subtracted (1.5MW), not the total internal electric power consumption of the real power plant (3.6MW). The reason for this is that in the baseline scenario, there would have also been a power plant (that would have only generated steam), which would have had an internal electric power consumption of 2.1MW. The Nueva Aldea Power Plant Phase 1 has a total net capacity of 28 MW, however only 13 MW are injected to the grid and the remaining 15 MW are consumed in the Nueva Aldea Complex (Phase 1). Despite this, the emission calculation is done considering the total power output (28 MW), since if the power plant had not been built (baseline case), it would have been necessary to buy 15MW from the SIC grid and the 13MW of excess clean power would have not been available in the SIC.

Data / Parameter:	**Q_y**
Unit:	(GJ)
Description:	Net quantity of heat generated from firing biomass in the project plant.
Measured/ Calculated / Default:	Measured and Calculated.
Source of data:	The net quantity of heat generated from firing biomass residues in the project plant is calculated using data from dedicated steam flow, pressure and temperature meters.
Value(s) of monitored parameter:	2,549,198 (GJ)

	Monitoring equipment:	462-FT-9150 Type: Steam flow meter 5.5 bar (Deaerator) ABB 264DSGSSB2A3/V1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404006181 Calibration frequency: 18 months Date of calibration: 08/12/2010 Validity: 07/06/2012 463-FT-0402 Type: Steam flow meter 85 bar (Soot blower) ABB 264DSHSSB2A3/V1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6403015454 Calibration frequency: 18 months Date of calibration: 07/12/2010 Validity: 06/06/2012 463-PT-0106 Type: Pressure Transmitter Feed water ABB 264PSSSSB2A3V1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6403015456 Calibration frequency: 18 months Date of calibration: 07/12/2010 Validity: 06/06/2012 463-PT-0403 Type: Pressure Transmitter 85 bar (Soot blower) ABB 264PSQSSB2A3V1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6403015460 Calibration frequency: 18 months Date of calibration: 07/12/2010 Validity: 06/06/2012 463-TT-0110 Type: Temperature Transmitter Feed water Rosemount 3244MVF1NAA01B4C2C4Q4 Accuracy class: +/- 0.10 °C Serial number: 458205 Calibration frequency: 5 years Date of calibration: 07/12/2010 Validity: 06/12/2015 463-TT-0406 Type: Temperature Transmitter 85 bar (Soot blower) Rosemount 3244MVF1NAA01B4C2C4Q4 Accuracy class: +/- 0.10 °C Serial number: 458156 Calibration frequency: 5 years Date of calibration: 08/12/2010 Validity: 07/12/2015 465-FT-9019 Type: Steam flow meter 5.5 bar (AASA) Rosemount	

		3051SFADS120DCHPS2T100072AF1A2G2Q4F2 Accuracy class: +/- 0.025% Serial number: 34310 Calibration frequency: 5 years Date of last calibration: 09/12/2010 Validity: 08/12/2015 465-FT-9023 Type: Steam flow meter 5.5 bar (Boiler) Rosemount 3051SFADS180ZCHPS52T1000 Accuracy class: +/- 0.025% Serial number: 24439 Calibration frequency: 5 years Date of calibration: 10/12/2010 Validity: 09/12/2015 465-FT-9025 Type: Steam flow meter 11.5 bar (AASA) Rosemount 3051SFADS120DCHPS2T100072AF1A2G2Q4F2 Accuracy class: +/- 0.025% Serial number: 8808 Calibration frequency: 5 years Date of calibration: 09/12/2010 Validity: 08/12/2015 465-FT-9027 Type: Steam flow meter 19 bar (Plywood mill) Rosemount 3051SFADS120DCHPS2T100072AF1A2G2Q4F2 Accuracy class: +/- 0.025% Serial number: 8809 Calibration frequency: 5 years Date of calibration: 09/12/2010 Validity: 08/12/2015	

		465-PIT-9000-A Type: Pressure Transmitter 19 bar (Main line) ABB 264PSQSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008677 Calibration frequency: 18 months Date of calibration: 10/12/2010 Validity: 09/06/2012 465-PIT-9000-B Type: Pressure Transmitter 19 bar (Main line) ABB 264PSQSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008676 Calibration frequency: 18 months Date of calibration: 10/12/2010 Validity: 09/06/2012 465-PIT-9001-A Type: Pressure Transmitter 11.5 bar (Main line) ABB 264PSPSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008680 Calibration frequency: 18 months Date of calibration: 09/12/2010 Validity: 08/06/2012 465-PIT-9001-B Type: Pressure Transmitter 11.5 bar (Main line) ABB 264PSPSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008679 Calibration frequency: 18 months Date of calibration: 09/12/2010 Validity: 08/06/2012 465-PIT-9002-A Type: Pressure Transmitter 5.5 bar (Main line) ABB 264PSPSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008685 Calibration frequency: 18 months Date of calibration: 10/12/2010 Validity: 09/06/2012 465-PIT-9002-B Type: Pressure Transmitter 5.5 bar (Main line) ABB 264PSPSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404027440 Calibration frequency: 18 months Date of calibration: 10/12/2010 Validity: 09/06/2012	

