



VCS 2007.1 Monitoring Report

Nobrecel Biomass Energy Project

Project ID: 78

Monitoring period: 01/11/2008 - 30/04/2010

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Version 4

Project background

Nobrecel Biomass Energy Project is a voluntary emission reduction project (not a grouped project) that was validated under the Voluntary Carbon Standard VCS Version 1. The project is requesting the third verification under VCS.

The first verification covered the period between 01/01/2002 - 31/12/2007 and the second verification covered the period between 01/01/2008 – 31/10/2008. During this monitoring period, the project operated continuously, only stopping for its regular maintenance in November 2009.

The project uses approved methodology ACM0006 (“Consolidated baseline methodology for grid-connected electricity generation from biomass residues”), Version 06, Valid from 10 Aug 07 onwards. Scenario 16 from this methodology was applied.

For spatial extent of the project electricity system, including issues related to the calculation of the build margin (BM) and operating margin (OM), ACM0006 refers to ACM0002 (“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”), Version 06, Valid from 19 May 06 onwards. For methane avoidance component, ACM0006 refers to the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”, EB 35 Meeting Report, Annex 10, Version 2.

Further background on this project can be found in the VCS PD and associated documents, which are available on the VCS website:

<https://vcsprojectdatabase1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=78>

Verification Criteria

The project seeks to claim emission reductions solely under the VCS 2007.1 standard.

Therefore, the following criteria apply:

1. Voluntary Carbon Standard 2007.1 [“VCS 2007.1”]. For verification, this standard requires application of ISO14064-3. The level of assurance shall be reasonable. This project reduces less than 1 Mt CO₂e per year and the materiality level is therefore 5%.
2. The monitoring plan has been included in the validated VCS PD, which is based on the methodology ACM0006 (as mentioned in the above section) of the CDM.

Conformity with VCS requirements

Project start date

According to the VCS 2007.1, projects validated under the VCS v1 shall be grandfathered into the VCS 2007.1 and should follow the criteria required under this version (VCS 2007.1) for subsequent verifications. The VCS 2007.1 specifies that validation of projects against the VCS v1 should have been completed or contracted before 19 November 2007. In relation to contracts entered into before 19 November 2007, validation should have been completed by 19 May 2008 and proof of contracting prior to 19 November 2007 should have been provided.

The Nobrecel Biomass Energy Project validation / verification was contracted on September 14th, 2007 and completed under VCS v1 on March 25th, 2008, therefore complying with this requirement.

The Project Crediting Period for the VCS v1 shall be the same as for the VCS 2007.1 commencing at the specific Project Crediting Period Start Date. As stated in the project PD, the Project Crediting period start date is January 1st, 2002, starting operations in November 2001. As the project was validated under the VCS v1, it is therefore in compliance with the starting date requirements of the VCS.

Project scope

The project applies a CDM methodology. It therefore applies a methodology that is approved by the VCS Program. This project fits in Sectoral Scope 01 (Energy industries – renewable/non-renewable sources).

Demonstrate that no GHG were created for subsequent removal or destruction

The project generates renewable energy, replaces fossil fuel per renewable fuel and avoids methane emissions. There are no GHG emissions created for the purpose of its subsequent removal. The project therefore complies with paragraph 1.12 of the VCS Project Description Template.

Demonstrate that no other environmental credits were generated

There is no other environmental credit system other than CDM in place in Brazil. The project can therefore not generate other environmental credits than VERs and CERs. In the particular case of this project, as it is not registered as a CDM project, it can only generate VERs.

This project is not registered or being considered in any other GHG emission reduction program other than VCS. The project therefore complies with paragraph 1.13 of the VCS Project Description Template.

Rejection under other GHG Programs (if applicable)

The project did not apply for registration or issuance of emission reduction credits under any other GHG program. The paragraph 1.14 of the VCS Project Description Template is therefore not applicable to this project.

Proof of Title

The emission reductions associated to the project activity belong to the project participant Nobrecel S.A. Celulose e Papel, as can be demonstrated by the latest Environmental Operational License issue to the project site. The project therefore complies with paragraph 8.1 of the VCS Project Description Template.

Relation with other participants in emissions trading program (if applicable)

The project does not take place in a jurisdiction or sector in which binding limits are established on GHG emissions. Emission reductions achieved by this program do not limit the emissions of projects that take place in an emissions trading program. The paragraph 8.2 of the VCS Project Description Template is therefore not applicable to this project.

