CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Trombini / Green Domus – Curitiba - Biomass for Thermal Energy
Version 03
20/03/2008

A.2. Description of the small-scale project activity:

Trombini Industrial S.A. has started its industrial activities in 1962, and at present its products include recycled paper, corrugated cardboard boxes and paper bags in its various factories throughout the country. The project activity aims to use primarily biomass residue (pieces of various types of wood and firewood) instead of fossil fuel in the process of steam generation for industrial use and a biomass based co-generation system that produces electricity.
Trombini's plant in Curitiba manufactures:
At sector "CP", brown paper for packaging;
At sector "PO", corrugated cardboard.
In the manufacture of brown paper for packaging, steam is used for drying paper, cooking starch and preparing polymers.
In the manufacture of corrugated cardboard, steam is used to warm up the machine cylinders where the paper goes through various stages until the corrugated cardboard plate is ready.
The boilers that are the object of this project belong to the supporting area of the production process and are away from the paper machines.

The features of the boiler installed at "CP-Curitiba" are: (see Annex 3)
Manufacturer: Dedini S/A Industrias de Base;
Model: "CSCT 750";
Generated power: 12,37 MW and
Measured efficiency: 80%.

The features of the boiler installed at "PO-Curitiba" are: (see Anex 3)
Manufacturer: ATA Combustão Técnica S/A;
Model: ATA 26 H-3 with furnace 22 Alp.
Generated power: 2,48 MW;
Measured efficiency: 86%

The project activity reduces greenhouse effect GHG gases emission because biomass is used in the boiler, instead of fossil fuel to generate steam and the biomass based co-generation system permit Trombini to avoid the grid electricity use.
The biomass is acquired from various local sawmills which, if not for the project, would burn it outside or it would simply be left in the woods to decay.
Considering the uncertainties in relation to the guarantee of biomass supply, there still remain in the place old boilers that use fossil fuel, to be used in case of absence of biomass in the place, or in case of maintenance and repairs in the new boilers.

The project activity contributes in several ways for sustainable development, namely:

a) It uses remains of other productive process (wood chips) that, if not for the project, would be burned, abandoned outdoors for decay or sent to a landfill.
b) Biomass being considered a "neutral carbon", the project complies with CDM rules.
c) It diminishes expressively the burning of fossil fuels reducing atmosphere contamination with greenhouse gases GEE, as well as other harmful pollutants originated from such burnings.
d) Electricity will be produced from renewable biomass to supply the industry (with possibility of export to the grid).
e) It encourages improvements in the manufacturing technology of boiler's burners that use biomass (firewood or wood chips) since it is difficult sustain the steam demand and keep pressure stable on biomass burners.
f) It encourages improvements in the manufacturing technology of co-generations systems based on biomass.
g) The technology used in steam production through biomass encourages the companies that have productive processes generating residues which can be used as fuel not to dispose of them in an inappropriate manner, as they can be an additional income source for their businesses.
h) Another economic activity is created in the area, that being biomass handling from its origin and in the project site.

A.3. Project participants:

Name of the country involved	Private project participants	Does the involved country wish to be considered project participant? (Yes/No)
Brasil (host)	• **Trombini Industrial S.A. (Private entity)** • **Green Domus Desenvolvimento Sustentável Ltda . (Private entity)**	**No**

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

Brazil

A.4.1.2. Region/State/Province etc.:

Southern Region – State of Paraná

A.4.1.3. City/Town/Community etc:

City: Curitiba

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

Rua Olympio Trombini, 619 – Vista Alegre
Curitiba - PR
82020-040
Brasil

Geographical coordinates: 24° 24' 28,30" S
49° 18' 24,55" W

1:5.000.000

1:2.000.000

1:500

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

Small-scale project activity
Sectoral Scope 1 – Energy industries (renewable / non-renewable sources)
Type I: Renewable energy projects
Category I.C.: Thermal energy for the user with or without electricity

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Emissions reduction total for the first 7 years project period:

Years	Emissions reduction estimate per year in CO_2e metric tons
2009	58847
2010	58847
2011	58847
2012	58847
2013	58847
2014	58847
2015	58847
Reductions estimated total (CO_2e metric tons)	**411929**
Total crediting period in years	**7**
Average of emissions reduction during the crediting period (CO_2e metric tons)	**58847**

A.4.4. Public funding of the small-scale project activity:

There was no public funding for the project activity, not of the host country, neither of other parties included in the Convention Annex I.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

The project activity is not a separate component of a major project, since there is no other small-scale project activity registered, or in the process of being registered, with the same project participants, in the

same project category and technology, registered in the last 2 years, and the project boundaries are within a radius of 1 km of the small-scale project activity proposed here.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Version 13 of AMS I.C.
Thermal energy for the user with or without electricity.

B.2 Justification of the choice of the project category:

As directed in AMS I.C version 13, the conditions to be observed to classify the project in the category are:
Technology/measurement:

1. This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuels with or without electricity.

a) In sector "CP" the proposed small-scale project activity uses biomass instead of fossil fuel in a boiler, to generate steam for the production processes and co-generates electricity for own use (with a possibility of export to the grid).
b) In sector "PO" the proposed small-scale project activity uses biomass instead of fossil fuel in a boiler, to generate steam for the production processes, do not co-generates electricity.

