

Monitoring Report

BK Itacoatiara Energia Ltda.

Biomass Power Plant Project Activity

Itacoatiara-AM, Brazil

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SECTION A. General description of project activity**A.1. Title of the project activity**

Project title: BK Energia Itacoatiara Project (hereafter referred to simply as BK Itacoatiara Project).

Monitoring period: 01/01/2007 – 31/12/2007.

Date: 09/01/2008.

UNFCCC PROJECT REGISTRATION REF. No. 0168

A.2. Description of the project activity

The primary objective of the Itacoatiara Project is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to the environmental, social and economic sustainability by increasing renewable energy's share of the total Brazilian (and the Latin America and the Caribbean region's) electricity consumption.

The project consists of the generation of electricity with a thermoelectric power plant using wood residues from wood processing companies in the city of Itacoatiara, in the State of Amazonas, Brazil. The power plant, when fully operational, consumes around approximately 137,000 tonnes of wood residues per year, which are mostly provided by Mil Madeireira Itacoatiara Ltda., which is a subsidiary of Precious Woods Holding Ltd., a company founded in 1990 with the objective of promoting sustainable forest management in Latin America and substituting the demand for tropical wood from deforestation with sustainable produced tropical wood.

Precious Woods has set ecological standards in tropical forestry in the past and received a number of environmental awards for its efforts. In 1997, Precious Woods became the first company in the Amazon to receive FSC certification for environmentally friendly and socially responsible forest management.

Beyond the reduction of GHG emissions the project's environmental benefits are related to the sourcing of the wood waste combustible from 450,000 hectares of sustainably managed and FSC certified forest near the project site in Itacoatiara.

As before the implementation of the project the sawmill had no other option available to safely eliminate the wood waste generated in the production process, these were stored in several sawdust and wood residues stockpiles, which represented a major environmental and safety problem. A second component of the project is thus related to the substantial reductions in methane emissions from the wood waste, which used to be left to decay.

The Itacoatiara Project reduces emissions of greenhouse gases by selling sustainable renewable electricity to the grid and by avoiding methane emissions from biomass decay. In November 2002, the project sold its first MWh to the local power utility CEAM – "Companhia Energética do Amazonas".

The project uses wood-processing residues from sustainable renewable sources as a fuel to power the thermal facility through a high-pressure boiler and a multiple stage condensing steam coupled with a power generator. The electric energy output was in 2007 around 40'000 MWh, with approximately 6'000 MWh used for own consumption and 2'500 MWh sold to sawmill MIL.

Wood residues have historically come from three different types of sources (various sawmills, clearing roads, and landfill). However, in 2007 there were no residues used from PWI-Carolina, landfills or road-clearing but only from the sawmill MIL. The project participants monitor the origin of the biomass burned in

the power plant. The historic of the origin and amount of fuel burned from January 2007 until December 2007 is presented in table 4.

Wood residues from the sawmills include residues from processing (sawing and moulding) such as sidecuts and sawdust but also few deteriorated logs from the sawmill's log yard. These logs supplied from PWA are logs that had been harvested and brought to the log yard of PWA with the purpose of processing them in the saw mill. However, after revising its roundwood inventory PWA for different reasons (insect and fungus attacks, holes in the center of the logs; change of production concept focusing on fewer species) they came to the conclusion that these logs could not be processed to commercially viable products. They were written off and sold to BKE as fuel wood. This process is documented in the financial reporting of PWA and the nature of the logs is specified in the invoices from PWA/Mil Madereira to BKE. Moreover a report from an independent assessor made for the purpose of revaluating PWA/Mil Madereira's inventories is very specific in documenting the fact that the logs originate from the log yard of the saw. Photos illustrate the condition of these logs.

These documents evidence that the logs must be considered as by-products of the saw mill operations and fall within the project boundaries. In the absence of the project the logs would have been deposited in the landfill together with the processing residues of the saw mill and would have produced methane.

A.3. Project participants

Detailed contact information on party(ies) and private/public entities involved in the project activity is listed in Annex 1.

Table 1 Party(ies) and private/public entities involved in the project activity

Party involved	Private and/or public entities project participants	Project participant?
Brazil (host)	Private entity: <i>BK Energia Itacoatiara Ltda.</i>	No

Credit owner and project operator, the special purpose company BK Energia Itacoatiara Ltda., is author and the responsible for all activities related to the project management, registration, monitoring, measurement and reporting.

