CLEAN DEVELOPMENT MECHANISM

SMALL SCALE PROJECT DESIGN DOCUMENT (CDM-PDD)

IMBITUVA BIOMASS PROJECT, PARANÁ - BRAZIL

Version 3.0

Prepared by
EcoSecurities Ltd

May, 2005

CONTENTS

A. General description of project activity

A.1 Title of the project activity:

Imbituva Biomass Project

A.2 Description of the project activity:

The Imbituva Biomass Project (hereafter, the Project) developed by Usina Termoelétrica Winimport, S.A., a joint venture between Propower Energy S.A., and Winimport S.A. (hereafter referred to as the Project Developer) is a biomass power plant generation project in the town of Imbituva, State of Paraná.. The project developer is close to an agreement with an independent energy consumer to buy the electricity generated by the proposed project activity. The independent energy consumer currently purchases electricity from the national grid. Total installed capacity will be 12.33 MW.

The project is greatly improving the renewable electricity generation in the town of Imbituva, avoiding future problems with electricity supply. The Project Developer is proposing to build a biomass generation plant to supply the energy to displace electricity generation from a more fossil-intensive grid, thus reducing GHG emissions in the process. This new biomass generation plant will use approximately 200,000 tonnes of biomass per year, which will be provided by 42 sawmill companies. The sawmills in the region use wood from *Pinus* and *Eucaliptus* plantations. There are about 150 sawmills in the region of Imbituva, which pile the sawdust forming real hills of up to 10 metres, representing a big environmental problem in the region. Thus, the project scenario also involves avoiding releasing methane emissions from the biomass sent to landfills and/or left to decompose.

The electricity currently generated by the grid is relatively carbon intensive, with an operating margin emission factor of 0.949 tCO_2/MWh and a build margin emission factor of 0.094 tCO_2/MWh (see section B for further details). In the last decade, the electricity generation in Brazil was mainly based on hydropower. However, the share of coal and natural gas has been increasing over the last years in order to provide security of electricity supply. The amount of biomass used by third suppliers is 200,00 tonnes of biomass per year, therefore the transport emissions were considered on the project calculations. Also, impacts relevant to noise were considered and mitigated by the engineering project elaborated by projects proponents.

The project is helping the Host Country fulfil its goals of promoting sustainable development. Specifically, the project:

- Increases employment opportunities in the area where the project is located, specifically, it is expected that over 60 indirect jobs will be created;
- Diversifies the sources of electricity generation;
- Uses clean and efficient technologies, and conserves natural resources, thus the project will be meeting the Agenda 21 and Sustainable Development Criteria of Brazil.
- Acts as a clean technology demonstration project, encouraging development of modern and more efficient cogeneration of electricity and thermal energy using biomass fuel throughout the Country;
- Optimises the use of natural resources, avoid new uncontrolled waste disposal places, using a large amount of wood residues from region;

A.3 Project participants:

- **Carbon credit owner and project manager:** Usina Termoelétrica Winimport, S.A. This is a joint venture between Propower Energy S.A., and Winimport S.A.
- **Project CO_2 Advisor and Annex 1 Party**: EcoSecurities Ltd

Further contact information of project participants is provided in Annex 1.

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies): Brasil

A.4.1.2 Region/State/Province etc.: South Region, State of Paraná

A.4.1.3 City/Town/Community etc: City of Imbituva

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity *(max one page)*:

The thermoelectric plant will be constructed in the following address: Rodovia BR 376, km 222, in the City of Imbituva, State of Paraná, Brazil.

A.4.2 Type and category(ies) and technology of project activity

The Project conforms to the small scale projects Type 1.D since the nominal installed capacity of the Project is below the 15 MW threshold and the plant will sell its generated electricity to the grid.

In addition, the methane avoidance component of the project is eligible under Type III.E of the simplified procedures because in the project scenario the emissions related to the combustion of the biomass thus avoiding methane production will be lower than 15,000 tCO_2e annually.

The plant to be installed is composed by a boiler manufactured by Biochamm Ltda., a Brazilian company. The boiler will use 4 types of biomass as fuel that corresponds to the typical biomass mix found in the landfills in the region. Biomass of high quality, such as wood ships (*cavaco* in Portuguese), will not be purchased by the plant. Only wood residues, known generically in the region as biomass (*biomassa* in Portuguese) will be purchased. The boiler will generate steam with temperature of 420°C and pressure of 43 bar. The steam turbine is manufactured by German company Tuthil, with installed capacity of 12,33 MW of electricity generation. This is a case of technology transfer, since this type of technology is a new development and it is still not available from any Brazilian company.