2. The thermal generation capacity will be less than 45 MW.

The maximum generation capacity of the boilers is:
Boiler Dedini CSCT 750: 21,7 MW.
Boiler ATA 26 – H-3: 4,2 MW.

Therefore, the maximum generation capacity of the project is 25,9 MW, less than the established 45 MW.

3. Cogeneration projects that displace/avoid fossil fuel consumption in the production of thermal energy and electricity shall use AMS I.C.

Condition 4 is not applicable to the proposed project activity.

B.3. Description of the project boundary:

The physical and geographical location of the factory Trombini Industrial S/A in Curitiba, where the units CP-Curitiba and PO-Curitiba are, circumscribe the site of the project activity.

B.4. Description of baseline and its development:

- For renewable energy technologies to substitute the ones that use fossil fuels, the simplified baseline is the consumption of fuel of the technologies that would have been employed in the absence of the project activity multiplied by a substituted fossil fuel emission coefficient. The *"IPCC Guidelines–2006"* reference values were used.

For steam produced using fossil fuel, the baseline of emissions is calculated as follows:

$$BE_y = HG_y \times EFCO_2 / \eta_{th}$$

where:

BE_y: emissions in the baseline during year y, in tCO_2e
HG_y: net quantity of steam produced by the project activity during year y in TJ.
$EFCO_2$: Emission factor of CO_2 per unit of energy by the fuel previously used in tCO_2/TJ
η_{th} : Efficiency of the system with the fossil fuel used in the absence of the project activity.

The efficiency of the units in the baseline was determined through measurements carried out on site.

- Baseline emissions for electricity imported from the grid shall be calculated as the amount of electricity produced with renewable energy technology (GWh) multiplied by the CO_2 emission factor of the grid.:

$$BE_y = EG_y * EFCO_2(grid)$$

where:

BE_y: baseline emissions from electricity displaced by the project activity during the year "y", in tCO_2e
EG_y: amount of electricity imported from the Grid during year y in GWh.
$EFCO_2$(grid): CO_2 emission factor of the Brazilian South Region Grid, given by the Brazilian DNA, in tCO_2/MWh.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

To substitute the existent boilers burners by new ones that use biomass (wood chips), complies with CDM principles, since this fuel is considered "neutral carbon".

According to Annex A of Appendix B of "Simplified modalities and procedures for small scale clean development machanism project activities" (version 6 of September 30th, 2005) it is demonstrated that the alternative of the project activity is unique, and it would not have happened due to the barriers:

a) Alternative scenarios

a1) Unit CP-Curitiba:
The alternative for the project activity would be for the boiler "CSCT 750" to go on generating the necessary steam for the production line using fossil fuel. As a matter of fact, in 1998 the boiler was adapted to substitute biomass (wood) by oil BPF-3A (fossil fuel), and keep importing electricity from the grid to use at factory production.

The fossil fuel (BPF-3A) boiler "Keystone 11M" was kept on the site as an alternative boiler.(See annex 3)

a2) Unit PO-Curitiba
The option of transforming the burner of boiler "ATA-26" from firewood into wood chips was adopted with a basis on the same norms used for boiler "CSCT 750".
The alternative for the project activity would be to use the boiler "EÔNIA" of unit "PO-Curitiba", fueled by shale oil, and keep boiler "ATA-26" fueled by firewood as an alternative, just in case. The fossil fuel (shale oil) boiler was kept on the site as an alternative boiler.
As a matter of fact, the plant had already the necessary structure to store and distribute shale oil, since the boiler was already used as an alternative.

The substitution of the existing boiler for a new one, fueled by biomass (wood chips) faces the following barriers:

b) Investment barrier:

b1) Unit CP-Curitiba:
Adapting a biomass burner to the existing boiler to substitute oil BPF 3A (fossil fuel), its implantation together with receiving, stocking and transporting systems to the chip wood burner apart from all other peripheral systems demanded an investment of approximately US$ 2.150.000,00. The cogeneration system will cost about US$ 19.850.000,00.
To go from oil to biomass – that was done in 1998 – the boiler had already spent more resources, thus to reinvest resources in yet another transformation was a difficult decision, and for that the CDM incentives were considered of the utmost importance to the project, although the way of getting them was not clear yet.

b2) Unit PO-Curitiba:
The adaptation of a new biomass burner (wood chips) to the boiler "ARTA-26" to substitute the existing one fueled by wood demanded an investment of US$ 540.000,00: that would not have been necessary if alternative a.2 were applied for the project activity. Again, CDM incentives were considered relevant to the project, although the way of getting them were not clear yet.

c) Technological barrier:

At the time boilers "CSCT 750" and "ATA-26" used firewood in the burner, they were manually fed, which means the gates were opened often, to throw in an irregular and intermittent quantity of firewood, which lead to burner's temperature instability and, therefore, of boiler pressure and steam generation.
The firewood stock in the manufacturer's yard took less room than is necessary for wood chips.
In 1998, the change of "CSCT 750" to BPF oil, removed the system instabilities at CP-Curitiba, but they were still there at PO-Curitiba.

