MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

MONITORING REPORT (CDM –MR)
Version 1 – date: 04/10/2011

Switching of fuel from coal to palm oil mill biomass waste residues at Industrial de Oleaginosas Americanas S.A. (INOLASA)
Reference number: 1314
Monitoring period number 5 (01/09/2010 - 30/09/2011)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

The project activity comprises the installation of a biomass fuelled boiler to supply steam for internal production processes, displacing a coal-fired boiler. Coal is replaced by palm kernel shells (PK shells) and empty fruit bunches (EFB), saving coal consumption and consequently reducing carbon emissions.

Biomass fuel is mainly purchased from three nearby palm oil mills, called Palo Seco, Naranjo and Coto. The first two mills are located in Quepos and the last one in Golfito, in the province of Puntarenas. The biomass is transported from the palm oil plants using trucks with a capacity of 25-28 tons each, making approximately 2-3 trips per day.

The project activity replaced the current boilers with a new biomass boiler. This new boiler has a capacity to produce 35 tons of steam/hour with a design pressure of 35 bars. However, during the first years it will only produce 20 tons of steam/hour with a pressure of 12 bars.

The boiler is combusting biomass in a mixture of approximately 85% palm kernel (PK) shells and 15% empty fruit branches (EFB). The quantity of PK shells that the plant needs is approximately 20,000 tons per year. The combustion of biomass results in a low amount of ash production, corresponding to 3-4% of the feeding mass. These ashes are used as an aggregate for cement and concrete mixtures.

The boiler was installed and commissioned on April 15, 2007 and April 24, 2007 respectively.

The emission reductions achieved during this monitoring period are: **39,567 tCO_2e**

A.2. Project Participants

1. **Industrial de Oleaginosas Americanas S.A. (INOLASA)**
2. **KfW Bankengruppe**

A.3. Location of the project activity:

Costa Rica, Province of Puntarenas, District of Barranca.
Coordinates: 454.5-459 North; 217.5-217.9 East.
Latitude of Barranca is N 09, 59', 23.5" and longitude is W 084, 42', 36.9". The altitude is sea level.

A.4. Technical description of the project

A bi-drum water-tube boiler with membrane design wall and a rated capacity of 35,000 kg steam per hour is installed. The boiler has a designed pressure of 35.0 bars, but is currently used on 12.0 bars. The overall efficiency is given with 80%. Table 1 shows more technical specifications of the biomass boiler. Biomass residues from the palm oil are used as fuel; these biomasses are empty fruit bunches and palm kernel shells. The boiler is used for the generation of process steam for an onsite soybean refinery plant. Figure 1 provides a process scheme.