The technology and know-how being promoted by this project is environmentally safe and sound, and will further promote such activities in the future.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

The proposed project activity will displace energy from a more carbon-intensive grid. In addition, the project will also lead to the avoidance of methane emissions given that the biomass used for electricity generation would otherwise be landfilled generating methane. The estimate of total reductions from the electricity generation component is 1,061,542tCO_2e over 21 years.

Another source of emission reduction of the project is avoidance of methane emissions from decomposition of wood and biomass in landfills. Brazil has a huge wood industry, with more than 1200 sawmills. Most of industries (87%) are located in south region. As an example, Parana and Santa Catarina states represent almost 80% of all *Pinus spp*. consumption (Sant'anna *et al* [1]).

The Brazilian technologies in sawmills in general are very poor, and less than 50% of wood is transformed in products. The other 50% are wood residues. Given the large number of sawmills in south region the biomass residue generation is concentrated in south region, creating an excess of biomass residues that the market cannot absorb.

A study from Brand *et al.* (2001).[2] reports the production and use of wood residues of 283 companies in the region around the municipality of Lages, Santa Catarina state. The study concludes that more than 20% of residues are not used or sold resulting in many large biomass piles that a left for decay, generating methane during this process. Nevertheless Brand et.al. study was limited to the region around the municipality of Lages , Santa Catarina state.and iIt took in to account only part of the wood industries in the region and excluded the pulp and paper sector. Furthermore the selected region accounts for only 94,400 ha of *Pinus spp.* plantation.

According to a study from ABIMCI[3] (Associação Brasileira da Indústria de Madeira Processada Mecanicamente), Santa Catarina State has 598 industries in the wood sector, and a total area of *Pinus spp.* plantation of 317,000 ha. Given that Pinus is, according to Brand *et al* study, an important source of residue generation in the region, we conclude that the study covers 47% of the industry (in number of industrial plants) and 30% of the *Pinus spp.*planted area.

The state of Parana has a Pinus plantation area of 605,000 ha[4], almost twice as big as Santa Catarina state, and the wood sector is organized in a very similar way[5]. Although there are no specific studies for the region around the project, it is reasonable to conclude that Parana state alone produces around 4 to 6 million t/yr of residues.

As additional information about biomass availability in Brazil, a presentation from Waldir Ferreira Quirino Eng. Florestal, Ph.D., IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) points to an estimated production of wood and agricultural residues produced and not utilised in Brazil is of 200 million tonnes per year. His study estimates that 50 million tonnes are derived from the sustainable forestry sector (Revista Sul Ambiental, 9, March 2004). This is intimately linked to the wood processing industry, as 75% of wood processed becomes residues

---

[1] Sant'Anna, Mário; Teddy A. Rayzel; Mário C. M Wanzuita, 2004. Indústria consumidora de Pinus no Brasil. Rev. da Madeira. nº 83 - ano 14 - Agosto de 2004.

[2] Brand, Martha A; Flávio J. Simioni; Débora N. H. Rotta; Luiz Gonzaga Padilha Arruda. Relatorio Final do Projeto " Caeacterizacao da producao e uso dos residuos madeiraveis gerados na industria de base florestal da regiao serrana catarinense, 2001.

[3] "Setor de processamento Mecanico da Madeira no Estado de Santa Catarina", Associação Brasileira da Indústria de Madeira Processada Mecanicamente, 18/02/2004, available at www.abimci.com.br, accessed in 10/12/04.

[4] Data available at sbs.org.br, accessed in 10/12/04.

[5] "Setor de processamento Mecanico da Madeira no Estado do Parana", Associação Brasileira da Indústria de Madeira Processada Mecanicamente, 18/02/2004, available at www.abimci.com.br, accessed in 10/12/04.

(Revista da Madeira 85, Nov 2004). According to Revista da Madeira 80, April 2004), the potential for wood biomass generation in the South Region of Brazil is at least 200 MW.

