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

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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:

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Roullier biomass project.
PDD version number 4
Date: August 10 2007

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

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The projects consists in the retrofitting of a furnace and two boilers that burn heavy oil by another furnace (that also has the steam—boiler function) burning chipwood, with German technology by WVT - Wirtschafliche Verbrennungs – Technik with pyrolitic burning system, manufactured by Biochamm, which produces hot air to dry fertilizers granules and steam for general use at the unity. It will burn pinus chipwood from renewable energetic forests in fertilizers production process.

PICTURE 1 – Industrial Facility of Rio Grande, Rio Grande do Sul.

Roullier owns in the city of Rio Grande an industrial facility with the following features:

- A NPK granulated fertilizer production unity with capacity of 400,000 ton/year.
- A powder super phosphate (SSP + TSP) production unity with annual capacity of 300,000 ton/year.
- Imported liquid raw materials (sulphuric acid, phosphoric acid and anhydrous ammonia) static storage capacity of 32,000 ton.

- A total built area of 50,000 sq.m, of which 23,000 sq.m are of warehouses for solid raw materials end products storage, with capacity for 100,000 ton.
- Four expedition unities of bagged and bulk products with capacity of 800,000 ton per year.

PICTURE 2 – Furnace feeding with pinus chipwood

The Roullier project of burning biomass obtains the biomass raw material from saw mills in the surrounding areas, within a range of around 150 km.

Project contribution to sustainable development

The project contributes for the sustainable development through the use of renewable and sustainable energy sources instead of using fossil fuel.

This project has an important contribution to environmental sustainability by reducing carbon dioxide emissions to the atmosphere that would have occurred in the absence of this CDM.

The project reduces greenhouse gas emissions by avoiding fossil fuel combustion, which would be generating in the absence of this project.

The chipwood combustion also emits CO_2, however, since the chipwood comes from renewable forests, the CO_2 emissions are considered nil, since the emitted CO_2 is recovered during photosynthesis.

Besides, the project uses chipwood (wood waste) purchased in saw mills of surrounding areas, which helps the environmental problem of such companies that would have to find a final location for this material. It also helps to reduce greenhouse gas emission in CH_4 form through degradation of this wood waste, because this material would be sent to open sky waste deposits or dumped in landfills.

Bio-energy has been an important option for mitigating greenhouse gas emissions and substitution of fossil fuel. The use of renewable energy has been Roullier's key strategy to achieve environmental objectives.

The use of biomass in Brazil for energetic aims has a great importance in reducing CO_2 emission rate. Actually, with the participation of hydraulic energy, the Brazilian rate is 1.69 tCO_2/tep, which is much less than the world average of 2.36 tCO_2/tep. [1]

The project has pollution control system through cyclones, gas washers Venturi type, installed in series, bag filter for particulate material, and complies with Brazilian environmental regulations.

The ashes generated by the biomass combustion process reach about 1% of the used biomass, which are mixed with fertilizers raw materials, using, in this way, the nutrients contained in the ash.

The furnace was developed by the Brazilian company Biochamm with German technology WVT – Wirtschafliche Verbrennungs – Technik and installed by Roullier with local employees. The furnace construction had the participation of a supervisor and six employees during 30 days.

Roullier is responsible by the training, maintenance and service on the furnace, which improved local manpower skills.

About the Project Participants

The company began its activities in Brazil at the end of 1997 through a joint-venture with Defer S/A, a company belonging to Centralsul group.

In the beginning of 1999 Roullier Group purchased 100% of the capital of the operation in Brazil and started the re-structuration developed here.

The excellent work that is being developed through these years can be realized through Roullier significant increasing role in Brazil with a commercial team totally devoted to the customer, which works proposing solutions that allow the sustainable development of agriculture and cattle raising activities in Brazil. Acting intensively in the market, Roullier Brasil is steadily following its expansion cycle, ever seeking to diversify and add value to the work carried out.

Created in France in 1959 by Daniel Roullier, the Roullier Group has its headquarter in Saint Malo (France) and today is present in more than 20 countries with 50 industrial unities that contribute to a business volume in excess of 900 million euros.

Roullier group is registering a success history in the European and North and Latin American markets. With an entrepreneur corporative mentality, Roullier Group is one of the best examples of international development, with advanced production processes and modern work systems, in one of the most indispensable business areas of the planet, the agri-food production.