	465-PIT-9002-C Type: Pressure Transmitter 5.5 bar (Main line) ABB 264PSPSSB2A3/V1/L1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6404008681 Calibration frequency: 18 months Date of calibration: 10/12/2010 Validity: 09/06/2012 465-TT-9024 Type: Temperature Transmitter 5.5 bar Rosemount 3244MVF1NAA01B4C2C4Q4 Accuracy class: +/- 0.10 °C Serial number: 456395 Calibration frequency: 5 years Date of calibration: 11/12/2010 Validity: 10/12/2015 465-TT-9026 Type: Temperature Transmitter 11.5 bar Rosemount 3244MVF1NAA01B4C2C4Q4 Accuracy class: +/- 0.10 °C Serial number: 456304 Calibration frequency: 5 years Date of calibration: 11/12/2010 Validity: 10/12/2015 465-TT-9028 Type: Temperature Transmitter 19 bar Rosemount 3244MVF1NAA01B4C2C4Q4 Accuracy class: +/- 0.10 °C Serial number: 456397 Calibration frequency: 5 years Date of calibration: 09/12/2010 Validity: 08/12/2015 565-FT-0965 Type: Steam flow meter 19 bar (Pulp mill) ABB 264DSMSSA2A3/V1/B2/I2/N6/C1 Accuracy class: +/- 0.075% Serial number: 6406022860 Calibration frequency: 18 months Date of calibration: 05/05/2010-24/03/2011 Validity: 23/09/2012	
Measuring/ Reading/ Recording frequency:	Continuously.	
Calculation method (if applicable):	Specific enthalpy for each steam flow is drawn from thermodynamic tables. Entry values for the tables are pressure and temperature of each steam flow. By multiplying enthalpy times steam flow, the heat quantity carried by each flow is obtained. Q_y is the sum of these heat quantities.	

QA/QC procedures:	The associated uncertainty is very low, since these parameters are key to the production processes of the Nueva Aldea Complex and therefore, receive periodic maintenance according to proper industry standards, respecting the frequencies recommended by the supplier. The calibration results were according the instruments maximum permissible error, and no corrections were needed. The consistency of metered net heat generation was crosschecked by comparing net heat generated by the power boiler with the amount of fuels combusted in the power plant during this monitoring period. The Project Participant checked whether the heat generation divided by the quantity of biomass fired, calculating a thermal efficiency of 86.6%, results in a reasonable efficiency that is comparable to previous years.

Year	Thermal efficiency
2007	85.8%
2008	89.2%
2009	79.0%
2010	84.3%
2011	86.6%

Also, the Project Participant calculated the thermal efficiency index as described in the methodology (ACM0006 v 1): Steam to process expressed in energy units was divided by the total amount of biomass fuel combusted (expressed in m^3st).

Year	Thermal efficiency (steam to process (GJ) / biomass combusted (m^3st))
2007	1.1
2008	1.0
2009	0.9
2010	0.9
2011	1.0

Results were consistent from year to year.

Purpose of data:	Baseline emissions calculations.
Additional comment:	--

Data / Parameter:	**$EF_{OM,y}$**
Unit:	(tCO_2/MWh)
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 IPCC values.
Value(s) of monitored parameter:	0.709144 (tCO_2/MWh)

Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Calculated using equation N° 4 of the ACM0002/version 04, according the simple adjusted OM method. Full year data was used to calculate each emission factor. The calculation of this emission factor is in the Annex of this Monitoring Report.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emissions calculations.
Additional comment:	

Data / Parameter:	**$EF_{BM,y}$**
Unit:	(tCO_2/MWh)
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 IPCC values.
Value(s) of monitored parameter:	0.68243 (tCO_2/MWh)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Calculated using equation N° 9 of the ACM0002/version 04. In this case, the BM was calculated for each year (ex-post) and in each case, the weighted average of the emission coefficients of the most recent power plants responsible for 20% of the total power generation each year was used. Full year data was used to calculate each emission factor. The calculation of this emission factor is in the Annex of this Monitoring Report.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emissions calculations.