Figure 1 – Process Scheme

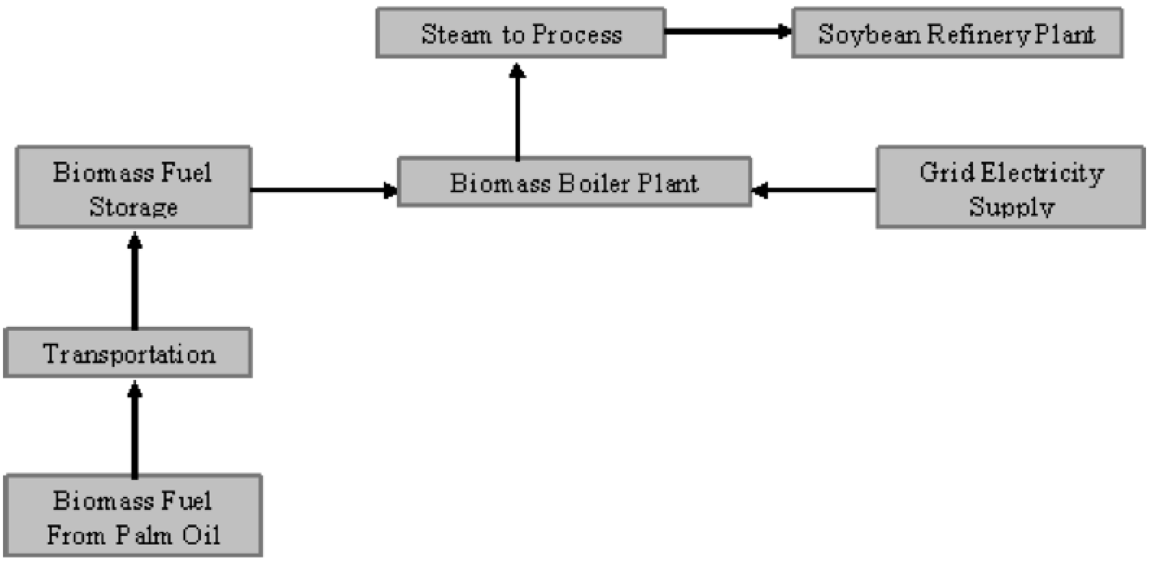


Table 1 - Technical specifications of Boiler

Technical Design Specification of Biomass Boiler	
Boiler Type	Fraser II Bi-Drum Watertube Boiler, Membrane wall design
Boiler Capacity	35,000 Kg/Hr
Boiler Model	FR 16/49
Boiler working pressure	12.0 bar resp. 31.0 bar
Design pressure	35.0 bar
Steam Temperature	192°C (Saturated) resp. 275°C (40° Superheated)
Feed water temperature	120°C +/- 5% (Economizer Water outlet temperature)
Air temperature at F.D Fan	220°C to 240°C (pre-heater air outlet temperature)
Actual steam evaporation	35,000 Kg/Hr.
Draught system	Balance Draught
Burning method	Reciprocating Step Grate; water cooled; hydraulically operated; grate material with high allow content.
Fuel to be used:	85% PK shells with Max 15% EFB (45% moisture)
Dust Emissions	<=100 mg/ nm³
Overall efficiency on Gross Calorific Value of Fuel	80%

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The small scale project activity is registered under the following methodology:

"Thermal energy for the user with or without electricity", AMS-I.C, version 10, May 18th, 2007

A.6. Registration date of the project activity:

30/11/2007

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

30/11/2007 – 29/11/2014 (renewable)

A.8. Name of responsible person(s)/entity(ies):

INOLASA
Ing. Domingo Vásquez Vásquez
Manager Plant
T: (506) 26630323
M: dvv@inolasa.com
F: (506) 2663-1524

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

The project is fully implemented and operational as explained in the previous verification processes and the PDD.

The boiler was installed and commissioned on April 15, 2007 and April 24, 2007 respectively. The CDM project activity was registered and started the first crediting period on 30 November 2007. From this date onward, the project was completely implemented and operational, as shown during the 1st, 2nd, 3rd and 4th Periodic Verifications.

During this monitoring period the following special events were recorded:

Table 2 - Event log

Date	Event description
16/09/2010 - 22/09/2010	Boiler stopped for maintenance and cleaning.
10/10/2010 - 23/12/2010	Boiler stopped for maintenance and cleaning; low availability of biomass.
14/02/2011 - 19/02/2011	Boiler stopped for maintenance and cleaning.
27/03/2011 - 01/04/2011	Boiler stopped for maintenance and cleaning.
20/04/2011 - 22/04/2011	Shut down for Easter Week.
29/05/2011 - 09/06/2011	Boiler stopped for maintenance and cleaning.
26/07/2011 - 02/08/2011	Boiler stopped for maintenance and cleaning.
18/09/2011 – 23/09/2011	Boiler stopped for maintenance and cleaning.

The cleaning of the biomass boiler is programmed for each one and a half months, and is based on an agreement between the Costa Rican Ministry of Health and INOLASA. This maintenance, involving cleaning equipment and the boiler, normally takes around a week.

Reduced supply of biomass occurs when the palm oil mills which supply residue waste to the INOLASA boiler have processed less fruits (December to February is a dry period in Costa Rica, and the production of fruits tends to be lower).

There were no incidences or situations during the Monitoring Period which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

The monitoring plan has been revised and has been approved on 31/05/11.

During the previous periodic verification (4th verification) it was concluded that no co-incineration using coal would be possible in the future and that consequently bunker fuel would be used permanently during periods with low availability of biomass or if the equipment is out for maintenance. Hence a request of revision of the monitoring plan has been filed and approved, in order to reflect in the PDD the actual monitoring activity.

B.3. Request for deviation applied to this monitoring period

No deviations occurred during this monitoring period.