[1] CONTRIBUIÇÕES AO PLANO NACIONAL DE ENERGIA 2006-2010, NO COMPONENTE FLORESTAS ENERGÉTICAS - Source:http://www.sbs.org.br/destaques_contribuicoes.html

In order to make it all possible, the group has more than 4,600 collaborators in several countries, with around 450 in Brazil.

A.3. Project participants:

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Table 1 – Parties involved

Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil	Roullier Brasil Ltda.	No
Brazil	Pro Carbono Consultoria Ambiental Ltda	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

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

The furnace of pinus chipwood was developed by the company Biochamm with German technology by WVT - – Wirtschafliche Verbrennungs – Technik and installed by Roullier according to the needs of fertilizer production in the form of thermal energy for the drying and steam process.

The energy generated by the biomass burning is under parameters control set by Roullier.

Before going to the atmosphere the gases are directed to a cyclone system, gas washers Venturi type, exhausters and chimney, installed in series. The gases are measured and monitored by Roullier technicians constantly, and are also measured and monitored twice a year by a company accredited by the environmental state agency.

Table 2 – Information regarding Roullier biomass furnace

Manufactured by	Biochamm Caldeiras e Equipamentos Industriais Ltda
Local of Manufacturing	Rio Grande
Date of Manufacturing	01/2003
Date of installation	06/2003
Lifetime	30 years
Fuel used	Firewood
Nominal Capacity	8 Gcal/h

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

A.4.1.1. Host Party(ies):

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Brazil

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

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South/Rio Grande do Sul

A.4.1.3. City/Town/Community etc:

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Rio Grande

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

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The project is located at Roullier plant in the city of Rio Grande, approximately 320 km from the Capital of the state of Rio Grande do Sul and has a population of 182,000 inhabitants according to IBGE (Brazilian Census Bureau) 2005 Census .

Roullier Brasil Ltda.
Av. Alm. Maximiano Fonseca 1550 Km 2
Distrito Industrial
96204-040 – Rio Grande/RS
South Latitude 32º 04' 19,9"
Longitude 52º 05' 59,7"

Figure 1: Geographical position of the city of Rio Grande

(Source: City Brazil, 2005 http://www.citybrazil.com.br)

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

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According to Appendix B of procedures and simplified modalities for small-scale projects, Roullier project falls into the following category:

Type I; Category I.C: Thermal Energy for the user (version 12 of 10/08/2007)

The furnace total capacity is:
8 Gcal/h = 33,448 MJ/h = (33,448 MJ)/(3,600 s) = 9.3 MW

Then, the installed capacity is below 45 MW.

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

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Table3 – Estimated emission reductions

Years	Annual estimation of emission reduction [tCO2]
2008 (Jul – Dec)	10,462
2009	20,924
2010	20,935
2011	20,946
2012	20,946
2013	20,946
2014	20,946
2015 (Jan – Jun)	10,473
Total estimated reductions (tCO2) eq	146,578
Total number of crediting years	7
Annual average over crediting period of estimated reductions (tCO2)	20,940

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

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The project is being financed by the FINAME, subordinated to BNDES - Banco Nacional de Desenvolvimento Econômico e Social.

No public funding was used in the development of this project and it doesn't derive from ODA.

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

The Roullier Biomass project, which consists in the substitution of fossil fuel by biomass, is not a debundled component of a larger project to reduce greenhouse gas emissions - GHGs, because it's the only CDM project proposed by Roullier Brasil in the city of Rio Grande, state of Rio Grande do Sul, Brazil. It's in accordance with the Appendix C referring to procedures and simplified modalities for small-scale CDM project activities.

There is no other small-scale CDM project activity registered, or any requirement to register another small-scale CDM project activity:

- With the same project participants; and
- In the same project category and technology/measure; and
- Registered in the previous 2 years; and
- Whose project limit is within the limit of 1 km of the small-scale project activity proposed in the nearest point.

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:

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Type I – Renewable energy projects / I.C. Thermal energy for the user version 12 from 10/08/2007**.**

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

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The project activity meets all applicability requirements of the AMS-1C methodology (Type I – Renewable Energy Project – Thermal energy for the user).

The project activity uses technology of furnace burning chipwood with generation capacity less than 45 MW. The renewable energy technology (biomass for heat drying and steam process) that supplies user with thermal energy displaces fossil fuel as required by Appendix B of simplified modalities and procedures for small-scale CDM project activities.

For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced based on conservative appendix B to the SSM&P.

During the next two years the use of heavy oil furnaces will be considered emission from the CDM project. These furnaces will be eliminated later. Now they are working with less than 3% of their capacity.

For renewable energy technologies that displace fossil fuels, the consumption of biomass is the only parameter that needs to be monitored.