GPS Project Boundaries

The GPS coordinates are 22°54'07.7"S and 45°23'35.3"W.

The project therefore complies with paragraph 1.5 of the VCS Project Description Template.

Consequently, the project is in conformity with the VCS 2007.1 requirements.

Monitoring results

Monitoring System

The monitoring system was setup by qualified technicians. No breakdown or replacement of the equipment has been carried out during this monitoring period. The equipments are maintained according to manufacturer's recommendations.

Emission reduction

The calculated emission reduction is summarized in Annex B and amounts to a total of 16,688 tCO₂e has been reduced in 2008, 104,173 tCO₂e in 2009 and 37,764 tCO₂e in 2010, totaling 158,625 tCO₂e.

This is the third VER monitoring report of this project. It covers the period 01/11/2008 to 30/04/2010.

Presentation of monitoring results - spreadsheet

All monitoring data have been included in an Excel workbook. This includes:

1. *MP Summary*. This worksheet contains the summary of the results presented in the workbook.
2. *Monitored data*. Registry of all data monitored (or calculated based on monitoring) for the project.
3. *VER Calculation*. This worksheet contains the calculation of emission reductions of each project component and general notes.
4. *FOD*. Calculation of the biomass avoided to decay anaerobically.
5. *Reference data*. Shows standard and reference values used in calculations.

Calculation methodology

The calculation methodology of emission reductions for this project is in line with the methodology and is summarized below.

Emission reduction calculation took place in the following steps for the data generated:

1. Electricity component
 - a. Net quantity of increased electricity generation as a result of the project activity (EG) is monitored by a calibrated energy meter.
 - b. EG is multiplied by the Grid emission factor (EF_{GRID})
2. Displacement of heat component
 - a. Quantity of heat generated (Q) is monitored by a steam flow meter and controlled by a supervisory system.
 - b. The quantity of steam that would be generated in the baseline scenario using the same type of biomass is excluded from Q.
 - c. Q is multiplied by the emission factor ($EF_{CO2,BL,heat}$) of the fuel used in baseline and divided by the efficiency of the boiler that would be used in baseline scenario.
 - d. Any consumption of auxiliary fuel used is considered as project emissions.

- e. The fuel used for biomass transportation is estimated considering the average distance from suppliers and the load capacity of each truck and considered as project emissions.

3. Methane avoidance component

- a. The biomass residues used as fuel (BF) is consumed in the boiler and monitored by a weight bridge at Nobrecel's plant.
- b. The avoided methane is calculated using the first order decay model according to "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
- c. Methane emissions from combustion of biomass residues are calculated using IPCC values and discounted from the project as project emissions.

4. All Emissions Reductions (ERs) are calculated as demonstrated below:

According to the Methodology the greenhouse gas emission reductions achieved by the project activity during a given year "y" (ER_y) shall be estimated as follows:

Emission Reductions:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

where:

ER_y	= Emissions reductions of the project activity during the year y (tCO ₂ /y)
$ER_{electricity,y}$	= Emission reductions due to displacement of electricity during the year y (tCO ₂ /y)
$ER_{heat,y}$	= Emission reductions due to displacement of heat during the year y (tCO ₂ /y)
$BE_{biomass,y}$	= Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO ₂ /y)
PE_y	= Project emissions during the year y (tCO ₂ /y)
L_y	= Leakage emissions during the year y (tCO ₂ /y)

Project Emissions:

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

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 from onsite combustion of fossil fuels (tCO ₂ /yr)
GWP_{CH_4}	= Global Warming Potential for methane valid for the relevant commitment period
$PE_{Biomass, CH_4, y}$	= CH ₄ emissions from the combustion of biomass residues during the year y (tCO ₂ /y)

Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PET_y):

Emissions are calculated on the basis of distance and the average truck load:

$$PET_y = \frac{\sum_k BF_{k,y}}{TL_y} \cdot AVD_y \cdot EF_{km,CO_2,y}$$

Where:

PET_y	= CO ₂ emissions during the year y due to transport of the biomass residues to the project plant (tCO ₂ /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).
$EF_{km,CO_2,y}$	= 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)
TL_y	= Average truck load of the trucks used (tons) during the year y.