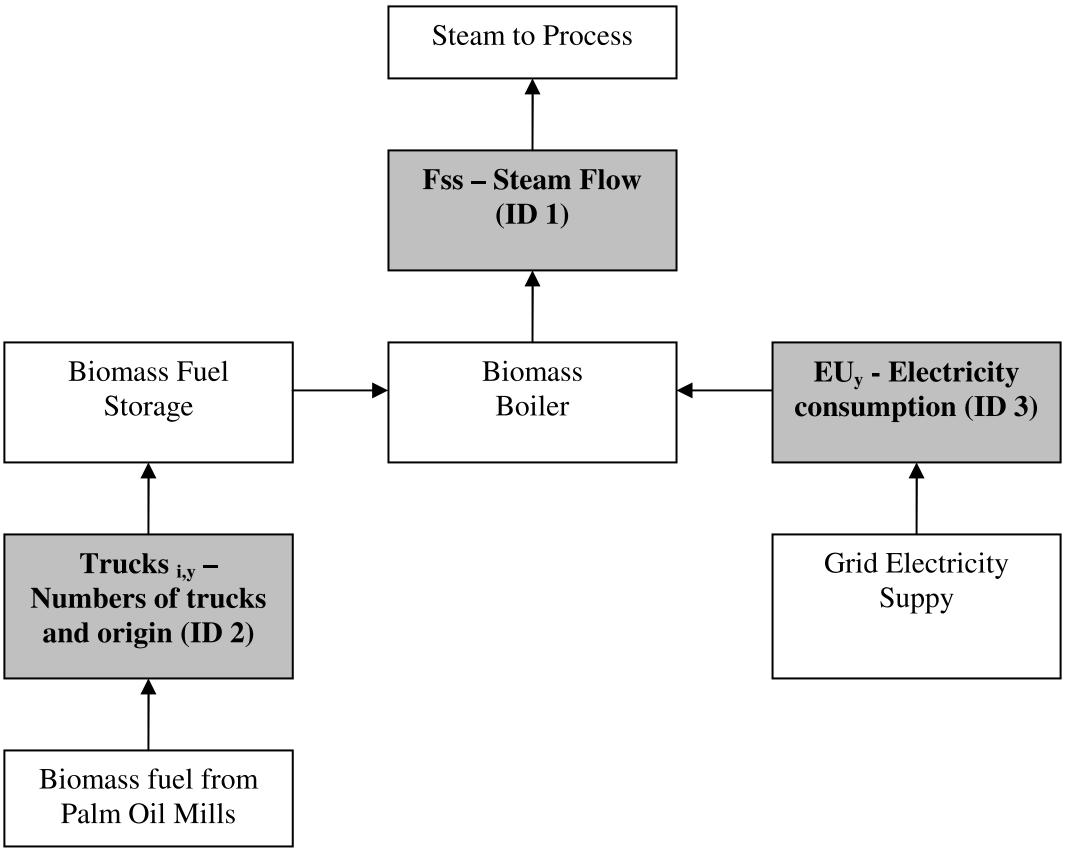
B.4. Notification or request of approval of changes

No changes to the project activity happened.

SECTION C. Description of the monitoring system

Metering scheme:
The main metering points relevant for this project can be schematically interpreted from Figure 2 below.

Figure 2 – Metering scheme



Further information on the relevant parameters that are monitored is readily available in Section D below.

Roles and responsibilities:
The Project owner is Industrial de Oleaginosas Americanas S.A. (INOLASA). INOLASA is therefore responsible for the operation and the monitoring of the project activities. INOLASA has appointed one person to be responsible for monitoring, Mr. Domingo Vásquez Vásquez. The operational staff, the Superintendent of Production and the Superintendent of Maintenance, report to him.

Trainings:
During the crediting period internal trainings are performed. If trainings are performed during this monitoring period, receipts of these internal trainings will be available on-site.

Involvement of Third Parties:
Support and consultancy regarding the CDM obligations is provided by the company Geo Ingeniería Ingenieros Consultores S.A. During operation, the technical team of INOLASA is supported, if necessary, by the technology provider PETRA.

Documentation from the authorised boiler inspector during his yearly on-site visit will be available during the on-site visit.

A third party check of the electricity meter has been performed and the documentation will be available to the DOE.