In the first two years of crediting the consumption of fossil fuel in the furnaces will be monitored until it's completely eliminated.

B.3. Description of the project boundary:

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The methodology Type I - Project of Renewable Energy, Category I.C - thermal Eneria for the user, Version 12 of 10/08/2007, defines as the limit of the project the physical and geographic place of the generation of renewable energy that delineates the limit of the project.

Therefore, the project boundary is the Roullier plant.

B.4. Description of baseline and its development:

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For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced based on conservative appendix B to the SSM&P).

The amount of fossil fuel that would have been used in the baseline is multiplied by the respective emission factor to calculate the baseline emissions.

$BE = FF \cdot EF_{FF}$ tCO_2

Where,

- ELB is the baseline emission in t CO_2.
- FF is the fossil fuel consumption that would have been required in each year of the crediting period to substitute the biomass, in TJ.
- EF_{FF} is the fossil fuel Emission Factor, in tCO_2/TJ

The fossil fuel emission factor is calculated as:

$EF_{FF} = CFE \cdot OXID\ 44/12$ tCO_2/TJ

According to IPCC[2], CFE = 21.1 tC/TJ and OXID – 0.99.

Therefore,

$EF_{FF} = 21.1 \cdot 0{,}99 \cdot 44/12 = 76.59$ tCO_2/TJ

$EF_{FF} = 76.59$ tCO_2/TJ

As per AMS-I.C, FF is determined directly from the consumption of biomass. It is assumed that the amount of fossil fuel that would be required in each year of the crediting period to substitute biomass is equal to the amount of biomass used, in energy units:

2 Data presented in Annex 3.

$FF = BIO \cdot LHV_{Biomass}$ TJ

Where,

- BIO is the amount of biomass consumed in each year of the crediting period in tones. Monitored by project proponents.
- $LHV_{Biomass}$ is the lower heating value of the biomass, in TJ/t.

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:

The additionality of the project activity is evaluated and demonstrated by the Annex A of Appendix B of the simplified modalities and procedures for a small-scale CDM project activity. In absence of the project activity the most likely scenario would be the use of oil in the operation of the furnace.

Step 0

Since the acquisition of the facilities for fertilizers production from Defer Group, Roullier sought to obey the current environmental rules of the state of Rio Grande do Sul and Brazil with the aim to be within the sustainable development policies. The fertilizer industry has been always looked upon with reservation by the environmental sector and for this reason Roullier worked in a way to show to the community that it's possible to have an industry that allies production and sustainability without harming the environment. Roullier saw in the CDM project an opportunity to show its costumers and the local community that it's engaged in the fight for a sustainable development and willing to act strongly to reduce GHG, contributing to prevent the climate change on earth.

Roullier believes that with its initiative it can contribute for other industries decisions of changing their energetic systems, based mainly on fossil fuel, to renewable energy systems, contributing to sustainable development and climate change.

It's not an applicable step because the project does not ask for retroactive credits.

Technological barriers

The furnace burning chipwood was developed by the company Biochamm with German technology WVT – Wirtschafliche Verbrennungs – Technik and installed by Roullier. Roullier installed and is responsible for the maintenance of the biomass furnace. The biomass furnaces are more laborious than oil furnaces, and require extra care from employees as well as their training, who performed a course for operation and maintenance in Senai – Serviço Nacional de Aprendizagem Industrial (*National Service of Industrial Learning*).

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In the process of fertilizer production it's necessary a rigorous temperature control of the heat generator to don't affect the quality of the product. To this end it was created an operation procedure that

controls the quality of the chipwood through analyses of humidity and granulometry in each chipwood load that is unloaded at the storage site.

Unlike the oil furnaces, which are fed by automatic pumps, the Roullier biomass furnace is fed with a power shovel that carries the biomass to the stock pile, which is at the unsheltered storage site, to the hopper. It requires, therefore, a storage site for the raw material and additional costs for the feeding operation, since it's necessary the use of additional manpower that wasn't needed before.

Besides, this storage is made in a prime area, located at an industrial district of the single maritime port of the state of Rio Grande do Sul.

It's our aim to build a shelter for chipwood storage in 2007.

Barrier due to prevailing practice

The operation with oil fuel (fossil) was well established at the Roullier plant due to its easier operation and because its industrial unity is located near to two petroleum refineries. One of them is at the city of Rio Grande, less than 5 km from Roullier plant, and the other one is at the metropolitan area of Porto Alegre, approximately 320 km from Roullier plant. The city of Rio Grande has maritime terminals for loading and unloading fossil fuels, which ensures a good supplying logistic in any worldwide market. In other words, the option for the use of fossil fuel granted a greater supplying security.