Carbon dioxide emissions from on-site consumption of fossil fuels ($PEFF_y$)

$$PEFF_y = \sum_i \left(FF_{project\ plant,i,y} + FF_{project\ site,i,y} \right) \cdot NCV_i \cdot COEF_i$$

Where:

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

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

NVC_i = Net calorific value of fossil fuel type i (GJ / mass or volume unit)

$COEF_i$ = CO₂ emission factor for fossil fuel type i (CO₂/GJ)

Note: CO₂ emissions from electricity consumption ($PE_{EC,y}$) is not applicable.

There is a small amount of project emissions from a tractor that has the function of moving the biomass residues at the site. This project emissions is calculated as follows:

$$PE_{\text{tractor}} = FF_{\text{tractor}} * EF_{\text{diesel}}$$

Where:

PE_{tractor} = Project emissions from tractor (ton CO₂e/y)

FF_{tractor} = Amount of fossil fuel (i.e. diesel oil) consumed by the tractor (ton/year)

EF_{diesel} = CO₂ emission factor for the diesel oil (tCO₂e/ton)

Methane emissions from combustion of biomass residues ($PE_{\text{Biomass},CH_4,y}$)

$$PE_{\text{Biomass},CH_4,y} = EF_{CH_4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k$$

Where:

$PE_{\text{Biomass},CH_4,y}$ = CH₄ emissions from the combustion of biomass residues during the year y (tCH₄/y)

$BF_{K,y}$ = Quantity of biomass residue type K combusted in the project plant during the year y (tons of dry matter)

NCV_K = Net calorific value of the biomass residue type K (GJ/ton of dry matter)

$EF_{CH_4,BF}$ = CH₄ emission factor for the combustion of biomass residues in the project plant (KgCH₄/TJ)

Emission reductions due to displacement of electricity

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

Where:

$ER_{electricity,y}$ = Emission reductions due to displacement of electricity during the year y (tCO₂/yr)

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

$EF_{electricity,y}$ = CO₂ emission factor for the electricity displaced due to the project activity during the year y (tCO₂/MWh)

Determination of EG_y

The calculation of EG_y is done as per the Annex 5 in the registered VCS PD. It is a minor deviation from scenario 16 of the methodology, but it is an approach used in scenario 30 from the same methodology. It is calculated in the following way:

$$EG_y = EG_{8MW} \times \left(\frac{Steam\ Production_{BiomassBoiler}}{Steam\ Production_{BiomassBoiler} + Steam\ Production_{BlackLiquorBoiler}} \right)$$

Where:

$Steam\ Production_{BiomassBoiler}$ = Steam produced by the biomass boiler (project boiler) (MWh/y).

$Steam\ Production_{blackLiquorBoiler}$ = Steam produced by the black liquor boiler (not part of this project) (MWh/y).

EG_{8MW} = Electricity produced by the 8MW electricity unit (project power unit) (MWh/y)

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

Emission reductions or increases due to displacement of heat

$$ER_{heat,y} = \frac{Q_y \cdot EF_{CO2,BL,heat,i}}{\mathcal{E}_{boiler}}$$

And

$$Q_y = \min \left\{ \begin{array}{l} Q_{\text{project plant},y} \\ Q_{\text{total},y} - \frac{Q_{\text{historic},3\text{yr}}}{3} \end{array} \right\} - \frac{Q_{\text{biomass,historic},3\text{yr}}}{3}$$

Where:

$ER_{\text{heat},y}$ = Emission reductions due to displacement of heat during the year y (tCO₂/y)

Q_y = Quantity of increased heat generation in the project plant (incremental to heat generation in any existing cogeneration plants) that displaces heat generation in fossil fuel fired boilers during the year y (GJ/y)

$Q_{\text{project plant},y}$ = Net quantity of heat generated in the cogeneration project plant from firing biomass residues during the year y (GJ)

$Q_{\text{total},y}$ = Net quantity of heat generated in all cogeneration units at the project site, generated from firing the same type(s) of biomass residues as in the project plant, including the cogeneration unit installed as part of the project activity and any previously existing units, during the year y (GJ)

$Q_{\text{historic}, 3\text{yr}}$ = Net quantity of heat generated during the most recent three years in all cogeneration plants at the project site, generated from firing the same type(s) of biomass residues as in the project plant (GJ)