Under the Project Scenario these residues would not be stockpiled but instead burned in the cogeneration plant. The estimate of total reductions from the methane component is 5,197,525 tCO_2e over 21 years. Total emission reductions from the electricity and methane components are estimated as 6,259,067 tCO_2e over 21 years, which means an average annual emission reduction of 298,051 tCO_2e.

For details of the emission reduction calculations, please refer to Section E.

A.4.4 Public funding of the project activity:

The project will not receive any public funding from Parties included in Annex I.

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

This small-scale renewable energy project is not part of a larger emission-reduction project. The distance between Imbituva Biomass Project boundaries and Inácio Martins Biomass Project boundaries are approximately 100 km and therefore it is not a debundling of a larger project.

B. Baseline methodology

B.1 Title and reference of the methodology applied to the project activity:

- Project Activity 1.D. - Renewable electricity generation for a grid

combined with

- Project Activity 3.E. – Methane avoidance.

B.2 Project category applicable to the project activity:

According to the sectoral scope list presented by UNFCCC (http://cdm.unfccc.int/), the project is related with the sectoral scopes 1 Energy industries (renewable - / non-renewable sources) and 13 (Waste handling and disposal).

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity *(i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario)*

According to Attachment A to Appendix B of the simplified modalities and procedures for CDM small-scale project activities, evidence to why the proposed project is additional can be done by conducting an analysis of the following: (a) investment barrier, (b) technological barrier, and (c) prevailing practice. The result is a matrix that summarizes the analyses, providing an indication of the barriers faced by each scenario. The most plausible scenario will be the one with the fewest barriers.

The first step in the process is to list the likely future scenarios. Two scenarios were considered:

- Scenario 1 - The continuation of current activities – This scenario represents the continuation of current practices, which is the electricity generation based on a higher carbon intensity, and landfilling of sawmill residues releasing methane as a result.

- Scenario 2 - The construction of the new renewable energy plant – In this scenario, a new source of neutral carbon emissions electricity will be available and will displace the higher carbon intensity electricity prevailing in the baseline scenario. Additionally, in this scenario generation of methane emissions will be avoided.

The barriers are as follows:

- Financial/economical – This barrier evaluates the viability, attractiveness and financial and economic risks associated with each scenario, considering the overall economics of the project and/or economical conditions in the country.

- Technical/technological – This barrier evaluates whether the technology is currently available, if there are indigenous skills to operate it, if the application of the technology is a regional, national or global standard, and generally if there are technological risks associated with the particular project outcome being evaluated.

- Prevailing business practice – This barrier evaluates whether the project activity represents prevailing business practice in the industry. In other words, this barrier assesses whether in the absence of regulations it is a standard practice in the industry, if there is experience to apply the technology and if there tends to be high-level management priority for such activities.

With respect to **financial/economical** barriers:

- The continuation of current practices (Scenario 1) does not pose any financial/economical barrier to the project developer, and requires no further financing.

- The construction of a renewable energy plant (Scenario 2) faces specific financial/economic barriers due to the fact that technical/technological innovations carry with them risk premiums in terms of financing. The capital costs involved in the project pose a barrier, especially considering the high interest rates prevalent in Brazil. The financial/economical barrier to the project activity is demonstrated through a cash flow financial analysis. Comparing the project results with and without carbon, it is clearly demonstrated that the project would not occur without carbon revenues (see table 1 below). The investment analysis considers all savings and expenses associated to the project such as the revenues from costs reduction with electricity and fuel purchases and the costs associated to the installation and operation of new plant. The carbon revenues increased the project's returns to an acceptable level compared to other investments in Brazil. Although 7 MW were subscribed on the Brazilian PROINFA Program, this has no implication in the project financials because the prices for renewable energy offered by the Program are lower than the prices offered by the currently electricity market (and considered in the financial analysis): PROINFA pays 35.31 US$/Mwh while the market price is 36.67 US$/Mwh.

Table 1: Financial Results for project scenario.

	with carbon	**without C**
Net Present Value ($)	1,911,856	(2,705,644)
IRR	13.79%	9.24%
Discount rate	12%	
Present Value of carbon sold (21 years) $	**6,211,701**	

With respect to the **technical/technological** barrier:

- In the case of Scenario 1 (continuation), there are no technical/technological issues as this simply represents a continuation of current practices and does not involve any new technology or innovation. Indeed, in this scenario there are no technical/technological implications as the scenario calls for continued use of electricity from the grid.

