B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>
The emission reductions are realized by avoidance of emissions from the combustion of coal for the generation of steam for the internal production processes.

The energy output of the new biomass boiler has an energy output of 27 $MW_{thermal}$. Since this is below the threshold of 45MW thermal specified in methodology type I.C "*Thermal energy for the user with or without electricity*", the project is eligible for the use of this monitoring methodology.

Monitoring methodology I.C prescribes that monitoring shall consist of metering the energy produced by a sample of systems where the simplified baseline is based on the energy produced multiplied by an emission coefficient. In the project activity the amount of energy produced is measured with a steam flow meter.

The project activity emissions consist of the emissions from transportation of the biomass and emissions from the electricity consumed by the project. The emissions from transportation of the biomass are determined by multiplying the amount of trucks from each palm oil mill with an emission coefficient. The emissions from electricity usage are determined by multiplying the amount of electricity consumed by the emission factor for the Costa Rican grid, obtained from registered CDM projects.

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

(Copy this table for each data and parameter)

Data / Parameter:	**trucksi,y**
Data unit:	Number of trucks per year
Description:	number of trucks supplying the biomass originating from palm oil mill i in the year 'y'
Source of data used:	Calculation according to the load of 28 tons and total biomass consumed.
Value applied:	From 653 in 2007 up to 1,098 in 2016
Justification of the choice of data or description of measurement methods and procedures actually applied :	For the transportation of biomass trucks with a load capacity of 28 ton are used. To be conservative TransCOEFi is determined based on a full truck load.
Any comment:	

Data / Parameter:	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 applied:	Km - distance Coto 47 to Barranca 340 Km - distance Quepos 133

Justification of the choice of data or description of measurement methods and procedures actually applied :	Distance was determined by the readings of the mileage counter of a representative truck. It was crosschecked by measuring the distance on a 1:50,000 map.
Any comment:	

Data / Parameter:	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 applied:	0.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	It relies on specific truck data based on the contracted transport company's fleet of trucks.
Any comment:	

Data / Parameter:	CVdiesel
Data unit:	(MJ/kg)
Description:	Calorific value of the fuel
Source of data used:	Diesel reference value for Costa Rica.
Value applied:	45.91
Justification of the choice of data or description of measurement methods and procedures actually applied :	This reference is considered as a fixed value, and based on the fuel provider's specifications (Refinadora Costarricense de Petróleo, S.A.).
Any comment:	

Data / Parameter:	Ddiesel
Data unit:	(kg/l)
Description:	= diesel density
Source of data used:	the fuel density of diesel in Costa Rica
Value applied:	0.85
Justification of the choice of data or description of measurement methods and procedures actually applied :	National specifications for diesel fuel in Costa Rica
Any comment:	

Data / Parameter:	EFdiesel
Data unit:	(tCO_2/MJ)
Description:	emission factor diesel
Source of data used:	IPCC
Value applied:	20.2 tC/TJ x 44/12 = 74.1 tCO_2/TJ = 0.00007 tCO2/MJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	This reference comes from the latest IPCC guidelines, and has been considered as representative for the current emission reduction calculation.
Any comment:	

Data / Parameter:	**EUy**
Data unit:	GWh.
Description:	electricity consumption of baseline boiler
Source of data used:	Quotations from boiler technology provider
Value applied:	1.07
Justification of the choice of data or description of measurement methods and procedures actually applied :	baseline boiler: including a two weeks maintenance period.
Any comment:	

Data / Parameter:	**EUy**
Data unit:	GWh.
Description:	electricity consumption of project boiler
Source of data used:	Quotations from boiler technology provider
Value applied:	2.72
Justification of the choice of data or description of measurement methods and procedures actually applied :	Including a two weeks maintenance period
Any comment:	

Data / Parameter:	**EFgrid**
Data unit:	tCO2/GWh
Description:	Emission factor of the Costa Rican grid.
Source of data used:	This factor has been calculated using ICE data and available info from other sources. See Annex 3
Value applied:	62.86

Justification of the choice of data or description of measurement methods and procedures actually applied :	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".
Any comment:	

Data / Parameter:	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 applied:	78%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The efficiency is considered as a fixed value, and based on the manufacturer's information for coal.
Any comment:	

Data / Parameter:	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 applied:	80%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The efficiency is considered as a fixed value, and based on the manufacturer's information for biomass fuels.
Any comment:	

Data / Parameter:	NCVi = NCVc
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 applied:	A default value of 10,887 BTU/lb will be considered based on tests done to Colombian coal (equivalent to 25.73 TJ/kt).
Justification of the choice of data or description of	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

measurement methods and procedures actually applied :	developed by the 'Inspectorate Colombia Ltda.'.
Any comment:	

Data / Parameter:	COEFi
Data unit:	tCO2/kt
Description:	is the CO2 emission factor of the fossil fuel type i fired in the boiler in the absence of the project activity in.
Source of data used:	Reference from Colombian provider of coal
Value applied:	2.38 tCO2/t of coal
Justification of the choice of data or description of measurement methods and procedures actually applied :	Carbon percentage of the Colombian coal that would have been used is stated as 64.9%
Any comment:	

Data / Parameter:	hssi
Data unit:	Kj/kg
Description:	is the enthalpy of the saturated steam at 12 bar
Source of data used:	Set as a default value provided from saturated steam tables.
Value applied:	2782.73 Kj/kg
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is considered as a fixed value and will be used for emission reduction calculations.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Formula relevant for project activity emissions:

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

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

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

Formula relevant for the baseline:

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

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

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

No specific formulae are provided in the appendix. Paragraph 6 of this appendix states that "For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced".