A.4. Type and category(ies) and technology of project activity

Component 1, power-generation: type I, renewable energy projects; category I.D – renewable electricity generation for a grid

Component 2, methane-emissions-avoidance: type III, other project activities; category III.E – avoidance of methane production from biomass decay through controlled combustion

Both project components are eligible under the simplified procedures for small-scale CDM project activities.

For component 1, the power plant has 9 MW of nominal installed capacity (below the eligibility limit of 15 MW).

SECTION B. Monitoring methodology and plan**B.1. Name and reference of approved monitoring methodology applied to the small-scale project activity**

According to Appendix B of the simplified modalities and procedures for small-scale CDM project activities for Type I.D:

“Monitoring shall consist of metering the electricity generated by the renewable technology. In the case of co-fired plants, the amount of biomass input and its energy content shall be monitored.”

Thus, the monitoring plan of the electricity generation component consists in metering the renewable electricity generated by the power plant.

In addition, the project also includes the methane avoidance component. In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities for Type III.E the amount of biomass combusted by the project activity in a year will be monitored. The project owners are aware that the different origins of biomass burned in the power plant should be differentiated as not everything would decay in anaerobic conditions and therefore would not generate methane as forecasted in the methodology. There is no guidance in the methodology on how to handle such differences. Although it is not demanded in the methodology, project owners will maintain the monitoring of the different sources of biomass. For the methane avoidance component the biomass collected from clearing roads and open air stockpiles will not be accounted.

B.2. Data to be monitored

In accordance with the approved methodology the PDD lists two data to be monitored:

Electricity quantity

The project owner measures with an electronic supervisory system (Figure 1) the amount electricity exported to the grid, and also electricity consumed internally and sold to sawmill MIL. There is a meter that informs the supervisory system. The system keeps historical data that can be accessed when necessary.

Double check is done with the receipt of sales issued by CEAM, the local electricity utility, in the case of exported electricity.

Therefore, BK Itacoatiara Project is the main responsible for generating, monitoring, measuring and reporting data regarding electricity exportation to the grid.



Figure 1 Software for energy control

Fuel quantity

The project owner monitors wood residues that are burned to generate electricity. The measurement is done by scales at two stationary points: The first one measures the total of biomass fed into the boiler, at the end of a conveyor. Data is obtained through a load cell that sends the information to the supervisory system. This historical data also can be obtained accessing the supervisory system. The second scale is at the entrance of the site and quantifies the total of biomass entering the site. This measurement is made manually in the field. Every day this information is electronically stored into a spreadsheet. The weight of the fresh biomass from sawmill MIL (which is inside the site, and not measured by the second scale) sent to the boiler can be calculated in two different ways. The first one: MIL measures the volume of wood residues sent to BK Itacoatiara and transforms it into tons, according to the density of each different type of wood. BK Itacoatiara is not responsible for this calculation. The second one: BK Itacoatiara calculates the difference between the weight of all the biomass entering the boiler, measured by the first scale (at the entrance of the boiler), minus the weight of all other residues, measured by the scale at the entrance of the site. The result is the weight of biomass coming from MIL. The examined trend of these two values along the year shows that they are very close. Since the second calculation was considered to be more reliable, the values obtained through it will be accounted in this report.

- Scale 1 (the one used to weight the total of wood residues that enter in the boiler) manufactured by Toledo, model 9270, TAG number PL 1200, Maximum capacity 75t/h,code 9270/1X-12-Z-40;
- Scale 2 (the one used to weight wood residues that come from outside) manufactured by Toledo, model 820, Capacity 60t, and 8 load cells.

Table 2 monitored variables

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) 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	EG_y	Electricity supplied to the grid.	MWh	M	Monthly recording	100%	Electronic	During the credit period and two years after	Electricity supplied by the project to the grid. Energy metering connected to the grid and receipt of sales.
D.3-2	$Q_{biomass, fresh}$	Amount of wood residues consumed at the project activity, collected from the sawmills operation.	$tonnes$	M	daily	100%	Electronic and paper	During the credit period and two years after	Renewable sourced wood waste from sawmills operations
D.3-3	$Q_{biomass, old}$	Amount of wood residues consumed at the project activity, collected in open field stockpiles.	$tonnes$	M	daily	100%	Electronic and paper	During the credit period and two years after	Wood waste from sawmills operations, not accounted for methane avoidance.
D.3-4	$Q_{biomass, roads}$	Amount of wood residues consumed at the project activity, collected from clearing roads and harvest residues.	$tonnes$	M	daily	100%	Electronic and paper	During the credit period and two years after	Wood waste from access road construction and residues from harvest (tree crowns, branches), not accounted for methane avoidance.
D.3-5	EF_y	Emission factor of the grid	tCO_2/MWh	C	At validation of every renewable crediting period	Not applicable.	Electronic	During the credit period and two years after	Data will be archived during the credit period according to internal procedures.
D.3-6	$EF_{OM,y}$	Operating margin emission factor of the grid	tCO_2/MWh	C	At validation of every renewable crediting period	Not applicable.	Electronic	During the credit period and two years after	Data will be archived during the credit period according to internal procedures.
D.3-7	$EF_{BM,y}$	Build margin emission factor of the grid	tCO_2/MWh	C	At validation of every renewable crediting period	Not applicable	Electronic	During the credit period and two years after	Data will be archived during the credit period according to internal procedures.