- In the case of Scenario 2, there is a significant technical/technological barrier. The technology used in the plant is the ultimate German technology for biomass energy generation. This new technology requires precise operation of plant, requiring also very specialized labour. Moreover, the technical assistance is from Germany, and any problem related to equipment replacement, the new one must come from Germany. It represents a risk for the continuous operation of the plant. An equipment replacement problem can represent a long period of non-activity.

With respect to the analysis of **prevailing business practice**:

- The continuation of current practices (Scenario 1) presents no particular obstacles. This practice has been used effectively in the past with good results, and the continued operation of existing facilities and actual practices presents no real barriers.

- The construction of a new renewable energy plant (Scenario 2) represents a deviation from the electricity generation current practices. Even with large increases in demand, new plants are generally not planned as they imply significant changes and adaptations in the production process and in the employees' activities (e.g., safety measures). As a result, such changes require high management capacity and have high economic costs. Still, it is worth noting that the consumption of biomass residues as fuel represents a barrier. Also, Propower will use exclusively residues like sawdust, bark, and shavings (in Portuguese: lamina, serragem, and lamina), that have a small value on the biomass market and therefore, in the absence of the project definitely would be left to decay. To make this scenario practicable, a new expensive and complex process to treat the residues before its use as fuel, must be installed. All the residues are composed by materials of distinct types granulometry and calorific powers This new equipment shreds triturates and homogenizes the wood residues mixture, prior to using it and adds wood to produce a mix of fuel. Moreover, a complex logistic process must be implemented to a non-stop supply of wood residues and wood to the new equipment. As a result, such changes require high management capacity and have high economic costs. Finally, the outsourcing of some activities (e.g., energy production) is a market trend because it tends to simplify operations at the facility. Finally, the outsourcing of some activities (e.g., energy production) is a market trend because it tends to simplify operations at the facility.

Table 2 below summarises the results of the analysis regarding the barriers faced by each of the plausible scenarios. As the table indicates, Scenario 1 faces no barriers, whereas Scenario 2 faces three important barriers – the financial/economic, the technical/technological and prevailing business practice barriers.

Table 2: Summary of Barriers Analysis

Barrier Evaluated		Scenario 1	Scenario 2
		Continuation of current activities	Construction of a new plant
1.	Financial / Economical	No	**Yes**
2.	Technical / Technological	No	**Yes**
3.	Prevailing Business Practice	No	**Yes**

To conclude, the barrier analysis above has clearly shown that the most plausible scenario is the continuation of current practices (continuation of use of electricity from the grid). Therefore, the project scenario is not the same as the baseline scenario, and these are defined as follows:

- The **Baseline Scenario** is represented by the continued use of electricity from the grid. Additionally, biomass which will be used in the project activity will decay in landfills, generating methane.

- The **Project Scenario** is represented by the construction of a new renewable energy plant. The new plant will displace electricity from a more carbon-intensive source, thus resulting in significant GHG emission reductions. Additionally, biomass will be used avoiding landfilling, and associated methane emisisons.

The Project Scenario is environmentally additional in comparison to the baseline scenario, and therefore eligible to receive Certified Emissions Reductions (CERs) under the CDM.

B.4 Description of the project boundary for the project activity:

The project boundary is defined as the notional margin around a project within which the project's impact (in terms of carbon emission reductions) will be assessed. As referred to in Appendix B for small-scale project activities, the project boundary for a small-scale renewable energy project that provides electricity to a grid encompasses the physical, geographical site of the renewable generation source. For the Project this includes emissions from activities that occur at the project location.

The system boundary for the baseline is defined as the South-Southeast grid of Brazil, and will include all the direct emissions related to the electricity produced by the power plants to be displaced by the Project. Additionally, based on the contracts signed with the sawmills for biomass supply, the project boundary can be extended to their sites and therefore emissions reductions can be claimed for the methane emissions avoidance of such biomass waste.

Conforming to the guidelines and rules for the small-scale project activities, the emissions related to production, transport and distribution of the fuel used in the power plants in the baseline are not included in the project boundary, as these do not occur at the physical and geographical site of the project. For the same reason the emissions related to the transport and distribution of electricity are also excluded from the project boundary.