Data collection and procedures:
The Superintendent of Production collects data on a daily basis, and transfers these data to weekly and final monthly reports, which are submitted to the responsible for monitoring. The Superintendent of Maintenance saves the steam flow data digitally, which he regularly crosschecks with the manual data. In addition, crosschecks of the final reports against the daily data are performed for quality assurance.
The CDM spreadsheet is prepared from the original data. It comprises monthly summary sheets that contain the daily data for easy control and comparison of these against other sources. The data sheets are compiled by the person responsible for monitoring, and signed by the plant manager.

Troubleshooting procedures:
In case of unforeseen problems or failures of the data recording system, the operating staff will switch to manual readings of all meters. This procedure is well defined and trained by the staff, since manual readings as back-up for the computerised data readings have been a part of the normal operation since the starting period of this project. Furthermore, a logbook will be maintained, recording all deviations from normal operation, including observations and all other information necessary to document. In this way, jumps or periods where operating conditions are out of range can be identified and explained.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	ID.5 / Km_i
Data unit:	**km**
Description:	Distance from palm oil mill i to the biomass boiler
Source of data used:	This information is provided by the contracted transport company.
Value(s) :	Km – distance Coto 47 to Barranca 340 Km – distance Quepos to Barranca 133
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	Distance was determined by the readings of the mileage counter of a representative truck. It was cross checked by measuring the distance on a 1:50,000 map. Distances values expressed above are one way only; thus, they are multiplied by two in order to obtain the round-trip distance. Palo Seco and Naranjo palm mills are both located at Quepos; only Coto palm mill is located in Coto 47.

Data / Parameter:	ID.6 / VF_{cons}
Data unit:	**l/km**
Description:	Vehicle fuel consumption in litres per kilometre
Source of data used:	This information is provided by the contracted transport company
Value(s) :	0.6
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	It relies on specific truck data based on the contracted transport company´s fleet of trucks

Data / Parameter:	ID.7 / CVdiesel
Data unit:	**MJ/kg**
Description:	Calorific value of the fuel
Source of data used:	Diesel reference value for Costa Rica
Value(s) :	45.91
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	This reference is considered as a fixed value, and based on the fuel provider´s specifications (Refinadora Costarricense de Petróleo, S.A.)

Data / Parameter:	**ID.8 / Ddiesel**
Data unit:	**kg/l**
Description:	Diesel density
Source of data used:	The fuel density of Diesel in Costa Rica
Value(s) :	0.85
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	National specifications for Diesel fuel in Costa Rica

Data / Parameter:	**ID.9 / EFdiesel**
Data unit:	**tCO_2/MJ**
Description:	Emission factor Diesel
Source of data used:	IPCC
Value(s) :	20.2 tC/TJ x 44/12 = 74.1 tCO_2/TJ = 0.00007 tCO_2/MJ
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	The reference comes from the latest IPCC guidelines, and has been considered as representative for the current emission reduction calculation

Data / Parameter:	**ID.10 / EUy**
Data unit:	**GWh**
Description:	Electricity consumption of baseline boiler annually.
Source of data used:	Quotations from boiler technology provider
Value(s) :	1.07
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline boiler: including a two week maintenance period.
Additional comment:	

Data / Parameter:	**ID.11 / EFgrid**
Data unit:	**tCO_2/GWh**
Description:	Emission factor Costa Rican grid
Source of data used:	This factor has been calculated using ICE data and available info from other sources. See Annex 3 of the PDD
Value(s) :	62.86
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	This baseline emission factor was calculated ex-ante in a transparent and conservative manner as the average of the "approximate operating margin" and the "build margin"

Data / Parameter:	**ID 12 / η_{th}**
Data unit:	%
Description:	Energy efficiency of the boiler in the baseline scenario
Source of data used:	The energy efficiency of the boiler that would be used in absence of the project activity is based upon the manufacturer's information
Value(s) :	78
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	The efficiency is considered as a fixed value and based on the manufacturer´s information for coal

Data / Parameter:	**ID.13 / η_p**
Data unit:	%
Description:	Energy efficiency of the boiler in the project scenario
Source of data used:	Is based upon the manufacturer´s information
Value(s) :	80
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	The efficiency is considered as a fixed value, and based on the manufacturer's information for biomass fuels

Data / Parameter:	**ID.14 / $NCV_i = NCV_c$**
Data unit:	**TJ/kt**
Description:	Is the net calorific value of the fossil fuel type i
Source of data used:	Based on tests done to Colombian coal
Value(s) :	A default value of 10,887 BTU/lb will be considered based on tests done to Colombian coal (equivalent 25.73 TJ/kt)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	The net calorific value of the fossil fuel is determined by means of analytical results at the 'Laboratory of Puerto Bolivar, La Guajira', in accordance with the applicable ASTM standards. The resulting 'Screen Analysis Certificate' was developed by the 'Inspectorate Colombia Ltda.'