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

$EF_{\text{CO}_2,\text{BL,heat}}$ = CO₂ emission factor of the fossil fuel type i used for heat generation in the absence the project activity (tCO₂/GJ)

Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues

Baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner. Baseline emissions are calculated by multiplying the quantity of biomass residues that would not be used in the absence of the project activity with the net calorific value and an appropriate emission factor, as follows:

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH4,k,y}$$

Where:

$BE_{biomass,y}$	= Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO ₂ e/yr)
GWP_{CH4}	= Global Warming Potential of methane valid for the commitment period (tCO ₂ e/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)
NCV_k	= Net calorific value of the biomass residue type k (GJ/ton of dry matter)
$EF_{burning,CH4,k,y}$	= CH ₄ emission factor for uncontrolled burning of the biomass residue type k during the year y (tCH ₄ /t biomass)

Baseline emissions are calculated using the “*Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site*”. The variable $BE_{CH4,SWDS,y}$ calculated by the tool corresponds to $BE_{biomass,y}$ in ACM0006. Use from the respective quantities of biomass residues that are prevented from anaerobic decay ($BF_{PJ,k,y}$ or fractions of it) as the waste quantities prevented from disposal ($W_{j,x}$) is in the tool.

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1-e^{-k_j})$$

Where:

$BE_{CH4,SWDS,y}$	= Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO ₂ e)
φ	= Model correction factor to account for model uncertainties (0.9)
f	= Fraction of methane captured at the SWDS and flared, combusted or used in another manner.

GWP_{CH_4}	= Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	= Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
F	= Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	= Fraction of degradable organic carbon (DOC) that can decompose
MCF	= Methane correction factor
$W_{j,x}$	= Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons)
DOC_j	= Fraction of degradable organic carbon (by weight) in the waste type j
K_j	= Decay rate for the waste type j
j	= Waste type category (index)
x	= Year during the crediting period: x runs from the first year of the first crediting period ($x = 1$) to the year y for which avoided emissions are calculated ($x = y$)
y	= Year for which methane emissions are calculated.

Deviation from the approved methodology

As outlined in details in VCS PD Annex 5, this project has minor deviations from ACM0006 scenario 16. The deviations are related to:

- 1) The existence and operation of the Black Liquor Boiler (existing biomass boiler);
- 2) Calculation of the electricity generated by the project activity (the calculations applied for this deviation can also be found in the section above, in this Monitoring Report);
- 3) The lifetime of the boiler.

For all cases cited above, the solution applied can be found in the methodology itself, but for other scenarios other than 16. These minor deviations have no negative impact on the conservativeness of the VCS Program approved methodology's criteria and procedures to quantify data leading to GHG emission reductions or removals. The deviations were audited during the validation/registration of this VCS project and were deemed reasonable.

Annex A – Parameters used in calculations

The parameters listed in the two tables below were the parameters that did not need to have its values modified from the registered VCS PD, where sources and detailed explanation for each one can be found.

Parameter	Unit	Value	Parameter	Unit	Value
$EF_{CO_2,FF,j}$	tCO ₂ /GJ	0.0774	$FF_{\text{project plant},i,y}$	Tonnes	0
$EF_{CO_2,BL,heat,i}$	tCO ₂ /ton fuel	3.1064	φ	-	0.9
$EG_{\text{historic},3yr}$	MWh	0	OX	-	0
$Q_{\text{historic},3yr}$	GJ	0	F	-	0.5
$Q_{\text{biomass,historic},3yr}$	MWh	85 467	DOC_f	-	0.5
$EF_{CH_4,BF}$	Kg/TJ	41.1	MCF	-	0.8
$EF_{km,CO_2,y}$	tCO ₂ /km	0.00053	DOC_j	%	43 ¹
NCV_k	GJ/ton	0.01465	k_j	-	0.035
$NCV_{\text{Fuel oil}}$	GJ/ton	40.1514	$\varepsilon_{\text{boiler}}$	%	85
NCV_{diesel}	GJ/ton	42.287	GWP_{CH_4}	tCO ₂ e/tCH ₄	21
$EF_{\text{burning},CH_4,k,y}$	tCH ₄ /t biomass	0.001971			
$EF_{\text{grid},y}$	tCO ₂ /MWh	0.2823			

The parameters listed below, where can be found details on each one, were updated from the PDD.