Additional comment:	

Data / Parameter:	**EF_y**
Unit:	(tCO_2/MWh)
Description:	CO_2 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 IPCC values.
Value(s) of monitored parameter:	0.69579 (tCO_2/MWh)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Calculated using equation N° 10 of the ACM0002/version 04. In this case, the grid emission factor was calculated ex-post as the weighted average of $EF_{OM,y}$ and $EF_{BM,y}$. Each one of these factors was assigned equal weight, i.e: 50%.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emissions calculations.
Additional comment:	--

Data / Parameter:	**$F_{i,y}$**
Unit:	Refer to the CO_2 grid emission factor calculation excel sheet.
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's public information and host country government official information.
Value(s) of monitored parameter:	Refer to the CO_2 grid emission factor calculation excel sheet.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.

Calculation method (if applicable):	Not applicable.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emissions calculations.
Additional comment:	

Data / Parameter:	**$COEF_i$**
Unit:	Units in (tCO_2/000ton) except Natural Gas, Butane, Propane and Natural Gas Liquid (tCO_2/MMm^3)
Description:	CO_2 emission coefficient of each fuel type i consumed by the electric power generators 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: 2,581 (tCO_2/000ton) Petcoke: 2,306 (tCO_2/000ton) Diesel: 3,145 (tCO_2/000ton) Natural Gas: 1,909 (tCO_2/MMm^3) IFO 180: 3,155 (tCO_2/000ton) Butane Gas: 2,807 (tCO_2/MMm^3) Propane Gas: 2,807 (tCO_2/MMm^3) Liquid Natural Gas: 1,909 (tCO_2/MMm^3)
Monitoring equipment:	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:	Local NCVs and IPCC default carbon contents were used. Local NCVs were compared with IPCC default values and found to be consistent.
Purpose of data:	Baseline emissions calculations.
Additional comment:	

Data / Parameter:	**$GEN_{j/k/n,y}$**
Unit:	(MWh/yr)
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:	Refer to the CO_2 grid emission factor calculation excel sheet.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emission calculations.
Additional comment:	

Data / Parameter:	**--**
Unit:	Text.
Description:	Identification of power source / plant for the OM calculation.
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:	Refer to the CO_2 grid emission factor calculation excel sheet.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emission calculations.
Additional comment:	

Data / Parameter:	**--**
Unit:	Text.

Description:	Identification of power source / plant for the BM calculation.
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:	Refer to the CO_2 grid emission factor calculation excel sheet.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emission calculations.
Additional comment:	

Data / Parameter:	λ_y
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:	0.00010662434
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	As per the corresponding methodology (ACM0002).
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	Baseline emission calculations.

Additional comment:	

Data / Parameter:	**$GEN_{j/k/ll,y\ IMPORTS}$**
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)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	
Additional comment:	

Data / Parameter:	**$COEF_{i,jy\ IMPORTS}$**
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:	Does not apply since there is no interconnection with other transmission systems.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.

QA/QC procedures:	As mentioned in the PDD, the quality control of this data is beyond the control of the Project Participant. However, the Project Participant calculated this emission coefficient from official and publicly available data from the CDEC-SIC dispatch center.
Purpose of data:	
Additional comment:	

Data / Parameter:	**$BF_{i,y}$**
Unit:	(BDt)
Description:	Amount of biomass type i for which leakage could not be ruled out using one of the approaches in the baseline methodology.
Measured/ Calculated / Default:	Measured.
Source of data:	The project did not cause any leakage effect during the monitored period.
Value(s) of monitored parameter:	0 (BDt)
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	As per option L2 and equation N°26 of ACM0006/version 01.
QA/QC procedures:	This parameter has the same QA/QC procedures of parameter BFi,y (Quantity of biomass type i combusted in the project plant).
Purpose of data:	Leakage emission calculations.
Additional comment:	

Data / Parameter:	**--**
Unit:	(BDt)
Description:	Amount of biomass type i fired in all grid-connected power plants in the region / country.
Measured/ Calculated / Default:	Measured or calculated.
Source of data:	Leakage effects were duly considered following the L2 criteria of the ACM0006/version 01. The project did not cause any leakage effect during the monitored period.
Value(s) of monitored parameter:	See table on the leakage section of this monitoring report.
Monitoring equipment:	Not applicable.

Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	As per option L2 and equation N°26 of ACM0006/version 01.
QA/QC procedures:	The biomass surplus index was calculated using official information as priority (National information of INFOR [3] , Environment Ministry and other publication of the forestry sector).
Purpose of data:	Leakage emission calculations.
Additional comment:	

Data / Parameter:	**--**
Unit:	(BDt)
Description:	Amount of biomass type i that was available in surplus in the region / country.
Measured/ Calculated / Default:	Measured or calculated.
Source of data:	Leakage effects were duly considered following the L2 criteria of the ACM0006/version 01. The project did not cause any leakage effect during the monitored period.
Value(s) of monitored parameter:	See table on the leakage section of this monitoring report.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Annually.
Calculation method (if applicable):	As per option L2 and equation N°26 of ACM0006/version 01.
QA/QC procedures:	The biomass surplus index was calculated using official information as priority (National information of INFOR, Environment Ministry and other publication of the forestry sector).
Purpose of data:	Leakage emission calculations.
Additional comment:	

Data / Parameter:	**$COEF_{CO2,j}$**
Unit:	(tCO_2/000ton)
Description:	CO_2 emission factor of the most carbon intensive fuel in the calculation of the combined margin with methodology ACM0002.
Measured/ Calculated / Default:	Default.

[3] INFOR (Forestry Institute) is depending of the Chilean Agriculture Ministry.

Source of data:	Local values were used whenever possible. In cases in which they were not available, IPCC factors were 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.
Monitoring equipment:	Not applicable.
Measuring/ Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	The Project Participant 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.
Purpose of data:	Leakage emission calculations.
Additional comment:	

Data / Parameter:	**--**
Unit:	(%)
Description:	Biomass moisture.
Measured/ Calculated / Default:	Measured.
Source of data:	Nueva Aldea Phase 1 Power Plant's procurement department.
Value(s) of monitored parameter:	52.2%
Monitoring equipment:	Type: Electronic moisture analyser Sartorius AG. Gottingen MA100H-000230V1 Accuracy class: Class I Serial number: 17302238 Calibration frequency: Annual Date of calibration: 05/05/2010-15/07/2011* Validity: 14/07/2012
Measuring/ Reading/ Recording frequency:	Continuously.
Calculation method (if applicable):	Not applicable.
QA/QC procedures:	Electronic moisture analyser received periodic maintenance and calibration as per instructed by the equipment manufacturer and according proper industry standards. The measured data is constantly compared with historic data in order to avoid or minimize errors.
Purpose of data:	Baseline and project emission calculation.

Additional comment:	There exists a gap in the calibration frequency of 2 months and 10 days. According EB52 annex 60, Project Participant applied the maximum permissible error in a conservative manner to the measured values taken during the period between the scheduled date of calibration and the last calibration date.

Data / Parameter:	**--**
Unit:	Not applicable
Description:	Biomass source identification
Measured/ Calculated / Default:	Not applicable
Source of data:	Nueva Aldea Phase 1's reception bills and CONAF dispatch bills
Value(s) of monitored parameter:	Not applicable
Monitoring equipment:	Not applicable
Measuring/ Reading/ Recording frequency:	Recording frequency: Continuously for every truck with biomass residues that enters the power plant.
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Quality control and assurance of this variable relies on the enforcement of the outstanding law pertinent to the forestry sector in Chile. The Nueva Aldea Phase 1 Power Plant only receives biomass from suppliers who declare to fully comply with the Chilean Forestry Law. This law mandates that all harvested forest plantations must be replanted. Therefore, it guarantees the sustainable source of biomass fuels, as well as the source of any other products from the forest industry. The law also establishes that the purchase of products that come from illegally managed forestlands is also considered illegal in Chile. The Chilean forest law is stringent and effectively monitored by the corresponding authority. Failing to comply with the law may imply hefty penalties for the transgressors in some cases. For these reasons all the Arauco industrial facilities tend to be very selective in choosing their suppliers and have tight quality controls in the reception of the raw-materials.
Purpose of data:	--
Additional comment:	

D.3. Implementation of sampling plan

Not applicable

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

Please note the following:

1. 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 with full decimals (no rounding), this implies a decimal precision that is not carried onto word formatted tables because decimals are shown truncated and rounded down. Exact values can be viewed directly in emission reduction calculation spreadsheet.

2. Since the emission reduction calculation for the project activity was done monthly, in some cases year-averages were employed the calculations presented below.

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

Since the baseline scenario is that the current practice continues, i.e. the biomass related to the project activity would be disposed and not utilized for electricity generation. The emission reductions then, result from the avoidance of biomass open-air burning and the electric power generated with fossil fuels. According to this, the baseline emissions for year y were calculated according to the following formula:

$$BL_{E,y} = BL_{E1,y} + BL_{E2,y}$$

Where:

$BL_{E,y}$	Total baseline emissions (tCO_2eq/yr).
$BL_{E1,y}$	Baseline emissions from avoided biomass disposal (tCO_2eq/yr).
$BL_{E2,y}$	Baseline emissions from grid electricity displacement (tCO_2/yr).