Data / Parameter:	**ID.15 / $COEF_i$**
Data unit:	**tCO_2/kt**
Description:	Is the CO_2 emission factor of the fossil fuel type i fired in the boiler in the absence of the project activity
Source of data used:	Reference from Colombian provider of coal
Value(s) :	2.38 tCO_2/t
Indicate what the data are	Baseline emission calculation

used for (Baseline/ Project/ Leakage emission calculations)	
Additional comment:	Carbon percentage of the Colombian coal that would have been used is stated as 64.9%

Data / Parameter:	**ID.16 / Hss_i**
Data unit:	**kJ/kg**
Description:	Is the enthalpy of the saturated steam at 12 bar
Source of data used:	Set as default value provided from saturated steam table
Value(s) :	2782.73
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	This is considered as a fixed value and will be used for emission reduction calculations

D.2. Data and parameters monitored

Data / Parameter:	**ID.1 / Fss_i**
Data unit:	**kg/yr**
Description:	Is the steam flow monitored, during year y
Measured /Calculated /Default:	Measured
Source of data:	Project owner, flow meter
Value(s) of monitored parameter:	123,376,340 kg (for the entire period)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Mass Flow Transmitter Make/Model: Rosemount 3095M Accuracy class: +/-1% Serial number: 0217271 Calibration frequency: According to *"General Guidelines to SSC CDM methodologies"*, version 14.1, para. 17.(c) at least every three years. However, the manufacturer assures 10 year stability of +/-0.25% Date of last calibration: 13.10.2009 Validity: At least until 12.10.2012 Location: The flow meter is installed in the steam output flow of the biomass boiler.
Measuring/ Reading/ Recording frequency:	Continuous measurement, daily reading and monthly recording
Calculation method (if	Flow of steam in tonnes/yr is converted to TJ by calculation.

applicable):	
QA/QC procedures applied:	The meters automatically present values in mass units (i.e. the equipment internally accounts for temperature and pressure of the gas). Flow meter will be subject to a regular maintenance and testing regime to ensure accuracy (see table in Annex 4 to the PDD).

Data / Parameter:	**ID.2 / $trucks_{i,y}$**
Data unit:	**Number**
Description:	Number of trucks and origin
Measured /Calculated /Default:	Measured
Source of data:	Project owner, logbook
Value(s) of monitored parameter:	907 trucks arrived from Quepos 577 trucks arrived from Coto
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable
Measuring/ Reading/ Recording frequency:	Measured at each delivery and subsequently recorded
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The recorded data will be crosschecked on a regular basis with the invoices from the transportation service provider

Data / Parameter:	**ID.3 / EU_y**
Data unit:	**GWh/year**
Description:	Electricity consumption biomass boiler in the project scenario
Measured /Calculated /Default:	Measured
Source of data:	Project owner,
Value(s) of monitored parameter:	1.70896 GWh (for the entire period)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Electricity meter Make/Model: Schneider Electric CM3250 Accuracy class: IEC 687 0.5 class Serial number: 15000219 Calibration frequency: 15 years stability according to manufacturer. But according to *"General Guidelines to SSC CDM methodologies"*, version 14.1, para.

	17.(c) at least every three years. Date of last calibration: 02.07.2009 Validity: At least until 01.07.2012 Location: The electricity meter is installed in an electric substation located at the biomass boiler.
Measuring/ Reading/ Recording frequency:	Measured continuously, reading daily, recorded monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The electricity meter will be recalibrated periodically by the supplying firm

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

Please note that the references used for the parameters, namely 'IDs', are defined in chapter D above and are applicable for all following chapters.

The baseline emissions can be calculated with the following equation:

$$BE_y = BE_{heat,y} + BE_{boiler,y}$$

Where :

$BE_{heat,y}$ Emissions due to coal combustion. In absence of the project the heat would be generated by a coal boiler.