B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

The Project uses baseline Type 1.D with option (a) of paragraph 29 of Appendix B, related to the generation and supply of renewable energy to the grid.

In addition, the project also includes a methane avoidance component that will use baseline Type III.E, as defined in paragraph 93 of Appendix B.

B.5.2 Date of completing the final draft of this baseline section:

05/01/2005

B.5.3 Name of person/entity determining the baseline**:**

The entity determining the baseline and participating in the project as its Carbon Advisor is EcoSecurities Ltd. The individuals at EcoSecurities that prepared the baseline are Flávia Resende and Sonia Medina, as listed in Annex 1 of this document.

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity :

26/10/2004

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

At least 21 years.

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

(Please underline the selected option (C.2.1. or C.2.2.) and provide the necessary information for that option.)

C.2.1. Renewable crediting period (at most seven 7 years per period)

C.2.1.1. Starting date of the first crediting period *(DD/MM/YYYY):*

01/06/2006

C.2.1.2. Length of the first crediting period:

7y – 0m

C.2.2. Fixed crediting period (at most ten (10) years)

C.2.2.1. Starting date *(DD/MM/YYYY):*

C.2.2.2. Length (max 10 years):

D. Monitoring methodology and plan

D.1. Name and reference of approved methodology applied to the project activity:

Monitoring methodology described in paragraph 31 of Appendix 3 of the Simplified Modalities and Procedures for Small Scale CDM project activities, Baseline Type 1.D.

In addition, the project also includes a methane avoidance component that will use the monitoring methodology listed for baseline Type III.E, as defined in paragraph 95 of Appendix B.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

As the project is eligible for using the methodologies listed in Appendix B of the Simplified Modalities and Procedures for Small Scale CDM project activities, it was felt that it should use the monitoring methodologies proposed for this project type.

The methodology applied to the project does not require monitoring of transport emissions. Besides, it would be expensive, difficult and inaccurate to monitor emissions released by biomass transportation. Therefore, it was created a transport emission factor (TEF) (see section E and appendix 2 for more information about TEF). The emissions by biomass transportation are equivalent to: amount of biomass multiplied by TEF. For all biomass purchased by third parties this factor will be applied for leakage calculation.

D.3 Data to be monitored:

Table 3: Data to be collected in order to monitor emissions from the project activity, and how this data will be archived.

ID n°	Data type	Data variable	Data unit	Measured (m), calculated (c) indicated (I) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3.1	Energy	Electricity sold to the grid	MWh	M	Continuous	100%	Electronic and paper	During the whole crediting period + 2 years	This item will be monitored by meters
D.3.2		Electricity consumed by Thermo							
D.3.3	Fuel	Amount of Biomass consumed by the project and obtained from third parties	tonne/ month	M	Monthly	100%	Electronic and paper	During the whole crediting period + 2 years	
D.3.4		Total annual project activity (methane component) related emissions	tCO_2e/yr	C	Yearly	100%	Electronic and paper	During the whole crediting period + 2 years	

D.4. Name of person/entity determining the monitoring methodology:

EcoSecurities Ltd is the entity determining the monitoring plan and participating in the project as the Carbon Advisor.

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

E.1.1 Selected formulae as provided in appendix B:

No formula is provided for the baseline for Project Category I.D., paragraph 29 a.

According to the simplified methodology for type III.E small-scale emission reduction projects, the baseline emissions are calculated using the following formulae:

$$CH_4\_IPCC_{decay} = (MCF * DOC * DOCF * F * 16/12)$$

where,
CH4_IPCCdecay = IPCC CH_4 emission factor for decaying biomass in the region of project activity (tonnes of CH_4/tonne of biomass or organic waste)
MCF = methane correction factor (fraction) (default is 0.4)
DOC = degradable organic carbon (fraction, see equation below or default is 0.3)
DOCF = fraction DOC dissimilated to landfill gas (default is 0.77)
F = fraction of CH_4 in landfill gas (default is 0.5)