The change for the biomass use incurred in higher maintenance costs of the furnace and of the accessory equipments that comes with it, like the hopper, belt conveyor, screw feeder among others, costs that didn't exist before the project implementation.

The step related to biomass feeding, which is performed using a power shovel, also has a higher cost and it's more laborious. In this process, the operator has to select the chipwood to avoid excess of humidity and sawdust, to don't harm the furnace performance.

Besides, analyses of humidity and granulometry are performed in each biomass load that comes to the unity, to ensure the quality of the chipwood and, consequently, of the whole process of heat and steam generation at the unity.

Other Barriers

The installation of the furnace required an investment of U$ 300,000.00, with two-thirds of this amount being used to purchase the furnace and the accessory equipments like bucket elevators, hopper for the chipwood, screw feeder for the chipwood and belt conveyor. The rest of the investment went to civil works and manpower to install the furnace.

The furnace was built at Roullier plant with funding from Brazil's National Development Bank.

The implementation of the project activity also faced a barrier related with securing biomass supply. Since two years the forestry base industry is in state of alert because of the unbalance between

wood demand and supply. The expectation is that in the next years there will be a shortage of raw material to attend the needs of wood production**.**

The governmental policies to encourage the reforestation has shown to be insufficient and inefficient to decrease the pressure over the natural forests, because they can't supply the crescent demand for wood. In the state of Rio Grande do Sul, where is located Roullier industrial facility, although there are only 13,5% of natural forests in medium and advanced stage, the crescent demand for wood doesn't put pressure over this indigenous residual forest. This is so because of the efficient action of the environmental protection agencies, the environmental police and the social control exerted by the non-governmental agencies. However, barriers for the wood supply persists.3

The governmental action of the state of Rio Grande do Sul supports with priority reforestation projects, especially in the south of the state, performed mainly by mega companies to the specific end of producing cellulose raw material. Such projects don't intend to supply raw material for firewood consumption.

Another pressing factor over the renewable forests for commercial ends, decreasing the wood offer as fuel, is the pressure exerted by the crescent expanding market of the dynamic furniture producing area of Rio Grande do Sul.

The overcoming of the current barrier will happen with the participation of small and medium size rural owners and with governmental policies to encourage reforestation.

Another aspect is the raise of wood prices. This raise is due, on one side, to the increasing demand for wood and, on another side, to the insufficiency of supplying by the renewable forests for commercial ends and the prohibition of exploitation of the indigenous forests.

According to BNDES[4] (Brazilian National Development Bank) there are some inhibition factors of the wood growth sector in the country:

- ✓ Absence of a long term sectoral police – absence of planning;
- ✓ The institutional model is not directed to the production – lack of instruments.
- ✓ Complexity of legislation, which discriminates and restricts the forestry plantations.
- ✓ Expansion of forestry base is dependent almost exclusively of big corporations.
- ✓ Insufficient insertion of small and medium rural producers.

Skepticism about reliability of the biomass supply and its price were some of the factors limiting project development.

Roullier has long term contracts for supplying biomass but eventually there are delays in the deliveries, forcing the company to keep a stock higher than necessary, affecting the just in time process.

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3 Cobertura Vegetal – Inventário Florestal. (www.sema.rs.gov.br)

4 A Questão Florestal e o Desenvolvimento – Carlos Alberto Roxo (WWW.bnds.gov.br/seminario)

National policies and circumstances relevant to the baseline

There are no programs limiting the use of oil fuel in Brazil. However there are no national policies that would reduce the use of oil fuel in the baseline.

Besides, the uncertainties of Brazilian energetic policies led the proposed CDM project to define the company policy for use of biomass.

The use of biomass furnaces is in compliance with all applicable legal and regulatory requirements in Brazil as well as with all the local safety and pollution standards.

Impact of CDM registration

The impact of registering the CDM project will contribute to the overcoming of all barriers described in this PDD like technological barriers, barriers due to prevailing practices and the barriers due to political and economical uncertainties.

The register will bring more security to the investment in itself and will foment and support the decision of the project owners to carry on with their business model.

Roullier understands that the present project contributes to the sustainable development and with the climate change and could be an unique opportunity for constructing a positive image of the Company, as well as of the sector in which it operates. It hopes that its initiative could act as an example to other companies that are in the fertilizers production field in the state of Rio Grande, changing their energetic systems, based mainly in fossil fuels, to renewable energy systems.