$BE_{boiler,y}$ Emissions caused by grid electricity consumption (coal boiler).

The emissions due to coal combustion are determined by dividing the amount of generated heat during the project activity by the net calorific value of coal and the efficiency of the coal boiler. This is multiplied with a CO_2 emission factor for the displaced fossil fuel (coal):

$$BE_{heat,y} = \frac{Q_y}{\eta_{th} \cdot NCV_i} \cdot COEF_i$$

Where:

$BE_{heat,y}$ the baseline emissions for fossil fuels during the year y in tons of CO_2eq.

Q_y is the quantity of heat generated in the project plant using renewable resources only, that displaces heat generation in the fossil fuel fired boiler during the year y in TJ. This is the same variable mentioned in AMS.I-C ver. 10 as HG_y (original notation in approved monitoring plan used for clarity).

η_{th} is the energy efficiency of the boiler that would be used in absence of the project activity. (**ID.12, fixed**)

NCV_i is the net calorific value of the fossil fuel type i per TJ/kt. In the project only coal as a fossil fuel is used. (**ID.14, fixed**)

$COEF_i$	is the CO_2 emission factor of the fossil fuel type i fired in the boiler in the absence of the project activity in tCO_2/kt – in the project activity only coal. (**ID.15, fixed**)

The total quantity of heat generated in the project plant using renewable sources (Q_y), is to be based on the following equation:

$$Q_y = h_{ssi} \cdot F_{ssi} \cdot 10^{-9}$$

Where

Q_y	is the total quantity of heat generated in the project plant using renewable resources, during year y, in TJ.
h_{ss}	is the enthalpy of the saturated steam at 12 bar (2782.73 MJ/t set as a default value) (**ID.16, fixed**).
F_{ss}	is the steam flow monitored, during year y (t/year) (**ID.1, to be monitored**)

The emissions resulting from electricity consumption by the boiler are determined by:

$$BE_{boiler,y} = EU_y \cdot EF_{grid}$$

Where:

$BE_{boiler,,y}$	Baseline emissions resulting from electricity usage in year 'y'
EU_y	Electricity Usage in year 'y' (**ID.10, fixed**)
EF_{grid}	Emission factor of the Costa Rican grid. (**ID.11, fixed**)

	ID.1 / F_{ss}	**BE_{heat}**	**BE_{boiler}**	**BE_{total}**
Month	**[t]**	**[tCO_2e]**	**[tCO_2e]**	**[tCO_2e]**
Set-10	11,535.10	3806.58	5.53	3,812.11
Oct-10	4,891.20	1614.09	5.71	1,619.81
Nov-10	0.00	0.00	5.53	5.53
Dic-10	3,334.04	1100.23	5.71	1,105.94
Ene-11	12,969.40	4279.90	5.71	4,285.61
Feb-11	10,313.60	3403.49	5.16	3,408.65
Mar-11	11,685.00	3856.05	5.71	3,861.76
Abr-11	12,284.00	4053.72	5.53	4,059.25
May-11	12,105.00	3994.65	5.71	4,000.36
Jun-11	10,359.00	3418.47	5.53	3,424.00
Jul-11	10,692.00	3528.36	5.71	3,534.07
Ago-11	12,292.00	4056.36	5.71	4,062.07
Set-11	10,916.00	3602	6	3,607.81
Total	123,376.34	40,714.16	72.79	**40,786.95**

E.2. Project emissions calculation

The project emissions can be calculated with the following equation:

$PE_y = PE_{trans,y} + PE_{boiler,y}$

Where :

$PE_{trans,y}$ Project emissions resulting from transportation of the biomass in year 'y'

$PE_{boiler,,y}$ Project emissions resulting from electricity usage in year 'y'

The CO_2 emissions from a biomass load are calculated from the quantity and the specific CO_2-emission factor of the fuel used by the trucks.

$$PE_{trans,y} = \sum trucks_{i,y} \cdot TransCOEF_i$$

Where:

$PE_{trans,y}$ Project emissions resulting from transportation of the biomass in year 'y'

$trucks_{i,y}$ Number of trucks supplying the biomass originating from palm oil mill i in year 'y' (**ID.2, to be monitored**)

$TransCOEF_i$ Coefficient for the CO_2 emissions from 1 truck load of biomass originating from palm oil mill i

$$TransCOEF_i = km_i \cdot VF_{cons} \cdot CV_{diesel} \cdot D_{diesel} \cdot EF_{diesel}$$

Where:

Km_i Distance from palm oil mill i to the biomass boiler (km) (**ID.5, fixed;** double of the values reported in D.1 are considered in order to account for a round-trip.)