Credit owner and project operator, the special purpose company BK Energia Itacoatiara (listed under A.3. Project participants), is author and the responsible for all activities related to the project management, registration, monitoring, measurement and reporting.



B.3. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken

The quality control and quality assurance measures planned for the Project are outlined in the following table.

Table 3 Quality control and quality assurance

Data (table and ID number.)	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D.3-1, 2, 3 and 4	Low	These data will be used to calculate the emission reductions. Two meters are used to measure the electricity delivered to the grid (main meter and backup meter). Sales records are used to ensure consistency. The weight of biomass residues is measured by a scale at the entrance of the site, except MIL biomass, calculated according to section B.2. Entrance receipts are used to ensure consistency.
Others	Low	Default data (for emission factors) and literature statistics (IEA, IPCC, others) are used to check the local data.

SECTION C. Monitoring report

C.1. Analysis report including energy content and humidity for each kind of biomass and evidence of adequate sampling for each analyse

Analysis of the energy content and humidity of the biomass are not fundamental for the operation of the plant. Such analyses are not foreseen in the monitoring report neither.

Standard values (according to a report issued in February, 2005, by IPT – Instituto de Pesquisas Tecnológicas – available at the site) are 31% of water in wood (31% moisture content, wet-weight basis) and 2,300 kcal/kg lower heat value.

Fresh processed biomass from local sawmills operation (wood chips and sawdust) and a collection of residues from roads and harvest residues (mainly trees branches) are used as fuel in the power plant. The power plant used rotting biomass as fuel until 2004.

Another monitoring tool is to estimate the total biomass used backtracking from the generated electricity and average values for the heat content. The cross-checking procedure is included in the monitored electricity generated and biomass consumed spreadsheets.

For the cross-checking procedure the following standard assumptions were used for the BK Itacoatiara thermoelectric power plant

- Installed capacity = 9,000 kW
- Average energy generation = 7.44 MWh/hour (in 2005)
- Steam demand/consumption = 45,000 kg of steam per hour
- Enthalpy at boiler input (after deaerator) = 116 kcal/kg (P= 50 Kgf/cm²) (T=115°C)
- Enthalpy at boiler output = 779 kcal/kg (P= 42 Kgf/cm²) (T=420°C)
- Lower heat value (LHV) of the wood residues = $9.63 \cdot 10^{-3}$ TJ/t or 2,300 kcal/kg (determined through regular calorimetric tests with wood residues from the region)
- Boiler efficiency = 85.48%
- Total hourly heat needed = $45,000 \times (779 - 116) \div 0.857 = 34,902,901$ kcal/h
- Total hourly wood residues = $34,902,901 \div 2,300 = 15,175$ kg of wood residues/hour
- Specific hourly wood residues = $15,175 \div 7.44 = 2.04$ tonnes of wood per MWh generated

For 91'947 tonnes of biomass, in 2007, 47'841 MWh (total energy amount: exported plus consumed internally) were generated. The result expected through the calculation above would be 97'596 tonnes, i.e., there is a discrepancy of 5.8%, which is acceptable, given the variation of humidity and of the quantity of the different types of wood residues used every year, what affects the value of LHV. For instance, in the years 2004 and 2005, the quantity of electricity generated was the same, but the quantity of biomass used in 2005 was 7% superior.

C.2. Evidences of biomass purchase: receipts of sawmill, open field stockpiles and from clearing of roads/forest. It will include the records of scales used on cross checking;

Biomass delivered to the power plant are according to the PDD either wood residues from the sawmills (processing residues or deteriorated logs from the log yard) or wood residues from forest/road “cleaning”. However, in 2007 no biomass from “cleaning” was used. The trucks are identified by license number, driver and biomass type, weighted at the entrance of the power plant. The information is also archived in the computers of the power plant for later payment procedures.