The choice of biomass, for "CSCT 750" and for "ATA-26", now as wood chips, has created the need of a biomass adduction system to automatically regulate the fuel quantity according to the need of heat, in order to stabilize the burner temperature and, therefore, the boiler pressure and steam generation.

As biomass heat-producing power is much lower than oil, there is the need of a much larger quantity of fuel that takes more room: also, the logistics for receiving, stocking, handling and transporting to the burner is more sophisticated and difficult.

It is also common knowledge that biomass boilers have a more difficult maintenance system than the ones fueled by oil.
Fossil fuels have the advantage of guaranteed supply and uniform quality, minimizing production risks.
It is important to emphasize that Brazil is self sufficient in oil production, and that, in itself, is already a supply guarantee.

d) Other barriers:

d.1) The use of fossil fuels for the type of activity of Trombini in Brazil has no legal restrictions: therefore, the maintenance of the old system would not have faced any legal barrier.

d.2) The use of biomass in boilers burners does not face any legal obstacle either.

Trombini has all environmental licenses needed to keep working.

The conclusion is that the project activity is additional and the income from CERs are very important for the project feasibility as time goes by. We must also consider that the emissions reduction activity has a very important publicity impact.
For that reason many companies as Trombini Industrial S/A were late on their CDM projects.
It is important to acknowledge that these dichotomy between companies that wants to officialize their CDM projects and CDM Consulting companies shall last for a while.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

- Baseline emissions as per the methodology MAS I.C.:

  $BE_y = BE_{\mathbf{CP},y} + BE_{\mathbf{PO},y}$ where:

CP-Curitiba:

$$BE_{CP,y} = \frac{HG_{CP,y} \times EFCO_2}{\eta th_{CP}} + EG_y * EFCO_2(grid)$$ where:

$BE_{\mathbf{CP},y}$ = baseline emissions from steam displaced by the unit CP-Curitiba and electricity import from the grid in year "y".
$HG_{\mathbf{CP},y}$ = net quantity of steam supplied by CP-Curitiba during year "y".
$EG_{\mathbf{CP},y}$ = amount of electricity imported from the Grid during year "y".
ηth_{CP} = boiler efficiency at unit CP-Curitiba.
$EFCO_2$ = Emission factor of CO_2 per unit of energy by the fossil fuel used in tCO_2/TJ.
EG_y = amount of electricity imported from the Grid during year "y".

$EFCO_2$(grid): CO_2 emission factor of the Brazilian South Region Grid, given by the Brazilian DNA, in tCO_2/MWh.

PO-Curitiba:

$$BE_{PO,y} = \frac{HG_{PO,y} \times EFCO_2}{\eta th_{PO}}$$ where:

$BE_{PO,y}$ = baseline emissions of the boiler at unit PO-Curitiba in year "y".
$HG_{PO,y}$ = net quantity of steam produced by PO-Curitiba in year "y".
ηth_{PO} = boiler efficiency at unit PO-Curitiba.
$EFCO_2$ = Emission factor of CO_2 per unit of energy by the fossil fuel used in tCO_2/TJ.

- Project emissions:

CP-Curitiba:

Due to electricity consumption of the new equipments used to feed CP's burner with biomass.

$EEL_{CP,y} = EG_{CP,y} \; x \; EFCO_{2(Grid)}$ where:

$EEL_{CP,y}$ = Emissions due to electricity consumption to feed the burner at CP-Curitiba.
$EG_{CP,y}$ = Amount of electricity used by the equipments to feed the burner with biomass.
$EFCO_2$(grid): CO_2 emission factor of the Brazilian South Region Grid, given by the Brazilian DNA,

PO-Curitiba:

Due to electricity consumption of the new equipments used to feed PO's burner with biomass.

$EEL_{PO,y} = EG_{PO,y} \; x \; EFCO_{2(Grid)}$ where:

$EEL_{PO,y}$ = Emissions due to electricity consumption to feed the burner at PO-Curitiba.
$EG_{PO,y}$ = Amount of electricity used by the equipments to feed the burner with biomass.

$EFCO_2$(grid): CO_2 emission factor of the Brazilian South Region Grid, given by the Brazilian DNA, in tCO_2/MWh.

- Leakages:

The leakages in Category I.C. are considered when the equipment is transferred to other activities, and this does not happen in this project. Therefore:

Leakages = 0

- Emissions reduction:

Emissions reductions will be calculated by the formula:

$RE_y = BE_y - EEL_{CP,y} - EEL_{PO,y}$ - Leakages

B.6.2. Data and parameters that are available at validation:

For CP-Curitiba unit, were used as baseline the data from the CSCT 750 boiler, which works on BPF-3A.