VF_{cons} Vehicle fuel consumption in litres per kilometre (l/km) (**ID.6, fixed**)

CV_{diesel} Calorific value of the fuel (MJ/kg) (**ID.7, fixed**)

D_{diesel} Diesel density (kg/l) (**ID.8, fixed**)

EF_{diesel} Emission factor diesel (tCO_2/MJ) (**ID.9, fixed**)

For the transportation of biomass trucks with a load capacity of 28 tonnes are used. To be conservative, $TransCOEF_i$ is determined based on a full truck load. The trucks use 0.6 litre of diesel per kilometre, the calorific value of the fuel is 45.91 MJ/kg, the fuel density of diesel in Costa Rica is 0.85 kg/l and the emission factor of the fuel is 74.1 tCO_2/TJ.

The project emissions resulting from electricity consumption by the boiler are determined by:

$$PE_{boiler,y} = EU_y \cdot EF_{grid}$$

Where:

$PE_{boiler,,y}$ Project emissions resulting from electricity usage in year 'y'

EU_y Electricity Usage in year 'y' (**ID.3, to be monitored**)

EF_{grid} Emission factor of the Costa Rican grid. (**ID.11, fixed**)

	ID.2 / number of trucks		PE_{trans}	ID.3 / EU_y	PE_{boiler}	PE_{total}
Month	**Quepos**	**Coto**	**[tCO_2e]**	**[MWh]**	**[tCO_2e]**	**[tCO_2e]**
Set-10	72	26	63.90	127.80	8.03	71.94
Oct-10	28	16	31.80	62.96	3.96	35.76
Nov-10	16	32	45.14	14.07	0.88	46.02
Dic-10	58	31	63.34	49.73	3.13	66.47
Ene-11	100	36	88.62	174.06	10.94	99.56
Feb-11	120	25	84.88	140.23	8.81	93.69
Mar-11	92	69	124	163	10	134.12
Abr-11	48	48	79	155	10	88.52
May-11	74	52	96	164	10	105.82
Jun-11	52	54	88	144	9	96.78
Jul-11	66	65	107	170	11	117.82
Ago-11	89	64	117	183	12	128.11
Set-11	92	59	112	160	10	122.14
Total	907	577	1,099.32	1,708.96	107.43	**1,206.75**

Other emissions occurring within CDM project activity

Two additional sources of emissions were detected during the present monitoring period. The first one is the use of 17 trucks (overall) bringing biomass from Río Escondido (Nicaragua), a site located 840 km from the project site. These trucks were used as they would have returned empty from Río Escondido after delivering fertilizer from Inolasa's facility in Barranca (project site). Notice that as the use of use of these trucks would have occurred anyway, this actually *reduces* project emissions by lowering the amount of trucks coming from Quepos and Coto (the locations from which the project obtains its biomass). Nevertheless, emissions from these trucks are assessed using the same criteria used for parameter $PE_{trans,y}$ for conservativeness.

Likewise, a bulldozer for on-site transportation of biomass was used. The vessel consumed 30,831 litres of diesel.

Table 3 - Other project emissions

Trucks from Río Escondido	17	trucks
Distance	840	km
Vehicle fuel consumption (VF_{cons})	0.6	l/km
Total fuel consumed by additional trucks	8,568	lts
Fuel consumed by on-site bulldozer	30,831	lts
Total additional fuel consumed	39,399	lts
calorific value of diesel (CV_{diesel})	45.91	MJ/kg
Density of diesel (D_{diesel})	0.85	kg/l
Emission factor diesel (EF_{diesel})	0.0000741	tCO_2 / MJ
Additional Project Emissions	113.93	tCO2
% of ERs claimed	0.29	%

The overall amount of emissions arising from these two sources are 113.93 tCO2, around 0.29% of the emission reductions claimed for this period (39,567 tCO_2 – see E.4 below). In accordance with the

CDM Validation and Verification Manual (paragraph 77), only emissions which are expected to contribute more than 1% of the emission reductions should be addressed.