Cross checking: there are receipts that confirm the weight values of the wood residues from PWI-Carolina and Logs from PWA. The cross checking of the weight values from MIL is done as explained in section B.2. In 2007 no residues from other sawmills were used. Only during the months January to March, logs from the log yard of PWA add to the residues from the sawmill MIL.

Data on the biomass amounts monitored are presented in item C.3.


C.3. Records of exported electricity and biomass amount burned in boiler;
1. Biomass amount burned in boiler. Only Sawmill MIL and logs from PWA biomass are accounted for methane avoidance in t
Table 4 Itacoatiara Project, monitored data, 2007

Supplier of biomass residues	January	February	March	April ¹	May	June	July	August	September	October	November	December	Total
Sawmill MIL, fresh biomass	11'342	9'732	5'869	0	243	9'335	9'535	9'712	9'254	9'346	8'516	8'916	91'799
Clearing roads/forests (NOT accounted)	0	0	0	0	0	0	0	0	0	0	0	0	0
Sawmill Carolina, fresh biomass	0	0	0	0	0	0	0	0	0	0	0	0	0
Logs from PWA, fresh biomass	38	28	81	0	0	0	0	0	0	0	0	0	148
Other sawmill (NOT accounted)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total of wood residues/month	11'380	9'761	5'950	0	243	9'335	9'535	9'712	9'254	9'346	8'516	8'916	91'947
Consumption of Boiler	11'380	9'761	5'950	0	243	9'335	9'535	9'712	9'254	9'346	8'516	8'916	91'947

¹ In April and May, there was a complete breakdown of the turbine and no electricity could be produced. Only by the end of May, operation of the powerplant could be taken up again

Table 5 Details of biomass residues purchase receipts

Period	Biomass residues	Number of purchase receipt	Emission date	Quantity (Metric tons)
January 2007	LOGS FROM PWA - FRESH BIOMASS	1505	31/01/2007	38.05
February 2007	LOGS FROM PWA - FRESH BIOMASS	1672	28/02/2007	28.37
March 2007	LOGS FROM PWA - FRESH BIOMASS	1845	31/03/2007	81.31

2. Records of exported electricity

Table 6 Details of exported energy

Period	Exported energy (MWh)	Number of energy sale receipt	Emission date
January 2007	4'262	000172	31/01/2007
February 2007	3'950	000179	28/02/2007
March 2007	2'378	000183	31/03/2007
April 2007	0	none	N/A
May 2007	13	000200	30/06/2007
June 2007	3'536	000200	30/06/2007
July 2007	4'091	000307	31/07/2007
August 2007	4'159	000309	31/08/2007
September 2007	4'248	000316	30/09/2007
October 2007	4'357	000318	31/10/2007
November 2007	4'188	000320	30/11/2007
December 2007	4'111	000324	31/12/2007
Total 2007	39'293		

Cost of energy BRL/MWh: 211.10 from January to October and 224,38 from November to December

C.4. Evidence of calibration of scales;

The biomass weighting scales are annually revised and calibrated. Calibration reports are submitted to the DOE.

**C.5. Receipts of electricity sold to CEAM;**

The exported electricity is monthly downloaded from an electronic electricity meter installed by the local power utility CEAM (“*Companhia Estadual de Energia Elétrica do Estado*”), which has a PPA with the Project.

After the measurement, CEAM issues a report of electricity exported to the grid in electronic format. After receiving the spreadsheets, the management of CEAM checks values and sends them to the commercial department of BK Itacoatiara (Project owner). Afterwards, the commercial department issues an invoice to CEAM.

Copies of all monthly metering reports as well as invoices issued since operation start are available at the project site (Itacoatiara, AM).

C.6. Evidences of electricity measure gage calibration;

According to the Brazilian legislation² electricity metering is responsibility of the power utility (CEAM in the case of the Itacoatiara Project). Therefore, the calibration of the instruments, when necessary, is also carried out by CEAM.

C.8. Evidences of quality control on collect, copy and store of records;

According to the final PDD version the following procedures apply:

All forecasted documents according to table 3 related to the quality control and monitoring of the project (sales records, metering and calibration reports, etc) are and will be available for verification at the project site.

The project participants use default data and literature statistics to check any local data considered uncertain.

C.9. Evidences assessment of gross records, calculation and checking by significant level of management.