Data / Parameter:	**F_{CP}**
Data unit:	t/h
Description:	Steam flow generated on the CP-Curitiba Boiler
Source of data used:	Direct measurements at the site
Value applied:	14 t/h
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use a flow meter
Any comment:	Used to calculate the power

Data / Parameter:	**T_{CP}**
Data unit:	°C
Description:	Steam temperature from the CP-Curitiba boiler
Source of data used:	Direct measurements at the site
Value applied:	305 °C
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use a thermometer
Any comment:	Used to calculate the boiler's internal energy

Data / Parameter:	**P_{CP}**
Data unit:	MPa
Description:	Work pressure of the steam generated by the CP-Curitiba boiler
Source of data used:	Direct measurements at the site
Value applied:	19 Kgf/cm² = 1,8633 MPa
Justification of the choice of data or description of measurement methods	Use a manometer

and procedures actually applied :	
Any comment:	used to calculate the boiler's internal energy

Data / Parameter:	ηth_{CP}
Data unit:	%
Description:	Fossil fuel boiler efficiency (CP-Curitiba) – baseline
Source of data used:	Direct measurements at the site
Value applied:	90%
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used to calculate baseline emissions

Data / Parameter:	**$Disp_{CP}$**
Data unit:	Hours per year
Description:	CP-Curitiba biomass Boiler availability during the year.
Source of data used:	Estimated
Value applied:	8472 hours
Justification of the choice of data or description of measurement methods and procedures actually applied :	CP-Curitiba boilers stop 72 hour for maintenance and repair every 3 months or 288 hours per year.
Any comment:	Used to calculate the net quantity of produced steam

Data / Parameter:	**IE_{CP}**
Data unit:	TJ/t
Description:	Internal energy of the steam based on temperature and pressure of the CP-Curitiba boiler
Source of data used:	Steam Temperature and pressure
Value applied:	0,002784 TJ/t
Justification of the choice of data or description of measurement methods	Value calculated according to "Fundamentos da Termodinâmica" from: "Sonntag , Borgnakke , Van Wylen.

and procedures actually applied :	
Any comment:	Used to calculate the power

Data / Parameter:	**$EFCO2_{CP}$**
Data unit:	t CO_2e / TJ
Description:	Emission Factor of the fuel used on the CP-Curitiba fossil fuel boiler -baseline (BPF-3A oil).
Source of data used:	Tab. 2.3 – IPCC – Gidelines – 2006)
Value applied:	73,30 t CO_2e / TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value from IPCC Guidelines - 2006
Any comment:	Used to calculate baseline emissions

Data / Parameter:	**EG_y**
Data unit:	GWh
Description:	Amount of electricity imported from the Grid to be produced by the cogeneration system (with a possibility of export to the grid..
Source of data used:	Direct measurements at the site
Value applied:	63,54 GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity consumption measurerer
Any comment:	Used to calculate baseline emissions

Data / Parameter:	**$EFCO_{2(Grid)}$**
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the Brazilian South Region Grid.
Source of data used:	Given by Brazilian DNA.
Value applied:	0,5036
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used to calculate baseline emissions

For the PO-Curitiba unit, were used for baseline the information of the boiler that work with shale oil since those are more conservative and measurable.

Data / Parameter:	**F_{PO}**
Data unit:	t/h
Description:	Steam flow generated on the PO-Curitiba boiler
Source of data used:	Direct measurements at the site
Value applied:	3 t/h
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use a flow meter
Any comment:	Used to calculate the power

Data / Parameter:	**T_{PO}**
Data unit:	°C
Description:	Steam temperature from the PO-Curitiba boiler
Source of data used:	Direct measurements at the site
Value applied:	198 °C
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use a thermometer
Any comment:	Used to calculate boiler's internal energy

Data / Parameter:	**P_{PO}**
Data unit:	MPa
Description:	Work preesure of the steam generated by the PO-Curitiba boiler
Source of data used:	Direct measurements at the site
Value applied:	14,5 Kgf/cm² = 1,4220 MPa
Justification of the choice of data or description of measurement methods and procedures actually applied :	Use a manometer
Any comment:	Used to calculate the boiler's internal energy

Data / Parameter:	ηth_{PO}
Data unit:	%
Description:	Fossil fuel boiler efficiency (PO-Curitiba - shale oil) - baseline
Source of data used:	Direct measurements at the site
Value applied:	84%
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used to calculate baseline emissions

Data / Parameter:	$Disp_{PO}$
Data unit:	Hours per year
Description:	PO-Curitiba biomass Boiler availability during the year.
Source of data used:	Estimated
Value applied:	8472 hours / year
Justification of the choice of data or description of measurement methods and procedures actually applied :	PO-Curitiba boilers stop 72 hour for maintenace and repare every 3 months os 288 hours per year.
Any comment:	Used to calculate the net quantity of steam produced

Data / Parameter:	IE_{PO}
Data unit:	TJ/t
Description:	Internal energy of the steam based on temperature and pressure of the PO-Curitiba boiler
Source of data used:	Steam Temperature and pressure
Value applied:	0,002598TJ/t
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value calculated according to "Fundamentos da Termodinâmica" from: "Sonntag , Borgnakke , Van Wylen.
Any comment:	Used to calculate the power