In terms of cooperation with the sustainable development Roullier also believes in a better income distribution among firewood producers, since the demand for wood will grow and consequently a growth in reforestation in the small and medium size properties will be necessary.

The costs of the project and the barriers will be reduced with CERs sales, and will add value to the community with the reduction of greenhouse gas emission (GHGs).

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emissions Reduction

The emissions reduction of the project activity is calculated by using the formula.

ERy = BEy – PEy – Leakage

Where:
ERy is the emission reduction in the year y
BEy is the baseline emission in the year y
PEy is the project emission in the year y

Baseline Emissions

As outlined in section B.4., the following formula from AMS-I.C is used:

$BE = FF . EF_{FF}$ tCO_2

Where,

- ELB is the baseline emission in t CO_2.
- FF is the fossil fuel consumption that would have been required in each year of the crediting period to substitute the biomass, in TJ.
- EF_{FF} is the fossil fuel Emission Factor, in tCO_2/TJ

The fossil fuel emission factor is calculated as:

$EF_{FF} = CFE . OXID\ 44/12$ tCO_2/TJ

According to IPCC, CFE = 21.1 tC/TJ and OXID – 0.99.

Therefore,

$EF_{FF} = 21.1 . 0,99 . 44/12 = 76.59$ tCO_2/TJ

$EF_{FF} = 76.59\ tCO_2/TJ$

As per AMS-I.C, FF is determined directly from the consumption of biomass. It is assumed that the amount of fossil fuel that would be required in each year of the crediting period to substitute biomass is equal to the amount of biomass used, in energy units:

$FF = BIO . LHV_{Biomass}$ TJ

Where,

- BIO is the amount of biomass consumed in each year of the crediting period in tones. Monitored by project proponents.
- $LHV_{Biomass}$ is the lower heating value of the biomass, in TJ/t.

Project Emissions

The GHGs emissions in the biomass combustion process will be consumed by the renewable forests plantation, representing a cyclical process of carbon sequestration.

However the emission of the project (PE) will be determined directly by the fossil fuel ($FF_{boilers}$) consumption in energy unity used in the furnaces, which will be working only during the first two years of the project activity.

During the next two years the use of heavy oil furnaces will be considered emission from the CDM project. These furnaces will be eliminated later. The oil consumption is being slowly eliminated since the operations with the new furnace started, as shown in the table below.

Table 4 – Reduction of fossil fuel (FF) use in the furnaces

YEAR	FF
2003	328.9 t
2004	207.1 t
2005	8.9 t
July 2006	6.4 t

$PE = FF_{boilers} . LHV_{FF} . \quad EF_{FF} \quad tCO2$

Where,

- $FF_{boilers}$ is the amount of fossil fuel consumed in each year of the crediting period in tones. Monitored by project proponents.
- EF_{FF} is the fossil fuel Emission Factor, in tCO2/TJ
- LHV_{FF} is the lower heating value of the fossil fuel, in TJ/t.
  LHV_{FF} = 10,345 kcal/kg = 43,312.3 $.10^{-6}$ TJ/t (value provided by the fossil fuel supplier)

The fossil fuel emission factor is calculated as:

$EF_{FF} = CFE . OXID \; 44/12 \; tCO_2/TJ$

According to IPCC, CFE = 21.1 tC/TJ and OXID – 0.99.

Therefore,

$EF_{FF} = 21.1 \; . \; 0.99 . 44/12 = 76.59 \; tCO_2/TJ$

So,

$PE = FF_{boilers}. \; 43,312.3 \; . \; 10^{-6} \; . \; 76.59 = 3.3173 . FF_{boilers} \qquad tCO_2$

$PE = 3.3173 \; . \; FF_{boilers} \qquad tCO_2$

Considering a fossil fuel consumption of 6.4 t/year, taken from the table 3, item A.4.3, and using the formulae above we will have a emission of approximately 22 tones of CO2 year, which means that for the first two periods of project activity we will have an amount of 44 tones of CO2 of emission.

Leakage

No leakage was considered as resultant of the project.

The leakage (LE) will be considered as neutral because the old furnace was disactivated.