Baseline emissions due to natural decay or burning of anthropogenic sources of biomass are calculated using equation D.2.1.4.1 of the current Revised Monitoring Plan (page 14) using the quantity of biomass residues used as a result of the project activity, according to equation N° 24 of the methodology ACM0006/version 01.

$$BE_{E1,y} = GWP_{CH4} \cdot \sum_i BF_{i,y} \cdot NCV_{Biomass,i} \cdot - \frac{Q_y}{\varepsilon_{Boiler}} \cdot EF_{burning,CH4,i}$$

Where:

$BE_{E1,y}$	Emissions due to natural decay or burning of anthropogenic sources of biomass (tCO_2eq/yr).
GWP_{CH4}	Global Warming Potential of methane (21 tCO_2eq/tCH_4).
$BF_{i,y}$	Biomass of type *i* used by the project activity (BDt/yr).
NCV_i	Net calorific value of biomass fuel type i (GJ/BDt).
Q_y	Net quantity of heat generated in the cogeneration project plant during the year y (GJ).
ε_{Boiler}	Energy efficiency of the boiler that would be used in the absence of the project activity.
$EF_{burning,\ CH4,i}$	CH_4 emission factor for uncontrolled burning of biomass type i (tCH_4/GJ).

The corresponding calculations for the monitoring period are presented below.

Data:

	Units	2011
(1) Biomass used by the project activity.	(BDt)	425,958
(2) Net calorific value of biomass fuel type i.	(GJ/ton)	16.47
(3) Net quantity of heat generated in the cogeneration project plant.	(GJ)	2,549,198
(4) Energy efficiency of the boiler that would be used in the absence of the project activity.	(%)	85%
(5) CH_4 emission factor for uncontrolled burning of biomass type i.	(Kg CH_4/TJ)	696.07
(6) CH_4 global warming potential of methane.	(number)	21

Calculations:

(7) Baseline emissions from avoided biomass disposal.	(6)*[[(1)-((3)/(4)*(2))]*(2)]*[(5)/1,000,000]	58,726 (tCO_2)

Baseline emissions due to displacement of electricity are calculated using equation D.2.1.4.2 of the current Revised Monitoring Plan (page 15) by multiplying the electricity baseline emissions factor ($EF_{electricity,y}$) with the net electricity generation of the project activity, according to equation N° 8 of the methodology ACM0006/version 01:

$$BE_{E2,y} = EF_{electricity,y} \cdot EG_y$$

Where:

$BE_{E2,y}$	Baseline emissions due to displacement of electricity during the year y (tCO_2/yr).
$EF_{electricity,y}$	CO_2 baseline emission factor for the electricity displaced due to the project activity during the year *y* (tCO_2/MWh).
EG_y	Net quantity of electricity generated in the power plant during the year *y* (MWh/yr).

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

Data:

	Units	2011
(1) CO_2 baseline emission factor for the electricity displaced due to the project activity.	(tCO_2/MWh)	0.69579
(2) Net quantity of electricity generated in the power plant during the year y	(MWh)	206,937

Calculations:

(3) Baseline emissions due to displacement of electricity.	(1)*(2)	143,984 (tCO_2)

Total baseline emissions

Baseline emission sources.	2010
Baseline emissions from avoided biomass disposal.	58,726 (tCO_2eq)
Baseline emissions from grid electricity displacement.	143,984 (tCO_2)
Total baseline emissions.	202,709 (tCO_2eq)

Determination of the emission factor of the grid electricity generation:

The parameter EF_y ($EF_{electricity,y}$) should be determined as the combined margin CO_2 emission factor for the grid to which the project activity is connected in year y, calculated according to the ACM0002 (version 04). This calculation is presented below:

a) Operating Margin calculations:

In this case the OM; emission factor is calculated using the simple/adjusted method equation N°4 of the ACM0002 (Version 04). The Project Participant used ex-post data to calculate this parameter, that is, the coefficient was calculated in year in which the project generation occurs, in this case corresponds to year 2010.