Data / Parameter:	$EFCO2_{PO}$
Data unit:	tCO_2e / TJ
Description:	Emission Factor of the used fuel used on the Po-Curitiba fossil fuel boiler - baseline (shale oil).
Source of data used:	Tab. 2.3 – IPCC – Gidelines – 2006)
Value applied:	73,30 tCO_2e / TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value IPCC Guidelines - 2006
Any comment:	Used to calculate baseline emissions

For the project emissions calculate:

Data / Parameter:	$EG_{CP,y}$
Data unit:	MWh
Description:	Amount of electricity used by the equipments to feed the CP's burner with biomass
Source of data used:	Estimated
Value applied:	1871
Justification of the choice of data or description of measurement methods and procedures actually applied :	Power of equipments and working time were used (see Annex 3)
Any comment:	Used to calculate project emissions

Data / Parameter:	$EG_{PO,y}$
Data unit:	MWh
Description:	Amount of electricity used by the equipments to feed the PO's burner with biomass
Source of data used:	Estimated
Value applied:	325
Justification of the choice of data or description of measurement methods and procedures actually applied :	Power of equipments and working time were used (see Annex 3)
Any comment:	Used to calculate project emissions

B.6.3 Ex-ante calculation of emission reductions:

a) Baseline emissions:

a.1) CP-Curitiba:

Available Parameters:

Boiler: CSCT 750
Fuel: BPF-3A oil (fóssil)
F_{CP} = 14 t/h
P_{CP} = 19 KGf/cm² = 1,8633 MPa
T_{CP} = 305°C
ηth_{CP} = 90%
$EFCO_2$ (BPF-3A) = 73,3 tCO_2 / TJ
$Disp_{CP}$ = 8472 hours per year
EG,y = 63,54 GWh
$EFCO_2$ (grid) = 0,5036 tCO_2 / TJ

Calculated parameters:

IE_{CP} = 2784 KJ/Kg, From the bibliographies.
Power = F_{CP} x IE_{CP}
HG_{CP} = Power x $Disp_{CP}$

$$BE_{CP,y} = \frac{HG_{CP,y} \times EFCO_2}{\eta th_{CP}} + EG_y \, x \, EFCO_{2(Grid)} = 56203 \text{ tCO2e}$$

a.2) PO-Curitiba:

Available Parameters:

Boiler: “Eônia”
Fuel: shale oil (fossil)
F_{PO} = 3 t/h
P_{PO} = 14,5 KGf/cm² = 1,4220 MPa
T_{PO} = 198°C
ηth_{PO} = 84%
$EFCO_2$ (shale oil) = 73,3 tCO_2e / TJ
$Disp_{PO}$ = 8472 hours per year

Calculated Parameters:

IE_{PO} = 2598 KJ/Kg, From the bibliographies.
Power = F_{PO} x IE_{PO}
HG_{PO} = Potência x $Disp_{CP}$

$$BE_{PO,y} = \frac{HG_{PO,y} \times EFCO_2}{\eta th_{PO}} = 4840 \text{ tCO}_2\text{e}$$

b) Project emissions:

b.1) CP-Curitiba:

$EEL_{CP,y} = EG_{CP,y}$ x $EFCO_{2(Grid)}$ = 942 tCO_2e

$EG_{CP,y}$ = 1871 MWh
$EFCO_{2(Grid)}$ = 0,5036 tCO2e/MWh

b.2) PO-Curitiba:

$EEL_{PO,y} = EG_{PO,y}$ x $EFCO_{2(Grid)}$ = 164 tCO_2e

$EG_{PO,y}$ = 325 MWh.
$EFCO_{2(Grid)}$ = 0,5036 tCO2e/MWh

c) Total project emissions:

$E_{total} = EEL_{CP,y} + EEL_{PO,y}$ = 1106 tCO_2e

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Baseline emissions Estimative - CP-Curitiba	Baseline emissions Estimative - PO-Curitiba	Project emissions	Lekeage estimative	Final Emission reduction Estimatives
2009	56203	4840	1106	0	58847
2010	56203	4840	1106	0	58847
2011	56203	4840	1106	0	58847
2012	56203	4840	1106	0	58847
2013	56203	4840	1106	0	58847
2014	56203	4840	1106	0	58847
2015	56203	4840	1106	0	58847
Total **(tonCO$_2$e)**	393421	33880	7742	0	411929

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

The following CP-Curitiba data will be monitored:

Data / Parameter:	**$F_{CP,y}$**
Data unit:	Tons (t)
Description:	Amount of steam produced by the CP-Curitiba biomass boiler on the year "y".
Source of data to be used:	Monthly measurements
Value of data	
Description of measurement methods and procedures to be applied:	Measured using a flow measurer.
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance inside ISO routine.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$T_{CP,y}$**
Data unit:	°C
Description:	Steam Temperature from CP-Curitiba boiler during the year "y".
Source of data to be used:	Direct measurements on site.
Value of data	
Description of measurement methods and procedures to be applied:	Measured with termometer.
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance inside ISO routine.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$P_{CP,y}$**
Data unit:	MPa
Description:	Work pressure of the steam generated by the CP-Curitiba boiler during the year "y".
Source of data to be used:	Direct measurements at site.
Value of data	
Description of measurement methods and procedures to be applied:	Measured with manometer.
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance inside ISO routine.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$Q_{CP,y}$**
Data unit:	Tons (t)
Description:	Amount of biomass used on CP-Curitiba during the year "y"
Source of data to be used:	Measured monthly.
Value of data	
Description of measurement methods and procedures to be applied:	The amount of biomass is verified on scale, the monitoring will be done using the invoice and weighing.
QA/QC procedures to be applied:	
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	ηth_{CP}
Data unit:	(%)
Description:	Boiler "CSCT 750" (CP-Curitiba) efficiency.
Source of data to be used:	Measured each six months.
Value of data	
Description of measurement methods and procedures to be applied:	The measurement wil be done inside ISO routine.
QA/QC procedures to be applied:	ISO procedures.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$EG_{CP,y}$**
Data unit:	MWh
Description:	Amount of electricity used by CP-Curitiba equipments to feed the burner with biomass during the year "y"
Source of data to be used:	Measured monthly.
Value of data	
Description of measurement methods and procedures to be applied:	Electricity consumption measurer
QA/QC procedures to be applied:	
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$EG_{,y}$**
Data unit:	GWh
Description:	Amount of electricity supplied for the project activity during the year "y"
Source of data to be used:	Measured monthly.
Value of data	
Description of measurement methods and procedures to be applied:	Electricity consumption measurer
QA/QC procedures to be applied:	
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$EFCO_{2(Grid),y}$**
Data unit:	tCO_2/MWh
Description:	CO2 emission factor of the Brazilian South Region Grid during the year "y"
Source of data to be used:	Measured monthly.
Value of data	
Description of measurement methods and procedures to be applied:	Given by Brazilian DNA.
QA/QC procedures to be applied:	
Any comment:	Data will be stored during the crediting period and 2 years after.

The following PO-Curitiba data will be monitored:

Data / Parameter:	**$F_{PO,y}$**
Data unit:	Tons (t)
Description:	Amount of steam produced by the PO-Curitiba biomass boiler on the year "y".
Source of data to be used:	Monthly measurements
Value of data	
Description of measurement methods and procedures to be applied:	Measured using a flow measurer
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$T_{PO,y}$**
Data unit:	°C
Description:	Steam Temperature from PO-Curitiba boiler during the year "y".

Source of data to be used:	Direct measurements at site.
Value of data	
Description of measurement methods and procedures to be applied:	Measured with termometer.
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance inside ISO routine.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	$\mathbf{P_{PO,y}}$
Data unit:	MPa
Description:	Work pressure of the steam generated by the PO-Curitiba boiler
Source of data to be used:	Direct measurements at site.
Value of data	
Description of measurement methods and procedures to be applied:	Measured with manometer.
QA/QC procedures to be applied:	The measurement equipments will be certified and will have proper maintenance inside ISO routine.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	$\mathbf{Q_{PO,y}}$
Data unit:	Tons (t)
Description:	Amount of biomass used on PO-Curitiba during the year "y"
Source of data to be used:	Measured monthly..
Value of data	
Description of measurement methods and procedures to be applied:	The amount of biomass is verified on scale, the monitoring will be done using invoice and weighing.
QA/QC procedures to be applied:	Data will be stored during the crediting period and 2 years after.
Any comment:	Amount of biomass used on PO-Curitiba during the year "y"

Data / Parameter:	$\eta th_{\mathbf{PO}}$
Data unit:	(%)
Description:	Boiler "ATA-26" (PO-Curitiba) efficiency.
Source of data to be used:	Measured each six months.
Value of data	
Description of measurement methods	The measurement will be done inside ISO routine.

and procedures to be applied:	
QA/QC procedures to be applied:	ISO procedures.
Any comment:	Data will be stored during the crediting period and 2 years after.

Data / Parameter:	**$EG_{PO,y}$**
Data unit:	MWh
Description:	Amount of electricity used by PO-Curitiba equipments to feed the burner during the year "y"
Source of data to be used:	Measured monthly.
Value of data	
Description of measurement methods and procedures to be applied:	Electricity consumption measurer
QA/QC procedures to be applied:	
Any comment:	Data will be stored during the crediting period and 2 years after.