Therefore,

$$LE = 0$$

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

Data / Parameter:	**EF**
Data unit:	tCO2/TJ
Description:	Is the fossil fuel Emission Factor
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse GasInventories:Workbook (table 1-2 e table1-4).
Value applied:	76.59
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC was chosen as the source for reliable data for emissions factors. This value will be fixed for the whole crediting period.
Any comment:	

Data / Parameter:	**$LHV_{Biomassa}$**
Data unit:	TJ/t.
Description:	Is the lower heating value of the biomass
Source of data used:	Value obtained from the average of three analyses performed in the Physico-Chemical lab of the Federal University of Rio Grande
Value applied:	$10{,}437 \cdot 10^{-6}$
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per AMS-I.C, FF is determined directly from the consumption of biomass. It is assumed that the amount of fossil fuel that would be required in each year of the crediting period to substitute biomass is equal to the amount of biomass used
Any comment:	

Data / Parameter:	**LHV_{FF}**
Data unit:	TJ/t.
Description:	Is the lower heating value of the fossil fuel, in TJ/t.
Source of data used:	Value provided by the fossil fuel supplier
Value applied:	$43{,}312.3 \cdot 10^{-6}$
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission of the project (PE) will be determined directly by the fossil fuel ($FF_{boilers}$) consumption in energy unity used in the furnaces, which will be working only during the first two years of the project activity.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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Emissions Reduction

The emissions reduction of the project activity is calculated by using the formula.

ERy = BEy – PEy – Leakage

Where:
ERy is the emission reduction in the year y
BEy is the baseline emission in the year y
PEy is the project emission in the year y

Baseline Emissions

As outlined in section B.4., the following formula from AMS-I.C is used:

$BE = FF \cdot EF_{FF}$ tCO_2

Where,

- BE is the baseline emission in t CO_2.
- FF is the fossil fuel consumption that would have been required in each year of the crediting period to substitute the biomass, in TJ.
- EF_{FF} is the fossil fuel Emission Factor, in tCO_2/TJ

The fossil fuel emission factor is calculated as:

$EF_{FF} = CFE \cdot OXID\ 44/12$ tCO_2/TJ

According to IPCC, CFE = 21.1 tC/TJ and OXID – 0.99.

Therefore,

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As per AMS-I.C, FF is determined directly from the consumption of biomass. It is assumed that the amount of fossil fuel that would be required in each year of the crediting period to substitute biomass is equal to the amount of biomass used, in energy units:

$FF = BIO \cdot LHV_{Biomass}$ TJ

Where,

- BIO is the amount of biomass consumed in each year of the crediting period in tones. Monitored by project proponents.
- $LHV_{Biomass}$ is the lower heating value of the biomass, in TJ/t.

Project Emissions

The GHGs emissions in the biomass combustion process will be consumed by the renewable forests plantation, representing a cyclical process of carbon sequestration.

However the emission of the project (PE) will be determined directly by the fossil fuel (FF_{boiler}) consumption in energy unity used in the furnaces, which will be working only during the first two years of the project activity.

$$PE = FF_{boilers} \cdot LHV_{FF} \cdot EF_{FF} \quad tCO2$$

Where,

- $FF_{boilers}$ is the amount of fossil fuel consumed in each year of the crediting period in tones. Monitored by project proponents.
- EF is the fossil fuel Emission Factor, in tCO2/TJ
- LHV_{FF} is the lower heating value of the fossil fuel, in TJ/t.
  LHV_{FF} = 10,345 kcal/kg = 43,312.3 . 10^{-6} TJ/t (value provided by the fossil fuel supplier)

The fossil fuel emission factor is calculated as:

$$EF = CFE \cdot OXID \; 44/12 \; tCO_2/TJ$$

According to IPCC, CFE = 21.1 tC/TJ and OXID – 0.99.

Therefore,

$$EF = 21.1 \cdot 0.99 \cdot 44/12 = 76.59 \; tCO_2/TJ$$

So,

$$PE = FF_{boilers} \cdot 43{,}312.3 \cdot 10^{-6} \cdot 76.59 = 3.3173 \cdot FF_{boilers} \quad tCO_2$$

$$PE = 3.3173 \cdot FF_{boilers} \quad tCO_2$$

Considering a fossil fuel consumption of 6.4 t/year, taken from the table 4, and using the formulae above we will have a emission of approximately 22 tones of CO2 year, which means that for the first two periods of project activity we will have an amount of 44 tones of CO2 of emission.

Leakage

No leakage was considered as resultant of the project.

The leakage (LE) will be considered as neutral because the old furnace was disactivated.