The Project Participant used data from 2011 to determine the lambda factor that expresses the percentage of the time when low-cost/must-run sources were on the margin for 2011:

$$\lambda_y = \lambda_{2011} = 0.00010662$$

The rest of the parameters used to calculate the $EF_{electricity,y}$ for 2011 were obtained from the CDEC-SIC dispatch centre (official and public information). The calculation is as follows:

- CO_2 emission of non-low cost/must-run power sources for 2011:

$$\sum_{i,j} F_{i,j,2011} . COEF_{i,j} = 16{,}983{,}392 \;\; tCO_2 \;\; y$$

- The total power generation in the SIC by non-low-cost/must-run power sources in 2011:

$$\sum_{j} GEN_{J,2011} = 23{,}946{,}627 \;\; Mwh \;\; y$$

- The CO_2 emissions of low-cost/must run power sources in 2011. Note that since in Chile low-cost/must run power sources include mostly hydro energy, the total emissions for this part of the equation are low:

$$\sum_{i,k} F_{i,k} . COEF_{i,k} = 323{,}347 \;\; tCO_2 \;\; y$$

- Total power generation in the SIC by low-cost/must-run resources for 2011:

$$\sum_{j} GEN_{J,2011} = 22{,}166{,}363 \;\; Mwh \;\; y$$

Replacing the above values in the equation used to calculate the $EF_{electricity,y}$ for the year 2011, the operating margin results:

$$EF_{OM,2011} = \; 1 - 0.00010662 \; . \frac{16{,}983{,}392}{23{,}946{,}627} \;\; tCO_2 \;\; Mwh \;\; + 0.00010662 . \frac{323{,}347}{22{,}166{,}363} \;\; tCO_2 \;\; Mwh$$

$$EF_{OM,2011} = EF_{OM,simple\ adjusted,2011} = 0.709 \;\; tCO_2 \;\; Mwh$$

b) Build margin calculation

According to 2011 SIC data, the group of plants that accounts for the largest generation in each year are the ones responsible for the 20% of the total generation in 2011. These plants are considered to calculate the Build Margin for 2011:

$$EF_{BM,2011} = 0.682\ tCO_2\ Mwh$$

As in the previous case, the Build Margin calculation also considered official CDEC-SIC data and/or other official data publicly available.

Having obtained the Operating Margin $EF_{OM,y}$ and the Build Margin $EF_{BM,y}$, for 2011, and assuming the default value of (0.5) for the weights W_{OM} and (0.5) for the W_{BM}, it is possible to calculate EF_y ($EF_{electricity,y}$) for the year 2011:

$$EF_{2011} = 0.5 \times 0.709 + 0.5 \times 0.682 = 0.696\ tCO_2\ Mwh$$

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

The anthropogenic emissions by sources of GHGs of the project activity in year *y* ($EM_{P,y}$) can be determined as follows:

$$EM_{P,y} = P_{E1,y} + P_{E2,y} + P_{E3,y} + P_{E4,y}$$

Where:

$EM_{P,y}$	Total project activity emissions (tCO_2eq/yr).
$P_{E1,y}$	Project emissions from biomass controlled burning in the Power Plant (tCO_2eq/yr).
$P_{E2,y}$	Project emissions from biomass transportation to the biomass Power Plant (tCO_2/yr).
$P_{E3,y}$	Project emissions from biomass transportation within the Power Plant site (tCO_2/yr).
$P_{E4,y}$	Project emissions from fossil fuel consumption in the Plant's power boiler (tCO_2/yr).

Methane emissions from combustion of biomass were calculated using equation D.2.1.2.1 of the current Revised Monitoring Plan (page 6) according to equation N° 7 of the ACM0006/version 01 as follows:

$$PE_{E1,y} = GWP_{CH4} \cdot EF_{Biomass,CH4} \cdot \sum_i BF_{i,y} \cdot NCV_{Biomass,i}$$

Where:

$PE_{E1,y}$	Project emissions from biomass controlled burning (tCO_2eq/yr).
GWP_{CH4}	Global Warming Potential of methane (21 tCO_2eq/tCH_4).
$BF_{i,y}$	Biomass of type *i* used by the project activity (BDt/yr).
$NCV_{Biomass,i}$	Net calorific value of the biomass type i (TJ/BDt).
$EF_{Biomass,CH4}$	Biomass methane emission factor (tCH_4/TJ).