For DOC, the following equation may be used instead of the default:

$$DOC = 0.4\ (A) + 0.17\ (B) + 0.15\ (C) + 0.30\ (D)$$

where,
A = per cent waste that is paper and textiles
B = per cent waste that is garden waste, park waste or other non-food organic putrescibles
C = per cent waste that is food waste
D = per cent waste that is wood or straw

$$BE_y = Q_{biomass} * CH4\_IPCC_{deca}y * GWP\_CH_4$$

where,
BEy = Baseline methane emissions from biomass decay (tonnes of CO_2 equivalent)
$Q_{biomass}$ = Quantity of biomass treated under the project activity (tonnes)
CH_4_GWP = GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)

According to the same guidelines for type III.E small-scale emission reduction projects, the project emissions are calculated using the following formula:

$$PE_y = Q_{biomass} * E_{biomass}\ (CH_4bio\_comb * CH_4\_GWP + N_2Obio\_comb * N_2O\ \_GWP)/10\text{^}3$$

where,
PEy = Project activity emissions (kilotonnes of CO_2 equivalent)
$Q_{biomass}$ = Quantity of biomass treated under the project activity (tonnes)
$E_{biomass}$ = Energy content of biomass (TJ/tonne)
CH_4bio_comb = CH_4 emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg of CH_4/TJ, default value is 300)
CH_4_GWP = GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)
N_2Obio_comb = N_2O emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg/TJ, default value is 4)
N_2O_GWP = GWP for N_2O (tonnes of CO_2 equivalent/tonne of N_2O)

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary: (for each gas, source, formulae/algorithm, emissions in units of CO2 equivalent)

No formula is needed. Emissions by sources are nil since renewable energy is either a zero CO_2 or CO_2 neutral source of energy. For Methane component see E.1.1.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities (for each gas, source, formulae/algorithm, emissions in units of CO2 equivalent)

The methodology applied to the project does not require the calculation of transport emissions. Although the validator required the inclusion of transport emissions for biomass from third parties. The formula is described below:

$$L = TEF * Q_{biomass}$$

Where:
L: Leakage (t CO_2e/year)
TEF: Transportation Emission Factor (tCO_2e/t of biomass transported)
$Q_{biomass}$: Amount of biomass from third parties used in project activity (t biomass/year)

$$TEF = 2 * (FC * D) * EF / TC$$

Where:
TEF: Transportation Emission Factor (tCO_2e/t of biomass transported)
FC: Fuel Consumption (Km/l)
D: Distance (km)
EF: Fuel Emission Factor (t CO_2e/ 10^3 litters of fuel)
TC: Truck Capacity (tonne)
This values corresponds to comings and goings

The TEF used for this project activity is 0,00270 tCO_2e/t of biomass transported. All parameters used to estimate transport emissions are in appendix 2. The leakage was calculated as 539,2 t CO_2e per year.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

Zero emissions for the electricity generation component. As for the methane component, project emissions are calculated using the formula described in E.1.1.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: (for each gas, source, formulae/algorithm, emissions in units of CO2 equivalent)

The baseline emissions (BE_y) resulting from the electricity supplied and/or not consumed from the grid is calculated as follows, where EG_y is the annual net electricity generated from the Project.

$$BE_y = EG_y * EF_y$$

The baseline emissions factor (EF_y) is a weighted average of the EF_OM_y and EF_BM_y:

$$EF_y = (\omega_{OM} * EF\_OM_y) + (\omega_{BM} * EF\_BM_y)$$

where the weights ω_{OM} and ω_{BM} are by default 0.5.

The Operating Margin emission factor (EF_OM_y) is calculated using the following equation:

$$EF\_OM_y\,(tCO_2 / MWh) = \frac{\sum_{i,j} F_{i,j,y} * COEF_{i,j}}{\sum_j GEN_{j.y}]}$$

Where:
$F_{i,j,y}$ is the amount of fuel i (in GJ) consumed by power source j in year y;
j is the set of plants delivering electricity to the grid, not including low-cost or must-run plants and carbon financed plants;
$COEF_{i,j,y}$ is the carbon coefficient of fuel i (tCO_2/GJ);
$GEN_{j.y}$ is the electricity (MWh) delivered to the grid by source j.

The Build Margin emission factor (EF_BM_y) is the weighted average emission factor of a sample of power plants m. This sample includes either the last five plants built or the most recent plants that combined account for 20% of the total generation, whichever is greater (in MWh). The equation for the build margin emission factor is:

$$EF\_BM_y\,(tCO_2 / MWh) = \frac{[\sum_{i,m} F_{i,m,y} * COEF_{i,m}]}{[\sum_m GEN_{m.y}]}$$

where $F_{i.m,y}$, $COEF_{i,m}$ *and* GEN_m are analogous to the *OM* calculation above.