All relevant records for the monitoring of the Itacoatiara Project (electricity export and biomass consumption at the boiler) are checked by at least two independent management levels. Electricity export is checked by the buyer (CEAM) and by the seller (UTE BK Itacoatiara). The biomass used in the power plant is verified by the buyer and producer (UTE BK Itacoatiara) and the sellers (wood mills).

² Agência Nacional de Energia Elétrica, Resolução 344, 25 de Junho de 2002. Operador Nacional do Sistema & Mercado Atacadista de Energia Elétrica, Sistema de Medição para Faturamento de Energia: Especificação Técnica (2002).



C.10. Evidences of back-up for records;

All data is archived and available at the project site (Itacoatiara, AM).

C.11. Evidences of renew of Operation Environment Licence.

The Operation License (LO number 355/02-04) was renovated in October, 30, 2007, by the environmental institute from the state of Amazonas (IPAAM – *Instituto de Proteção Ambiental do Amazonas*, Figure 3). Its validity is one year from the date of issue.



LICENÇA DE OPERAÇÃO – L.O. Nº 355/02-04

O INSTITUTO DE PROTEÇÃO AMBIENTAL DO ESTADO DO AMAZONAS – IPAAM, no uso das atribuições que lhe conferem a Lei nº 1532 de 06 de julho de 1992, o Decreto nº 10.028 de 04 de fevereiro de 1987, a Lei nº 2.367 de 14 de dezembro de 1995 e o Decreto nº 17.033 de 11 de março de 1996, expede a presente Licença que autoriza a:

INTERESSADO: BK Energia Itacoatiara Ltda .

ENDEREÇO PARA CORRESPONDÊNCIA: Rodovia Torquato Tapajós, (AM 010), km 227,2, Zona Rural, Itacoatiara-AM

CNPJ/CPF: 04.310.086/0001-00

INSCRIÇÃO ESTADUAL: 04.147.699-9

FONE: (92) 3521-2644/2603

FAX: (92) 3521-2160/3329

REGISTRO NO IPAAM: 1008.2401

PROCESSO Nº: 1205/T01

ATIVIDADE: Geração de Energia Elétrica

LOCALIZAÇÃO DA ATIVIDADE: Rodovia Torquato Tapajós, (AM 010), km 227,2, Zona Rural, Itacoatiara-AM.

FINALIDADE: Autorizar o funcionamento de uma central termoeletrica com residuos industriais de madeira geradora de energia elétrica e vapor, com capacidade de 9 MW.

POTENCIAL POLUIDOR/DEGRADADOR: Grande

PORTE: Pequeno

PRAZO DE VALIDADE DESTA LICENÇA: 365 dias.

Atenção:

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Manaus-AM, 30 OUT 2007


Aldenira Rodrigues Queiroz
Diretora Técnica


Neliton Marques da Silva
Diretor Presidente

Figure 2 : BK Itacoatiara operation license



SECTION D. Estimation of GHG emission by sources

D.1. Formulae used

For the power generation component no formula is provided in AMS I.D.

For the methane avoidance component the formulae listed in Type III.E are:

$$CH_4_IPCC_{decay} = (MCF * DOC * DOC_F * F * 16/12) \quad \text{Equation 1}$$

Where:

$CH_4_IPCC_{decay}$ IPCC CH_4 emission factor for decaying biomass in the region of the 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 2 or default 0.3)

DOC_F 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:

$$DOC = 0.4 (A) + 0.17 (B) + 0.15 (C) + 0.30 (D) \quad \text{Equation 2}$$

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

$$BE_y = Q_{biomass} * CH_4_IPCC_{decay} * GWP_CH_4 \quad \text{Equation 3}$$

Where:

BE_y Baseline methane emissions from biomass decay (tonnes of CO_2 equivalent)

$Q_{biomass}$ Quantity of biomass “treated” under the project activity (tonnes)

GWP_CH_4 GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)

$$Q_{biomass} = Q_{biomass,total} - Q_{biomass,old} - Q_{biomass,roads} \quad \text{Equation 4}$$

$$Q_{biomass,total} = Q_{biomass,fresh} + Q_{biomass,roads} + Q_{biomass,old} \quad \text{Equation 5}$$

Where:



$Q_{\text{biomass,total}}$	Total amount of wood residues consumed at the project activity (tonnes).
$Q_{\text{biomass,old}}$	Amount of wood residues consumed at the project activity collected in open field stockpiles (tonnes).
$Q_{\text{biomass,fresh}}$	Amount of wood residues consumed at the project activity collected from the sawmills operation (tonnes).
$Q_{\text{biomass,roads}}$	Amount of wood residues consumed at the project activity collected from clearing the roads/harvest residues (tonnes).