Data:

	Units	**2011**
(1) Biomass of type i used by the project activity during the year.	(BDt)	243,892
(2) Net calorific value of the biomass type i.	(GJ/ton)	16.47
(3) Biomass methane emission factor	(Kg CH_4/TJ)	15.30
(4) Global Warming Potential of methane.	(tCO_2eq/tCH_4)	21

Calculations:

(5) Methane emissions from combustion of biomass.	**[(4)*(3)/1,000,000]*(1)*(2)**	**1,291 (tCO_2)**

Carbon dioxide emissions from biomass residues transportation to the power plant were calculated on the basis of distance and the number of trips (or the average truck load), using equation D.2.1.2.2 of the current Revised Monitoring Plan (page 7), according to equation N° 4 of the ACM0006/version 01.

$$PE_{E2,y} = \frac{{}_i BF_{T,i,y}}{TL_y} \cdot AVD_y \cdot EF_{km,CO2}$$

Where:

$PE_{E2,y}$	Carbon dioxide emissions from biomass transportation to the biomass Power Plant (tCO_2/yr).
$BF_{T,i,y}$	Biomass type i (wet) transported by trucks used by the project activity (wet ton/yr).
TL_y	Average truck load of the trucks used (ton).
AVD_y	Average return trip distance between the biomass fuel supply sites and the site of the project plant (km).
$EF_{km,CO2}$	Average CO_2 emission factor for the transportation fuel (tCO_2/km).

The corresponding calculation is shown below:

Data:

	Units	**2011**
(1) Biomass type i (dry) transported by trucks used by the project activity	(BDt)	50,357
(2) Biomass average humidity (wet basis) (See note).	(%)	52.16%
(3) Average truck load of the trucks used.	(ton)	25.2
(4) Average return trip distance between the biomass fuel supply sites and the site of the project plant.	(km)	184.2
(5) Average CO2 emission factor for the transportation fuel (See note).	(tCO_2/km)	0.001

Note: Since this parameter is reported monthly, an average was used for simplicity.

Calculations:

(6) Biomass of type i (wet) transported by trucks used by the project activity.	(1)/[1 – (2)]	105,254 (wet ton)
(7) Project emissions from biomass transportation to the biomass Power Plant.	**[(6)/(3)]*(4)*(5)**	**1,041 (tCO_2)**

Carbon dioxide emissions from on-site consumption of fossil fuels were calculated using equation N° 6 of the ACM0006/version 01:

$$PEFF_y = \sum_i FF_{project\ plant,i,y} \cdot COEF_{CO2,i}$$

Where:

$PEFF_y$	Carbon dioxide emissions from on-site consumption of fossil fuels (tCO_2/yr).
$FF_{project\ plant,i,y}$	Quantity of fossil fuel type *i* combusted in the biomass power plant during the year *y* (Kg/yr).
$COEF_{CO2,i}$	CO_2 emission factor of the fuel type *i* (tCO_2/Kg).

The project activity implies additional fossil fuel consumption due to:

- operational reasons associated to additional biomass consumption (e.g. biomass too wet in winter, etc.).
- on-site additional biomass transportation.

Using equation N° 6 of the ACM0006/version 01, the emissions from biomass transportation within the Power plant site (equation D.2.1.2.3, page 7 of the current Revised Monitoring Plan) and the emissions from fossil fuel consumption in the Power Plant's power boiler (equation D.2.1.2.4, page 8 of the current Revised Monitoring Plan) were calculated as follows:

$$P_{E3,y} + PE_{E4,y} = \sum_i OF_{i,y} \cdot COEF_{CO2,i} + \sum_i FF_{i,y} \cdot COEF_{CO2,i}$$

Where:

$P_{E3,y}$	Project emissions from biomass transportation within the Power Plant site (tCO_2/yr).
$P_{E4,y}$	Project emissions from fossil fuel consumption in the Plant's power boiler (tCO_2/yr).
$OF_{i,y}$	Fossil fuel type *i* used on-site transportation of biomass related to the project activity (kg/yr).
$FF_{i,v}$	Fossil fuel type *i* used in the power boiler related to the project activity (kg/yr).
$COEF_{CO2,i}$	CO_2 emission factor for the fossil fuel of type i used in the power boiler (tCO_2/kg).

Data:

	Units	**2011**
(1) Diesel used in the power boiler related to the project activity.	(l)	867,844
(2) LPG used in the power boiler related to the project activity	(l)	298
(3) Diesel used for on-site transportation of biomass related to the project activity.	(l)	54,543
(4) Diesel density.	(kg/l)	0.84
(5) Diesel CO_2 emission factor.	(tCO_2/ton)	3.172
(6) LPG density	(kg/m^3)	0.5
(7) LPG CO_2 emission factor	(tCO_2/ton)	2.920

Calculations:

(8) Project emissions from diesel consumption in the power boiler.	[(1)*(4)/1,000]*(5)	2,322 (tCO_2)
(9) Project emissions from LPG consumption in the power boiler.	[(2)*(6)/1,000]*(7)	0 (tCO_2)
(10) Project emissions from biomass transportation within the Power Plant site.	[(3)*(4)/1,000]*(5)	146 (tCO_2)
(11) Carbon dioxide emissions from on-site consumption of fossil fuels.	**(8)+(9)+(10)**	**2,469 (tCO_2)**