E.3. Leakage calculation

According to the registered PDD no sources of leakage are identified. Therefore leakage is considered zero.

E.4. Emission reductions calculation / table

The total emission reductions can be easily calculated with the results of the below described equations. The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are considered to be zero. The general equation is as follows:

$ER_y = BE_y - (PE_y + L_y)$

ER_y	=	Emission $reduction_{year}$
BE_y	=	Baseline $emissions_{year}$
PE_y	=	Project $emissions_{year}$
L_y	=	$Leakage_{year} = 0$

The table below summarizes the results presented below, conservatively rounded.

Month	BEtotal [tCO_2e]	PEtotal [tCO_2e]	ERtotal [tCO_2e]
Set-10	3,812	72	3,740
Oct-10	1,619	36	1,583
Nov-10	5	47	-42
Dic-10	1,105	67	1,038
Ene-11	4,285	100	4,185
Feb-11	3,408	94	3,314
Mar-11	3,861	135	3,726
Abr-11	4,059	89	3,970
May-11	4,000	106	3,894
Jun-11	3,423	97	3,326
Jul-11	3,534	118	3,416
Ago-11	4,062	129	3,933
Set-11	3,607	123	3,484
Total	**40,780**	**1,213**	**39,567**

Total baseline emissions:	**40,780 tCO_2e**
Total project emissions:	**1,213 tCO_2e**
Total leakage:	**0 tCO_2e**
Total emission reductions:	**39,567 tCO_2e**

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

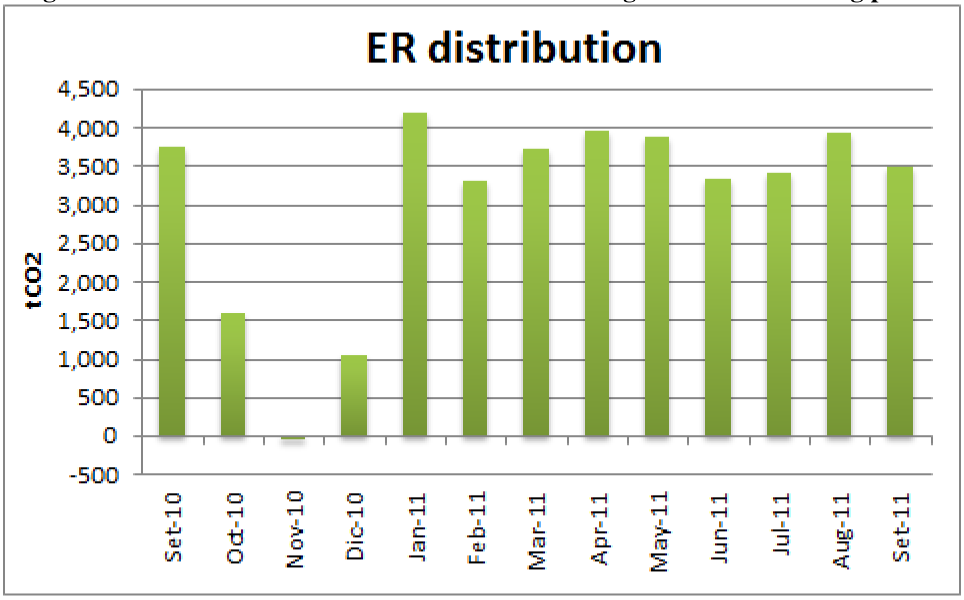
Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**39,506 (395 days)[1]**	**39,567**

The achieved emission reductions are 0.15% higher than the proportional ex-ante estimate. This difference is discussed below.

E.6. Remarks on difference from estimated value in the PDD

As the comparison under E.5 shows, actual emission reductions claimed are slightly (<1%) higher than the proportional ex-ante estimate included in the registered PDD. However, this is due to the fact that emission reductions are not evenly distributed throughout the year, as shown in Figure 3 below.

Figure 3 – Distribution of Emission Reductions throughout the monitoring period



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[1] 11,724 [obtained as (122/365) x 37,959 for 2010] + 27,782 [obtained as (273/365 x 40,197 for 2011] = 39,506

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		