B.7.2 Description of the monitoring plan:

Trombini Industrial S.A. established a Quality for Project, Development, Production and Commercialization Managing System for its industrial processes and this system was audited and conforms to standard NBR ISO 9001:2000. The measurement equipments of temperature, pressure and steam flow are not included in ISO calibration routine. It will be included in QA/QC the calibration of all measure equipments involved in project activities.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date of complementary application of methodology for the project activity:
20/03/2008

Persons/entities responsible for the project

Green Domus Desenvolvimento Sustentável Ltda (Project participant)
Rua Ribeiro do Vale, 318 - Brooklin
Sao Paulo - SP
Brazil
Tel: +55 11 5093 4854
e-mail: greendomus@greendomus.com.br

CDM – Executive Board

site: www.greendomus.com.br

André Leonel Leal: andrell@greendomus.com.br
Nino Sergio Bottini ninosb@greendomus.com.br
Felipe Jané Bottini felipejb@greendomus.com.br

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

19/08/2004

C.1.2. Expected operational lifetime of the project activity:

25 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

01/01/ 2009

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

Brazilian environmental laws do not require any special license for the type of fuel substitution object of the project activity.
Trombini Industrial S.A. has all environmental licenses required by Brazilian laws for its industrial activities, for its eucalyptus plantation, and acquires certified biomass from its suppliers according to the laws in force.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

Brazilian DNA is the *Interministerial Commission for the Global Change of Climate – CIMGC* created by decree on 07/07/1999, that issued on 11/09/2005 Resolution n° 1 determining how, when and to whom consultations have to be sent.
The following entities were consulted:

Prefeitura Municipal de Curitiba
Palácio 29 de março
Av. Cândido Abreu, 817 – 2º andar
Curitiba - PR
80530-908

Câmara Municipal de Curitiba
Palácio Rio Branco
Rua Barão do Rio Branco s/nº
Curitiba - PR
80010-902

Secretaria Municipal do Meio Ambiente
Av. Cândido Abreu, 817 – Centro Cívico
Curitiba - PR
80530-908

Secretaria de Estado do Meio Ambiente e Recursos Hídricos
Rua Desembargador Motta, 3.384
Curitiba - PR
80430-200

Instituto Ambiental do Paraná
Rua Engenheiro Rebouças, 1.206
Curitiba - PR
80215-100

Ministério Público do Estado do Paraná
Rua Marechal Floriano Peixoto, 1.251 – Rebouças

Curitiba - PR
80230-110

Fórum Brasileiro de ONGs e Movimentos Sociais para o Meio Ambiente
SCS – Quadra 08 – Bloco B – 50
Edifício "Venâncio 2000" – 1º andar
Brasília - DF
70333-900

Associação Protetora do Meio Ambiente Verde Vida Sul
Rua Emiliano Perneta, 10 – cj. 1301 A - Batel
Curitiba - PR
80250-100

Associação de Defesa do Meio Ambiente de Reimer
Av. República Argentina, 1347 - sala 3 - Água Verde
Curitiba - PR
80000-000

E.2. Summary of the comments received:

The only comment received was from "Secretaria Municipal do Meio Ambiente" (Environmental official agency from the city of Curitiba) that affirmed that does not have nothing against the project activity.

E.3. Report on how due account was taken of any comments received:

Not applicable since the comment do not demand action.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Trombini Industrial S.A.
Street/P.O.Box:	Rua Olympio Trombini, 619 – Vista Alegre
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City:	Curitiba
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Telephone:	+ 55 41 2169 1100
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E-Mail:	
URL:	www.trombini.com.br
Represented by:	José Marcelino Gonçalves
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Salutation:	Mr.
Last Name:	Gonçalves
Middle Name:	Marcelino
First Name:	José
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Organization:	Green Domus Desenvolvimento Sustentável Ltda
Street/P.O.Box:	Rua Ribeiro do Vale, 318 - Brooklin
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City:	São Paulo
State/Region:	State of São Paulo
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Represented by:	Nino Sergio Bottini
Title:	Director
Salutation:	Sr.
Last Name:	Bottini
Middle Name:	Sergio
First Name:	Nino
Department:	Tecnical Departament
Mobile:	

Direct FAX:	55 11 5093 4854
Direct tel:	55 11 5093 4854
Personal E-Mail:	ninosb@greendomus.com.br

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding was used from the parties included in Annex 1.

Annex 3

BASELINE INFORMATION

CP- Curitiba:

The boiler "Dedini", model "CSCT 750" was installed in 1981 and used firewood as fuel. With the development and more sophistication of the machines fueled with the boiler steam it was observed that they could not keepe a stable pressure, interfering too much in the factory production and in the product quality. Thus, in 1998 the boiler was converted to use fossil fuel (oil BPF-3A) with the following features:

Mnufacturer: Dedini S/A Indústrias de Base
Model: CSCT 750
Capacity t/h (steam): Installed = 35 t/h; effective = 21 t/h
Working temperature: 305°C
Working pressure: 20 Kgf/cm²
Generated potency: 14,60 MW
Measured efficiency: 90%
Fuel: oil BPF-3A

In 2004, slightly before the Kyoto Protocol went in force, Trombini had to decide which fuel it had to use in boiler ATA 26 at unit PO – Curitiba, that used firewood. It had to choose among keeping the firewood, change to oil BPF-3A as in boiler CSCT 750, or biomass (wood chips). One single solution was chosen.

That decision of using biomass (wood chips) was strongly influenced by the possibility of getting additional subsidies related to project CDM incentives, since the boiler CSCT 750 had already been modified 6 years before into oil fuel.

Trombini also decided to install a cogeneration system at the CSCT 750 boiler with 7,5 MW capacity.