For this project, data for combined margin calculation have been based on ONS – Operador Nacional do Sistema.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

Total annual emissions reductions from electricity generation and methane avoidance is 298,051 tons CO_2e per year.

E.2 Tables providing values obtained when applying formulae above:

Table 4: Table providing emissions reductions from electricity generation component.

Electricity generation emission reductions	**Per year**	**Total (crediting period)**
Operating Margin Emissions Factor ($EF\_OM_{y,}$ in tCO_2/MWh)	0,949	n/a
Build Margin Emissions Factor ($EF\_BM_{y,}$ in tCO_2/MWh)	0,094	n/a
Baseline Emissions factor (EF_y)	0,521	n/a
Electricity generated by the project (EG, in MWh)	98.640	2.071.440
Baseline Emissions (BE, in tCO_2)	50.550	1.061.542
Project emissions (PE, in tCO_2)	0	0
Emission reductions from electricity generation (tCO_2)	50.550	1.061.542

Table 5: Table providing emissions reductions from methane avoidance.

Methane avoidance emission reductions	**Per year**	**Total (crediting period)**
DOC	0.3	n/a
$CH_4\_IPCC_{decay}$ (tCH_4/tonne of biomass or organic waste)	0.0616	n/a
Quantity of biomass ($Q_{biomass}$, in tonnes)	200,000	4,200,000
Baseline Emissions (BE, in tCO_2e)	258,720	5,433,120
Energy content of biomass ($E_{biomass}$, in TJ/tonne)*	0.006367	n/a
Project emissions (PE, in tCO_2e)	10,680	224,273
Leakage due to project emissions	539	11,322
Emission reductions from methane avoidance (tCO_2)	247,501	5,197,525

* Based on Brand *et al* (2001) from UNIPLAC, Santa Catarina, Brazil.

Table 6: Table providing project total emissions reductions annually and for the entire 21-year crediting period.

Total project emission reductions	**Per year**	**Total**
Emission reductions from electricity generation (tCO_2)	50.550	1.061.542
Emission reductions from methane avoidance (tCO_2)	247.501	5.197.525
Total emission reductions (tCO_2)	298.051	6.259.067

F. Environmental impacts

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

The biomass plant has received permit for construction and environmental permit from the State of Paraná, where the project is located, and from the Brazilian Electricity National Agency. The Paraná Environmental Institute conceded the licence, according to article 2 of Law 13 464, authorizing for construction of "a Thermoelectric Plant, using sawdust and wood residues as fuels, in the Municipality of Imbituva." It is worth noting that according to CONAMA Resolution, numbered 01/86, electricity generation projects beyond 10 MW should present to the relevant environmental agency an Environmental Impact Assessment and its respective report, known as RIMA. The project proponents developed a preliminary report, known as RAS (Relatório Ambiental Simplificado), which was presented to receive the abovementioned permit. The outcome of the previous license was favourable and the project was found to have no significant environmental impacts. Where impacts were identified, mitigation measures were defined. The project also brought about more positive environmental benefits than adverse impacts. Additionally, the Brazilian Electricity Energy National Agency (in Portuguese ANEEL – Agência Nacional de Energia Elétrica) has authorised through Resolution no. 505, from 30th September of 2003, that Winimport S.A constructs and operates this thermoelectric plant using wood residues as fuel.

Renewable electricity generation

The project will contribute to displace more carbon-intensive electricity generation sources from the South-Southeast grid, promoting the use of renewable fuels (biomass) for electricity generation.

Sawdust and wood residues

The project will improve the local environmental condition due to the adequate treatment of sawdust and wood residues. Currently these residues are a problem because they are left decomposing in landfills, releasing methane emissions to the atmosphere.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

According to the Resolution #1 dated on December 2nd, 2003, from the Brazilian Inter-Ministerial Commission of Climate Change (Comissão Interministerial de Mudança Global do Clima -CIMGC), decreed on July 7th, 1999, any CDM projects must send a letter with description of the project and an invitation for comments by local stakeholders. In this case, letters were sent to the following local stakeholders:

- City Hall of Imbituva;
- Chamber of Imbituva;
- Environment agencies from the State and Local Authority;
- Brazilian Forum of NGOs;
- District Attorney (known in Portuguese as Ministério Público, i.e. the permanent institution essential for legal functions responsible for defending the legal order, democracy and social/individual interests) and;
- Local communities associations.