D.2 Leakage

No formula is needed. No leakage calculation is required.

D.3 Project activity emissions

To calculate the emissions that are attributable to the project one needs the total amount of biomass annually used by the thermo plant and the energy content of the biomass. The numbers shall be applied to the following formula:

$$PE_y = Q_{\text{biomass}} \times E_{\text{biomass}} \times (CH_4_{\text{bio_comb}} \times CH_4_GWP + N_2O_{\text{bio_comb}} \times N_2O_GWP) \div 10^6$$

Where:

PE_y	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)
$CH_4_{\text{bio_comb}}$	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 , default value is 21)
$N_2O_{\text{bio_comb}}$	N ₂ O 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 ₂ O (tonnes of CO ₂ equivalent/tonne of N ₂ O, default value 310)

$$PE_y = 91'947 \times 9.63 \times 10^{-3} \times ((300 \times 21) + (4 \times 310)) \div 10^3 = 6'6756 \text{ tCO}_2\text{e}$$

The project emissions are 6'676 tCO₂e, from January until December 2007.

D.4 Calculation of total CO2 emission reduction



For the electricity component, the emission reductions by the project activity (ER_y , in tCO_2e) during a given year y are the product of the baseline emissions factor (EF_y , in tCO_2e/MWh) times the electricity supplied by the project to the grid (EG_y , in MWh), as follows:

$$ER_{y, power-generation} = EF_y \cdot EG_y \quad \text{Equation 6}$$

The load factor of the power plant, with $9MW_{elt}$, is greater than 200kW. According to Appendix B of the simplified modalities and procedures for small-scale CDM project activities “For a system where all fossil fuel fired generating units use fuel oil or diesel fuel, the baseline is the annual kWh generated by the renewable unit times an emission coefficient for a modern diesel generating unit of the relevant capacity operating at optimal load as given in Table I.D.1”. Thus, the baseline to be used in the project is 0.8 tCO_2/MWh .

The values for the whole crediting period are shown in Table 3, section D.2

The electric energy output from January to December 2007 is 39'293 MWh; the emission reduction is calculated as follows:

$$ER_{y, power-generation} = 39'293 \cdot 0.8 = 31'434 tCO_2e \quad \text{Equation 7}$$

For the methane avoidance component, the amount of residues used in the power plant is monitored since the start of operation. Using the measured consumption of 91'947 tonnes of fresh wood residues (from sawmills MIL, PWI-Carolina and Logs from PWA) the emission reductions are:

$$ER_{y, methane-avoidance} = BE_y - PE_y = 118'942 - 6'676 = 112'266 tCO_2e \quad \text{Equation 8}$$

$$ER_{total} = ER_{y, methane avoidance} + ER_{y, power generation} = 112'266 + 31'434 = 143'700 tCO_2e \quad \text{Equation 9}$$

Table 7 Summary of estimated emission reductions

Years	Estimation of project activity emissions (tons of CO2e/year)	Estimation of baseline emission – methane avoidance (tons of CO2e/year)	Estimation of emission reductions from methane avoidance (tons of CO2e/year)	Estimation of emission reductions from electricity (tons of CO2e/year)	Estimation of total emission reductions (tons of CO2e/year)
Total (tonnes of CO2e)	6'676	118'942	112'266	31'434	143'700

(*)From January until December 2007

**D.5. Contact details**

Contact details for the monitoring report:

Company: Precious Woods Holding Ltd.
Baarerstrasse 135
6301 Zug, Switzerland

Contact person: Ms Manuela Gaehwiler

Address: Branch Office Zurich
Militaerstrasse 90
P.O. Box 2274,
8021 Zürich, Switzerland

Telephone number: +41 (0) 44 245 81 21

Fax number: +41 (0) 44 245 80 12

E-mail: manuela.gaehwiler@preciouswoods.com

Contact details of the participant on site:

Company: BK Energia Itacoatiara Ltda.

Contact person: Mr. Bonifacio Rocha

Address: Rodovia Torquato Tapajós, km 227 / Caixa Postal 39
69100-000 Itacoatiara
Amazonas, Brazil

Telephone number: +55 (92) 3521-3329 or (92) 3521-3331

Fax number: +55 (92) 3521-9230

E-mail: bonifacio.rocha@preciouswoods.com