Data/parameter:	$BF_{k,y}$
Data unit:	Tonnes
Description:	Quantity of biomass residue (wood residue) combusted in the project plant during the year y, on

¹ Since the moisture content of the biomass is not assessed, the value used in calculations for this monitoring period is the one for wet biomass, i.e. 43%. The 50% value is currently not used for calculations, since it should be used for dry biomass. The use of a “wet biomass value” is conservative.

	a wet basis
Value for this monitoring period:	235 251
Description of measurement methods and procedures applied:	Measurement on a wet basis of biomass. All the biomass sent to the biomass storage area is weighted in truck scales. During this weight, each subtype of wood residue is identified and registered.
QA/QC procedures applied:	Truck scales are maintained and calibrated according to manufacturer guidelines.
Comments	The average monthly consumption is based on the difference of initial and final amount of biomass in the storage area, plus the amount of biomass delivered to the storage area (stock control). However, since the daily stock is extremely low (just a few tonnes) and is consumed in the following day, the stock is considered zero and no record is kept. Therefore, the monitoring of biomass consumption – since there is no stock onsite – is performed only using the truck scale records.
Data/parameter:	$Q_{\text{project plant}}$
Data unit:	MWh
Description:	Net quantity of heat generated from firing biomass in the project plant
Value for this monitoring period:	579 959
Description of measurement methods and procedures applied:	The amount of steam produced [in tonnes] by the biomass boiler is measured by a steam flow meter. These data are recorded monthly, and stored electronically. The measurements are converted into MWh by multiplying the values with the steam enthalpy of 0.93 MWh/m³ steam in accordance with the validated VCS PD
QA/QC procedures applied:	The steam flow meter is maintained and calibrated according to manufacturer requirements.

Data/parameter:	Q_{total}
Data unit:	MWh
Description:	Net quantity of heat generated in all cogeneration units at the project side, including the cogeneration unit installed as part of the project activity and previously existing units
Value for this monitoring period:	905 840
Description of measurement methods and procedures applied:	The amount of steam produced [in tonnes] by all cogeneration units is measured by steam flow meters. These data are recorded monthly, and stored electronically. The measurements are converted into MWh by multiplying the values with the steam enthalpy of 0.93 MWh/m ³ steam in accordance with the validated VCS PD.
QA/QC procedures applied:	The steam flow meters are maintained and calibrated according to manufacturer requirements.
Comments:	Q_{total} is the sum of $Q_{project\ plant}$ and Q_{BL} as referred to in the emission reduction workbook.

Data/parameter:	$EG_{project\ plant}$
Data unit:	MWh
Description:	Net quantity of electricity generated in the project power plant (8 MW)
Value for this monitoring period:	28,442
Description of measurement methods and procedures applied:	This parameter cannot be directly measured because the steam generated by both, biomass and black liquor based boilers are fed to the same pipeline entering the 8 MW power unit. Thus this parameter is calculated based on measurements of $Q_{project\ plant}$ and Q_{BL} as explained in Annex 5 of the registered VCS PD.
QA/QC procedures applied:	The steam flow meters that are used to measure

	$Q_{\text{project plant}}$ and Q_{BL} are maintained and calibrated according to manufacturer requirements.
Comments:	Project emissions from auxiliary electricity consumption by the project plant were considered in the calculation of this parameter in accordance to footnote 12, page 26 of ACM0006. The 8MW power unit² is comprised of: Turbine TGM OS 40211 – Power 7900/8600 kW Generator WEG 94250 – Power 8000 kW

Data/parameter:	EG_{total}
Data unit:	MWh
Description:	Net quantity of electricity generated in all power units at the project site, including the new unit (8MW) installed as part of the project activity and the previously existing unit (3.2MW).
Value for this monitoring period:	45,128
Description of measurement methods and procedures applied:	This parameter cannot be directly measured because the steam of both, biomass and black liquor are fed to the same pipeline entering the 8 MW unit. Thus this parameter is calculated based on measurements of $Q_{\text{project plant}}$ and Q_{BL} as explained in Annex 5 of the registered VCS PD.
QA/QC procedures applied:	The steam flow meters that are used to measure $Q_{\text{project plant}}$ and Q_{BL} are maintained and calibrated according to manufacturer requirements.

