



VER Monitoring Report

Nobrecel Biomass to Energy Project

Monitoring period 01/01/2002 – 31/12/2007

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Project background

Nobrecel Biomass energy project uses the approved CDM methodology ACM0006. Nobrecel submitted in 2005 a new methodology (NM0098) which as consolidated in ACM0006.

Further background on this project is available in the attached VCS PD.

Parties involved are Brazil (Host Country) and the United Kingdom of Great Britain and Northern Ireland (other Parties). The project participants are Nobrecel S.A. Celulose e Papel and EcoSecurities Group Plc.

Verification Criteria

The following table describes how the project activity meets the verification criteria as set out under the Voluntary Carbon Standard (VCS v1) (please refer to <http://www.v-c-s.org/>)

#	Criterion	How fulfilled?
1.	Project category	The project is applicable under Sectoral Scope 01 (Energy industries – renewable/non-renewable sources) as listed at http://cdm.unfccc.int/DOE/scopes.html .
2.	Geographic location	The project is located in Pindamonhangaba city, SP, Brazil. Please refer to section A.4.1 in the VCS PD for further details.
3.	Eligible GHGs	The project reduces methane (CH ₄) and non-renewable carbon dioxide (CO ₂) emissions according to the emissions sources are included from the project boundary listed in the methodology.
4.	Project start date	The construction of the new biomass boiler started on 01/11/2001.
5.	Emission reduction start date	The project started reducing emissions on 01/01/2002.
6.	Public funding and grants	The project did not receive any public funding.
7.	Project boundary/GHG assessment boundary	The project boundary encompasses all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the project activity.
8.	Calculation Methodology	The project applies the approved CDM methodology ACM0006 version 06. Please refer to “Nobrecel Workbook” for the calculations.
9.	Secondary effects	The project’s secondary effects include project emissions and leakage. The project emissions encompass emissions from electricity use, transport of biomass, auxiliary fuel use and

		uncontrolled burn of biomass. There are no leakage effects since the equipment is not transferred from another.
10.	Project additionality	The project follows the additionality test as described in the PDD. Please refer to section B.5 in the PDD for further details.
11.	Quality of reductions	The project has no negative impact on sustainable development in the local community. Please refer to section D in the PDD for further details.
12.	Monitoring process	The basis for estimating the project's emission reductions is the monitoring plan as described in section B.6 in the PDD. The eco-efficiency sector in Nobrecel is responsible for collecting data, and assuring the quality of monitored information. The company has monitoring procedures for carbon credits in place. All staff received training to monitor all relevant parameters accordingly with the monitoring plan.

Monitoring results

Emission reduction

The calculated emission reductions amount to **388 452** ton CO₂eq.

Monitoring period covered

This is the first VCS monitoring report of this project. It covers the period 01/01/2002 to 31/12/2007. Please note that no CERs under CDM will be claimed for this project.

Presentation of monitoring results - spreadsheet

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

1. Front page. This worksheet contains the project description and contact details.
2. Entrada de dados. All data collected by Nobrecel that is used for the calculations.
3. Grid Data. Information regarding the grid emission factor.
4. Reference data. Shows standard and reference values used in calculations.
5. ER calculation. This worksheet contains the calculation of emission reductions of each project component and general notes.
6. Anaerobic Decay. Spreadsheet used for calculate the methane generation using the first order decay model.
7. Monitored Data. A summary of data monitored and collected.

Monitoring and Calculation methodology

The calculation methodology of emission reductions for this project is summarized below. Please note that data and calculations are cross-checked in order to assure quality.

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_{FUEL}) 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", EB 26 and all default values for each biomass type.
 - c. Methane emissions from combustion of biomass residues is calculated using IPCC values and discounted from the project as project emissions.

Table 1 – Data obtained from monitoring results with emission reduction calculations for the relevant period