Nevertheless, in 2004 there were many doubts about enough biomass availability in the market, so much so that an alternative boiler fueled by oil was kept at CP-Curitiba ready to be used, with the following features:

Manufacturer: Dedini S/A Indústrias de Base
Model: KEYSTONE 11M
Capacity t/h (steam): 18 t/h
Working temperature: 305°C
Working pressure: 20 Kgf/cm²
Generated potency: 12,52 MW
Efficiency: 90%
Fuel: oil BPF-3A

The boiler CSCT 750, adapted to use biomass, had from then on the following features:

Manufacturer: Dedini S/A Indústrias de Base
Model: CSCT 750
Capacity t/h (steam): Installed = 28 t/h; effective = 14 t/h.
Working temperatures: 305 °C
Working pressure: 19 Kgf/cm²
Generated potency: 8,7 MW
Measured efficiency: 80%

Availability: 8472 hours per year
Fuel: biomass

PO- Curitiba:

The boiler ATA 26 with ante-furnace model H-3 was installed in 1974 and used oil BPF as fuel: following the example of boiler CSCT 750 of CP-Curitiba, was converted into firewood fuel in 1982.

When CSCT 750 was modified to use oil BPF in 1998, the ATA modification decision was postponed as, apart from the costs incurred, it was still able to provide for the unit needs, although not in a satisfactory way.

In 2004 a decision had to be taken in relation to the fuel to be used in the boiler: oil BPF-3A, as in the CSCT 750, or biomass.

As already mentioned, the decision was taken for both boilers, that is, both were adapted for the use of biomass (wood chips) as fuel.

Similar to the CP-Curitiba, the unit PO-Curitiba, taking uncertainties into account, kept on site an alternative boiler fueled by schist oil, with the following features:

Manufacturer: Indústria de Caldeiras Eureka Santino
Model: Eônia – Fogo Tubular Compacta
Capacity t/h (steam): Installed:6 t/h, effective: 3 t/h.
Working temperature: 198 °C
Working pressure: 14,5 Kgf/cm²
Generated potency: 1,9 MW
Fuel: shale oil
Efficiency: 84%

The boiler ATA 26, adapted to use biomass (wood chips) has now the following features:

Manufacturer: ATA Combustão Técnica S.A.
Model: ATA-26 H-3 with ante-furnace 22 Alp
Capacity t/h (steam): Installed: 5.8 t/h; effective: 3 t/h.
Working temperature: 198°C
Working pressure: 14.5 Kgf/cm²
Generated potency: 1,9 MW
Measured efficiency: 86%
Availability: 8472 hours per year
Fuel: biomass

Project emissions:

At CP-Curitiba biomass feed system there are 29 electric motors (details available with DOE). The power of these equipments and their working time was used to calculate the amount, per year, of electricity needed to produce each ton of steam.
The amount of electricity needed was estimated in 15 KWh(year) per ton of steam produced.
During the project activities, this parameter will be monitored with direct measurements at site.

At PO-Curitiba, biomass feed system, there are 10 electric motors, and the amount of electricity needed was estimated in 12,5 KWh (year) per ton of steam produced.

Annex 4

MONITORING INFORMATION

Monitoring parameters: (see B.7.1.)

- CP-Curitiba:

$F_{CP,y}$: amount of steam produced by CP-Curitiba.
$T_{CP,y}$: steam temperature in the operating boiler.
$P_{CP,y}$: steam pressure in the operating boiler.
$Q_{CP,y}$: amount of biomass used.
$Q_{CPOil,y}$: amount of fossil fuel used.
η_{thCP} : boiler "CSCT 750" efficiency.
$Disp_{CP}$: biomass boiler availability.
$EG_{CP,y}$: Amount of electricity used by the equipments to feed burner with biomass.
EG,y: Amount of electricity produced by the cogeneration system.

- PO-Curitiba:

$F_{PO,y}$: amount of steam produced by PO-Curitiba..
$T_{PO,y}$: steam temperature in the operating boiler.
$P_{PO,y}$: steam pressure in the operating boiler.
$Q_{PO,y}$: amount of biomass used.
$Q_{POOil,y}$: amount of fossil fuel used.
η_{thPO} : boiler "ATA-26" efficiency.
$Disp_{PO}$: biomass boiler availability.
$EG_{CP,y}$: Amount of electricity used by the equipments to feed burner with biomass.

- Sistems:

For each of the units, CP-Curitiba and PO-Curitiba:

Measurements are stored in the systems already existent, keeping the usual back up routines. There will be monthly reports informing: measurement date, temperature, pressure and steam flow, quantity of consumed electricity and quantity of consumed biomass.

Worksheets format will be defined at the beginning of the crediting period.

- System peculiarities:

The steam flow gauges in both units are arranged in such a way to allow them to measure all the generated steam, not differentiating whether from the main or alternative boilers.

The period that the alternatives boilers will be used, will not be considered by the calculate of emission reductions.

Note: As their use is occasional, the efficiency of the alternative boilers "Keystone 11M" e "EÔNIA" will not be measured. The historical value of 90% and 84% respectively will be adopted.