Data/parameter:	AVD_y
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² The project power plant, or power unit, in the context of this project, means both Turbine and Generator. Since the Generator limits the maximum amount of electricity to be generated in 8MW, the power unit (or the project power plant) is considered to have 8MW installed capacity.

Data unit:	Km
Description:	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Value for this monitoring period:	277
Description of measurement methods and procedures applied:	As the biomass is supplied from different sites, this parameter corresponds to the mean value of km travelled by trucks that supply the biomass plant.
QA/QC procedures applied:	When this parameter can not be monitored a very conservative default number of 400 km (2 times 200km) will be used..

Data/parameter:	TL_y
Data unit:	Tons
Description:	Average truck load of the trucks used for transportation of biomass.
Value for this monitoring period:	10
Description of measurement methods and procedures applied:	Option 1 is chosen to estimate CO ₂ emissions from transportation. Each truck is weighted when entering and exiting the plant and its load determined by the difference of its weight. Since the number of trucks that enter the plant on a daily basis is relatively high, the daily calculation of this parameter has not been possible, therefore the average truck load value used is conservative.
QA/QC procedures applied:	The truck scale will be maintained and calibrated according to manufacturer instructions. As the trucks used to transport biomass normally has a capacity much higher than that (around 40 tons/truck), the number used is considered very conservative.

Data/parameter:	EC_{shredder/chopper}
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Data unit:	MWh
Description:	Electricity consumed by shredder/chopper of the project activity.
Value for this monitoring period:	552
Description of measurement methods and procedures applied:	Data was calculated according to the installed capacity of the chopper times operational hours.
QA/QC procedures applied:	This is a conservative approach, as is considering that the electricity consumption of the shredder is its full capacity during the hours the equipment is operating.

Data/parameter:	FF project site,i,y
Data unit:	Ton
Description:	Quantity of diesel oil combusted at the project site for other purposes that are attributable to the project activity during the year y
Value for this monitoring period:	89
Description of measurement methods and procedures applied:	Estimated based on the fossil fuel consumption of the truck used to manage the biomass on-site. Conservative value of 5 tonnes a month is used..
QA/QC procedures applied:	The total fuel oil consumption by the truck that manages the biomass on-site was measured from October 2009 to April 2010, totaling 3.33 tonnes. This demonstrates that the value used for the emission reduction calculation is conservative.

Data/parameter:	FF project plant,i,y
Data unit:	Ton
Description:	Quantity of fuel oil combusted in the biomass residue fired power plant during the year y
Value for this monitoring period:	0

Description of measurement
methods and procedures applied:

Project Developer Operational Patterns

QA/QC procedures applied:

There is no entrance for fossil fuels in the project boiler, thus it is not consumed. The absence of this structure shall be measured monthly by interviews with the Project boiler engineers.

Annex B – Summary of the Emission Reductions

Monitoring parameter	2008	2009	2010	Total Monitoring Period	Units
$Q_{\text{PROJECT PLANT}}$	68,850	382,080	129,029	579,959	MWh
Q_{BL}	36,465	213,807	75,609	325,881	MWh
Q_{TOTAL}	105,315	595,888	204,638	905,840	MWh
				0	
$EG_{\text{project plant}}$	3,587	18,769	6,087	28,442	MWh
$EG_{\text{8MW biomass,PR}}$	3,649	19,123	6,224	28,995	MWh
$EG_{\text{8MW black liquor,PR}}$	1,926	10,568	3,638	16,133	MWh
EG_{total}	5,575	29,691	9,862	45,128	MWh
				0	
BF_{T}	15,637	141,019	43,041	199,697	t biomass
BF_{P}	7,338	18,715	9,502	35,555	t biomass
$BF_{\text{k,y}}$	22,975	159,733	52,543	235,251	t biomass
$BF_{\text{PJ,k,y}}$	2,298	15,973	5,254	23,525	t biomass
$W_{\text{j,x}}$	20,678	143,760	47,289	211,726	t biomass
				0	
BF_{T}	15,637	141,019	43,041	199,697	t biomass
$FF_{\text{project site}}$	10	59	20	89	t fuel
$FF_{\text{project plant}}$	0	0	0	0	t fuel
				0	
$h_{\text{chopper+shredder}}$	310	1,766	686	2,762	hour
$EC_{\text{chopper+shredder}}$	62	353	137	552	MWh
ER	16,688	104,173	37,764	158,625	tCO ₂ e