Methane avoidance	Symbol	Data Source	Units	2002	2003	2004	2005	2006	2007
Uncontrolled burning or aerobic decay baseline	BE (B1)	Calculated	tCO ₂ e	418	425	484	590	585	486
Incremental biomass (uncontrolled burning)	BF _{ae}	Monitored	ton	10.097	10.267	11.686	14.246	14.136	11.731
GWP _{CH4} * NCV * EF burning * conservative factor		meth default	tCO ₂ e/ton	0.04	0.04	0.04	0.04	0.04	0.04
anaerobic decay baseline	BE (B2)	Calculated	tCO ₂ e	6.774	13.428	20.806	29.648	38.111	44.670
Incremental biomass under anaerobic decay (also called w)	BF _{an}	Monitored	ton biomass	90.872	92.401	105.176	128.213	127.226	105.575
Fraction of Methane capture in SWDS and flared or combusted	F	Monitored	%	0	0	0	0	0	0
GWP _{CH4}	GWP _{CH4}	meth default	tCO ₂ e/tonCH ₄	21	21	21	21	21	21
Incremental Biomass transported (third parties)	BF _T	Monitored	ton biomass	40.199	38.484	37.926	102.108	138.494	117.306
Incremental Own biomass	BF _P	Monitored	ton biomass	60.770	64.184	78.936	40.351	2.868	0
TOTAL Incremental Biomass	BF _{Total}	Monitored	ton biomass	100.969	102.668	116.862	142.459	141.362	117.306
Displacement of heat	Symbol	Data Source	Units	2002	2003	2004	2005	2006	2007
Emission Reduction	ER heat	Calculated	tCO ₂ e	31.398	28.056	25.556	42.696	41.918	37.002
Heat emission factor	EF heat (EF _{CO2,BL,heat})	Calculated	tCO ₂ e/MWh	0.130	0.130	0.130	0.130	0.130	0.130
Increased steam generated	Q	Calculated	MWh	241.174	215.509	196.305	327.957	321.985	284.226
Steam produced by the new boiler	Q _{project plant}	Monitored	MWh	326.641	300.976	281.772	413.424	407.452	369.694
Steam produced by old boilers	Q _{CRQ}	Monitored	MWh	325.923	270.423	265.288	242.622	239.827	256.758
Total steam produced	Q _{TOTAL}	Calculated	MWh	652.564	571.399	547.060	656.046	647.280	626.452
Heat from all old boilers	Q _{historic}	Fixed	MWh	0	0	0	0	0	0
Heat from biomass boilers	Q _{biomass}	Fixed	MWh	85.467	85.467	85.467	85.467	85.467	85.467
Electricity generation	Symbol	Data Source	Units	2002	2003	2004	2005	2006	2007
Net electricity generation for Ers calculation	EG	Calculated	MWh	8.633	12.503	20.342	25.125	22.534	18.056
net electricity generated by project	EG _{project plant}	Monitored	MWh	9.212	13.115	21.094	25.509	22.774	19.571
net electricity generated by old equip	EG _{old}	Monitored	MWh	5.616	0	178	985	4.088	1.262
Total electricity generated	EG _{total}	Calculated	MWh	14.828	13.115	21.272	26.494	26.862	20.833
Historical electricity generated by the plant	EG _{historic,3yr}	Fixed	MWh	0	0	0	0	0	0
Project Emission	Symbol	Data Source	Units	2002	2003	2004	2005	2006	2007
Transportation of biomass residues	PET	Calculated	tCO ₂ e	317	304	299	806	1.093	926
Biomass transported (third parties)	BF _T	Monitored	ton biomass	40.199	38.484	37.926	102.108	138.494	117.306
Truck Load	TL	Estimated	ton biomass	10	10	10	10	10	10
Average Distance	AVD	Estimated	km	150	150	150	150	150	150
Truck emission factor	EF _{km}	Estimated	tCO ₂ e/km	0.00053	0.00053	0.00053	0.00053	0.00053	0.00053
on-site consumption of fossil fuel	PE _{FF}	Calculated	tCO ₂ e	185	185	185	185	185	185
Fossil fuel consumption site	FF _{project site}	Monitored	ton	59	59	59	59	59	59
Fossil fuel consumption plant	FF _{project plant}	Monitored	ton	0	0	0	0	0	0
Fossil fuel emission factor	EF _{CO2,FF}	IPCC	tCO ₂ e/ton	3.11	3.11	3.11	3.11	3.11	3.11
consumption of electricity	PE _{EC}	Calculated	tCO ₂ e	163	173	212	108	68	428
shredder consumption	EC _p (EC shredder/chopper)	Calculated	gh	579	611	752	384	240	1.515
shredder work hours	H	Monitored	hour	2.894	3.056	3.759	1.921	1.199	7.573
Grid Emission Factor	EF _{GRID}	O.N.S.	tCO ₂ e/MWh	0.2823	0.2823	0.2823	0.2823	0.2823	0.2823
combustion of biomass residues	PE _{biomass,CH4}	Calculated	tonCH ₄	0	0	0	0	0	0
Total Emission Reductions	Symbol	Data Source	Units	2002	2003	2004	2005	2006	2007
Displacement of heat	ER _{heat}	Calculated	tCO ₂ e	31.398	28.056	25.556	42.696	41.918	37.002
Electricity generation	ER _{electricity}	Calculated	tCO ₂ e	2.437	3.530	5.743	7.094	6.362	5.098
Methane Avoidance	BE _{biomass}	Calculated	tCO ₂ e	7.192	13.853	21.290	30.237	38.696	45.156
Project Emission	PE	Calculated	tCO ₂ e	503	490	485	992	1.279	1.112
Leakage	L	Calculated	tCO ₂ e	0	0	0	0	0	0
ER _{heat} + ER _{electricity} + BE _{biomass} - PE - L	ER	Calculated	tCO ₂ e	40.523	44.950	52.104	79.034	85.697	86.144