Local stakeholders were invited to raise their concerns and provide comments on the project activity for a period of 30 days after receiving the letter of invitation. EcoSecurities and the project developer addressed questions raised by stakeholders during this period.

G.2 Summary of the comments received:

To date, no comments have been received.

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

Not applicable.

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

Carbon credit owner and project manager

Organization:	Usina Termoelétrica Winimport, S.A. (Joint Venture – Propower S.A. and Winimport, S.A.)
Street/P.O.Box:	Rodovia BR 376, 2121 – Vila Rocco
Building:	-
City:	São José dos Pinhais
State/Region:	Paraná
Postfix/ZIP:	-
Country:	Brazil
Telephone:	55 41 383 7330
FAX:	-
E-Mail:	-
URL:	-
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Bornia
Middle Name:	-
First Name:	Mario
Mobile:	-
Direct FAX:	-
Direct tel:	+55 (0) 41 383 7330
Personal E-Mail:	-

Project CO_2 Advisor and Annex 1 Party

Organization:	EcoSecurities Group Ltd, Uk
Street/P.O.Box:	21, Beaumont Street
Building:	-
City:	Oxford
State/Region:	-
Postfix/ZIP:	-
Country:	United Kingdom
Telephone:	44 1865 202 635
FAX:	44 1865 251 438
E-Mail:	uk@ecosecurities.com
URL:	www.ecosecurities.com.br
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Moura Costa
Middle Name:	
First Name:	Pedro
Mobile:	
Direct FAX:	44 1865 792 682
Direct tel:	44 1865 202 635
Personal E-Mail:	pedro@ecosecurities.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This project will not receive any public funding.

Appendix 1

REFERENCES

Bosi, M. et al. 2002. Road-Testing Baselines for Greenhouse Gas Mitigation Projects in the Electric Power Sector (OECD and IEA Information Paper COM/ENV/EPOC/IEA/SLT - 2002 6). Paris:OECD. Available at: http://www.oecd.org/env/cc (20 Apr 2004)

Brand, Martha A; Flávio J. Simioni; Débora N. H. Rotta; Luiz Gonzaga Padilha Arruda, 2001. Relatorio Final do Projeto " Caracterizacao da producao e uso dos residuos madeiraveis gerados na industria de base florestal da regiao serrana catarinense.". Univer. Planalto Catarinense (UNIPLAC).

Sant'Anna, Mário; Teddy A. Rayzel; Mário C. M Wanzuita, 2004. Indústria consumidora de Pinus no Brazil. Rev. da Madeira. nº 83 - ano 14 - Agosto de 2004.

Appendix 2

CALCULATION PARAMETERS

Description	Value	Unit	Source
Biomass/truck	20	t	Client
Truck Diesel consumption	2.5	km/l	Client
Average distance	25	km	Client
Biomass consumed/year (third parties)	200,000	t	Client
Diesel consumption/year	200,000	l	=2*C6*C7/(C4*C5)/1000
Carbon emission factor Diesel	2.7	t CO_2/10^3 l	=C23
Transport CO_2 emission	539.2	tCO_2/y	=C9*C8
Project emission	4,363	tCO_2/y	PDD
Emission reduction methane	100,847	tCO_2/y	PDD
Emission reduction electricity	50,586	tCO_2/y	PDD
Emission reduction total	105,210	tCO_2/y	PDD
Transport Emission Factor	0.00270	tCO_2/ton biomass	PDD
% Transport emissions	0.51%		PDD

Description (for diesel)	Value	Unit	Source
CV	43.33	Tj/10^3t	IPCC
CEF	20.20	t C/Tj	IPCC
CEF	875.27	t C/10^3t	=C18*C17
CEF	3,209	t CO_2/10^3t	=C19*44/12
Density	0.84	g/ml (kg/l) (t/10^3 l)	BEN 2003
CEF	2,696	t CO_2/10^6 l	=C20*C21
CEF	2,696	t CO_2/10^3 l	=C22/1000