Total project activity emissions

Project emission sources.	**2011**
Methane emissions from combustion of biomass.	1,291 (tCO_2eq)
Carbon dioxide emissions from biomass transportation to the biomass Power Plant**.**	1,041 (tCO_2eq)
Carbon dioxide emissions from on-site consumption of fossil fuels.	2,469 (tCO_2eq)
Total project activity emissions.	**4,801 (tCO_2eq)**

E.3. Calculation of leakage

Though there are no official studies in the country about the supply / demand situation of forest biomass in the relevant area, the Project Participant performed an annual study for 2011 using official bulletins from INFOR[4] as well as other official sources to calculate the biomass supply and demand situation in the Nueva Aldea Biomass Power Plant Phase 1 influence area[5]. This study was part of the monitoring plan of the Nueva Aldea Phase 1 project activity and was carried out according to approach L2 of the baseline methodology.

A detailed Excel spreadsheet with the monitored data and the calculation of the forest biomass supply /

[4] INFOR stands for "Instituto Nacional Forestal" or "National Forestry Institute" in English.
[5] The Nueva Aldea Biomass Power Plant Phase 1 influence area is defined in page 63 of the registered PDD.

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 provides the final results of such study:

SUPPLY/DEMAND SITUATION
(According to the "L2" criteria to establish leakage in the ACM0006 baseline methodology)

NUEVA ALDEA INFLUENCE AREA SUPPLY/DEMAND SITUATION

		2011
Total generation Biomass residues	(m^3st/yr)	6,927,654

		2011
Total consumption Biomass residues	(m^3st/yr)	3,620,996
Biomass residues generated/Biomass residues consumption	(number)	1.9132

As described in section E.2 of the registered PDD, no leakage is anticipated from the implementation of the project activity.

$$L_y = 0$$

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	202,709	4,801	0	197,908

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

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	100,486	197,908

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

The emission reductions for the monitoring period were 197,908 CERs. This amount is 97 % higher than the emission reductions of 100,486 CERs estimated in the PDD. This difference can be explained by the following reasons:

1. A considerably higher grid emission factor for 2011 than the estimated in the PDD:

A higher grid emission factor for the year 2011 than the one originally estimated in the PDD. The actual grid emission factor for 2011 was 695.79 (tCO_2/GWh), while the estimated grid emission factor for 2011 was 470.23 (tCO_2/GWh). The reason for the higher grid emission factor in years 2011 was the replacement of

natural gas[6] used for power generation for more carbon-intensive fossil-fuels, such as coal and diesel. This increased the overall GHG emissions in the SIC grid.

2. A higher CH_4 emission factor for uncontrolled burning of biomass residues than the one originally used in the PDD: 740.5 (Kg CH_4/TJ) monitored factor instead of 300 (Kg CH_4/TJ) used in the PDD. Given that by the time the PDD was written there were no local measurements available, the validator indicated the Project Participant to use the IPCC default factor corrected by the lowest conservativeness factor (Table N° 4, page 34 of the ACM0006/version 01). This generated extremely conservative CH_4 baseline emissions for the project activity, since when the biomass residues are burned in piles in the open air, the combustion occurs under very low oxygen presence conditions and therefore is very inefficient. Inefficient combustion leads to high CH_4 emissions. As a result, the Project Participant explicitly mentioned in page 66 of the registered PDD that a local CH_4 emission factor measurement for uncontrolled burning of biomass residues would be attempted in the future in order to have a more accurate and fair estimation of the baseline emissions from this source. The CH_4 emission factor used in this monitoring report was directly measured by the Project Participant.

3. A different way of determining the additional biomass consumed in the power boiler was instructed by the EB 38 paragraph 63 (f) (March, 14th, 2008) as compared to the one originally proposed in the registered PDD. As a result, a Revised Monitoring Plan dated June, 23rd, 2008, was approved by the EB in August, 17th, 2008. The Project Participant is now using equation N° 24 to calculate the baseline emissions due to the natural decay or uncontrolled burning of anthropogenic sources of biomass (as established for baseline scenario N° 3) and directly measured the quantity of biomass combusted in the power plant during the monitoring period rather than using a specific consumption factor (m^3st/MWh) as it would have been done according to what was established in the original PDD.

The combined effect of the reasons mentioned above resulted in higher emission reductions than the ones estimated in the PDD.

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

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	(See note below)	Not applicable

Note that the emission reduction claimed are from the monitoring period from January 1st to December 31st 2011

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[6] Argentina stopped sending natural gas in 2004.

Document information

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

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