Therefore,

LE = 0

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

>>

ERy = BEy – PEy – Leakage

Table 4 – PE, ELB, LE and ER

Years	Estimation of project activity emissions (tonnes of CO2 e)	Estimation of baseline emissions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2 e)	Estimation of emission reductions (tonnes of CO2 e)
2008 (Jul – Dec)	**11**	**10,473**	**0**	**10,462**
2009	**22**	**20,946**	**0**	**20,924**
2010	**11**	**20,946**	**0**	**20,935**
2011	**0**	**20,946**	**0**	**20,946**
2012	**0**	**20,946**	**0**	**20,946**
2013	**0**	**20,946**	**0**	**20,946**
2014	**0**	**20,946**	**0**	**20,946**
2015 (Jan – Jun)	**0**	**20,473**	**0**	**10,473**
TOTAL	**44**	**146,622**	**0**	**146,578**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**BIO**
Data unit:	T
Description:	Is the amount of biomass consumed in each year of the crediting period in tones.
Source of data to be used:	On-site measurements and monitored by project proponents.
Value of data	26,202
Description of measurement methods and procedures to be applied:	Daily. Purchasing receipts are cross-checked with field inspection of trucks daily.
QA/QC procedures to be applied:	The biomass consumption is measured from the purchasing receipts issued by the biomass supplier and it is strictly controlled by Roullier through the inspection of trucks that delivers biomass to the plant. Roullier pays for the biomass based on the volume delivered.
Any comment:	

Data / Parameter:	$FF_{boilers}$
Data unit:	t
Description:	Is the amount of fossil fuel consumed in each year of the crediting period in tones
Source of data to be used:	On-site measurements and monitored by project proponents
Value of data	6.4
Description of measurement methods and procedures to be applied:	Daily. The fossil fuel consumption control is made by the furnace operator for the 2 first years of project activity. After the oil furnaces will be eliminated
QA/QC procedures to be applied:	The fossil fuel consumption control in the furnaces that will be eliminated is made daily by the furnace operator through flow meters.
Any comment:	For the estimate of the emission of the project the consumption of the year of 2006 was considered.

Data / Parameter:	**FF**
Data unit:	**TJ**
Description:	Is the fossil fuel consumption that would have been required in each year of the crediting period to substitute the biomass, in TJ.
Source of data to be used:	Calculate
Value of data	273
Description of measurement methods and procedures to be applied:	The fossil fuel it is determined directly by the biomass consumption. It is assumed that the amount of fossil fuel that would be required in each year of period of credit for substituting the biomass is equal the amount of used biomass in units of energy.
QA/QC procedures to be applied:	Based in the control of biomass and the value of the $LHV_{Biomassa}$ of the biomass.
Any comment:	For the calculations of the estimates, the nominal capacity of the furnace was considered.

B.7.2 Description of the monitoring plan:

>>

The project operator and management is Roullier. Roullier has maintenance and operations procedures, which include the monitoring of process variables, instruments calibration and quality control, in accordance with company policies of engineering best practices. For this reason, no major changes in monitoring and QA/QC procedures will be required for the CDM project activity related variables and parameters.

For the project activity, the monitored variables are the consumption of biomass and fossil fuel in weight units. The consumption is controlled by Roullier through purchasing receipts and local inspection of trucks. The fossil fuel consumption control is made by the furnaces operator of those that will be eliminated

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

>>

The datas of completing the final draft of this baseline section was on 27/12/2007.

Mr. Marcos Cardoso da Cunha
Pro Carbono Consultoria Ambiental Ltda.
Rua Jerônimo Coelho 102, Conj. 51
CEP 90010-240
Porto Alegre/RS
Brazil.

The person/entity is not project participant listed in Annex 1 of this document

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:

>>

11/06/2003

The event that defines the date of the project activity beginning is the biomass furnace construction following the lines of paragraph 76, 33rd Executive Board Meeting, where the adopted date must be the oldest among the referring dates to the implementation, construction or the decision to begin the project.

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

>>

21y-0m.

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

The project will have a renewable crediting period.

C.2.1. Renewable crediting period

The project will have a 7 years crediting period, which can be renewed 2 times. In total the crediting period will be 3 x 7 years.

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

>>

01/07/2008

C.2.1.2. Length of the first crediting period:

>>

7y-0m.

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:

>>

Roullier Project complies with the environmental regulations of the country. The plant has the required environmental license issued by the State regulator agency, Fepam. The scope of the license includes the furnaces. The license is currently renewable and it is available under request. This project activity presents no major environmental impacts and does not request an environmental impact assessment. The ashes generated in the process of biomass burning will be mixed to the fertilizers raw materials, using, in this way, the nutrients contained in them.

Roullier plant that is ISO 9001:2000 certified is monitored by the company Apoio Consultoria do Meio Ambiente Ltda, which provides the consulting services related to good environmental practices and training of the facility personnel. The consulting company also verifies if Roullier complies with the procedures legislation. This company is preparing Roullier to be ISO 14.001 certified in the future, another evidence that all activities of the plant are in line with applicable requirements, including legislation and Roullier standards.

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:

>>

The activity of project does not present bigger environmental impacts and it does not need an evaluation of environmental impact.

SECTION E. Stakeholders' comments

>>

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

>>

The project proponent invited the local stakeholders for comments about the project activity. Several organizations and entities were invited for comments about the project activity:

- Municipality of Rio Grande.
- City Council of Rio Grande.
- Municipal Environmental Department
- Fepam- Environmental State Agency
- Local Public Prosecutor's Office
- FBOMs- Representative of Brazilian NGOs
- Industries Center of Rio Grande
- Chamber of Commerce of the City of Rio Grande
- Association of friends and residents of the Center district

- Association of the residents and friends of Barra's Fourth Section.

E.2. Summary of the comments received:

>>

1 – FBOMS (Brazilian Forum of NGOs and Social Movements for the Environment and Development) comments:

The FBOMS, in its comments, noted the entity's support to mechanisms for transparency of the analysis and approval process of the CDM and the importance of consultation with several sectors of the society, both by the project proponent and the Designated National Authority as well.

It also says that such consultation could help to improve the quality and sustainability of projects and, as result, cooperate with the implementation of the international regime of climate change.

The entity suggests the Gold Standard as additional criteria of sustainability, an evaluation and certification system developed by civil entities that began to be promoted in Brazil.

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

>>

The FBOMS (Brazilian Forum of NGOs and Social Movements for the Environment and Development) does not require, in its comments, any reply. It only suggests Gold Standard as additional criteria for the evaluation of sustainability.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is used in the project activity.

Annex 3

BASELINE INFORMATION

Information regarding baseline is all described in item B4

TABLA I-2
FACTORES DE EMISIÓN DE CARBONO (FEC)

Combustible	FEC (t C/TJ)
F ÍQUIDOS	
Combustibles primarios	
Petróleo crudo	20,0
Orimulsión	22,0
Líquidos de gas natural	17,2
Combustibles/productos secundarios	
Gasolina	18,9
Quer. para a. de reacción	19,5
Otros t. de queroseno	19,6
P. de esquisto bituminoso	20,0
Gasóleo/fuelóleo	20,2
Fuelóleo residual	21,1
GPL	17,2
Etano	16,8
Nafta	(20,0) (a)
Asfalto	22,0
Lubricantes	(20,0) (a)
Coque de petróleo	27,5
Mat. primas de refinería	(20,0) (a)
Gas de refinería	18,2 (b)
Otros prod. del petróleo	(20,0) (a)
FÓSILES SÓLIDOS	
Combustibles primarios	
Antracita	26,8
Carbón de coque	25,8
Otro carbón bituminoso	25,8
Carbón sub bituminoso	26,2
Lignito	27,6
Esquisto bituminoso	29,1
Turba	28,9
Combustibles/productos secundarios	
Bq.de lignito y prensadas	(25,8) (a)
Gas de horno de coque	29,5
Gas de horno de coque	13,0 (b)
Gas de alto horno	66,0 (b)
FÓSILES GASEOSOS	
Gas natural (seco)	15,3
BIOMASA	
Biomasa sólida	29,9
Biomasa líquida	(20,0) (a)
Gas de biomasa	(30,6) (a)

(a) Este valor es un valor por defecto hasta que se determine un FEC específico. Por lo que respecta al gas de biomasa, el FEC se basa en el supuesto de que el 50% del carbono contenido en la biomasa se convierte en metano y que el otro 50% se emite como CO_2. Las emisiones de CO_2 procedentes del gas de biomasa no deben incluirse en los inventarios nacionales. Si no ocurre combustión del biogas liberado, 50% del contenido de carbono deberá incluirse como metano.
(b) Se empleará en los cálculos sectoriales.

TABLA I-4
FRACCIÓN DEL CARBONO OXIDADO

Carbón [1]	0,98
Petróleo y derivados del petróleo	0,99
Gas	0,995
Turba para generación de electricidad [2]	0,99

1 Esta cifra es una media global pero varía para distintos tipos de carbón y puede ser de sólo 0,91.

2 La fracción correspondiente a la turba utilizada en los hogares podría ser muy inferior.

Annex 4

MONITORING INFORMATION

Information regarding baseline is all described in item B7

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