In the baseline of the proposed project activity is the use of coal-fired boilers to meet the steam demand of INOLASA's plant.

The emissions related to biomass steam production are zero, as the fuel source is a renewable source of waste biomass.

Emissions arising from the construction of the project have been excluded from the project boundary. It is assumed that similar activities and related emissions – for example, installation of new boilers as older boilers are retired – would also occur in the baseline situation. It is also extremely difficult to accurately estimate the emissions arising from construction, especially transportation of materials.

Emissions related to bunker use during the maintenance period has been excluded as well. The same maintenance period would have been required in the baseline situation as well.

Emissions from biomass transportation and emissions from electricity consumption by the biomass boiler are further described in the section below.

Emissions from transportation of biomass

The project results in transport emissions from transportation of the biomass from the palm oil mills to INOLASA , for this transport diesel fueled trucks are used. The origin of each truck supplying biomass to INOLASA is recorded. For each truck load of biomass the GHG emissions are obtained by multiplying with an origin bound emission coefficient.

The emission coefficients for each Palm Oil Mill is determined by use of parameters set forth in Approved Methodology AM0025 / Version 03, paragraph "Emissions from transportation". IPCC default values for fuel consumption and emission factors may be used. The CO2 emissions from a biomass load are calculated from the quantity and the specific CO2-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'

TransCOEFi = 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)
VF_{cons} = vehicle fuel consumption in litres per kilometre (l/km)
CVdiesel = Calorific calue of the fuel (MJ/kg)
Ddiesel = diesel density (kg/l)
EFdiesel = emission factor diesel (tCO_2/MJ)

For the transportation of biomass trucks with a load capacity of 28 ton are used. To be conservative TransCOEFi is determined based on a full truck load. The trucks use 0.6 liter of diesel per kilometer[1], the calorific value of the fuel is 45.91 MJ/kg[2], the fuel density of diesel in Costa Rica is 0.85 kg/l[3] and the emission factor of the fuel is 20.2 tC/TJ[4].

Emissions from grid electricity consumption

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’
EFgrid = Emission factor of the Costa Rican grid.

The calculation of the grid’s emission factor is presented in Annex 3. The resultant value for the grid emission factor is equal to 62.86 ton CO_2eq/GWh. This low value represents the Costa Rican grid, mainly composed by hydro power generation. There are no proved fossil fuel storages in the country; still some new capacity has been added to the grid based on imported fossil fuels.

The biomass fuelled boiler of 471 KW of installed capacity is expected to operate 5796 hrs per year, including a two weeks maintenance period. This results in a total electricity consumption of 2.72 GWh per year.

Specifications and breakdown of electricity consumption can be found in annex 3.

Finally the following statement can be defined to estimate project emissions:
Average annual Project activity emissions (t CO_2/year during 7 year period) = Emissions from biomass transportation + Emissions from the consumption of grid electricity

[1] Source: truck supplier

[2] Source: Refinadora Costarricense de Petróleo, RECOPE

[3] Source: Refinadora Costarricense de Petróleo, RECOPE

[4] Source: 2006 IPCC Guidelines for National GHG inventories Table 1.3 p1.21

Baseline:
Emissions due to coal combustion
The amount of fossil fuel that would have been consumed in the absence of the project is calculated using guidance from ACM006, paragraph "Emission reductions…due to the displacement of heat"

The baseline for the GHG emissions from fossil fuel combustion in the boilers is determined by dividing the amount of generated heat during the project activity by the net calorific value of the fuel and the efficiency of the boiler. This is multiplied with a CO_2 emission factor for the displaced fossil fuel. According to:

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

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.
η_{th}	is the energy efficiency of the boiler. The energy efficiency of the boiler that would be used in absence of the project activity is based upon the manufacturer's information.
NCV_i	is the net calorific value of the fossil fuel type i per TJ/kt.
$COEF_i$	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.

The total quantity of heat generated in the project plant (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.
hss_i	is the enthalpy of the saturated steam at 12 bar (2782.73 Kj/kg set as a default value).
Fss_i	is the steam flow monitored, during year y (kg/year)

In order to quantify ex-ante emission reductions, the total quantity of heat generated in the project plant (Q_y) has been determined by forecasting the heat demand of the production process. This quantity is expected to increase by 5.9 % per year, based on the trend in energy consumption over the last three and a half years. Please find Annex 5 with the data. The maintenance period of the coal boiler in the baseline scenario has been taken into account.

IPCC default values are used to determine the CO_2 emission factor of the fossil fuel in the boiler in absence of the project activity.

Emissions caused by grid electricity consumption (coal boiler)

The project 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'
EFgrid = Emission factor of the Costa Rican grid.

The coal boiler has an intalled capacity of 185 KW and is expected to operate 5796 hrs per year, including a two weeks maintance period. This results in a total electricity consumption of 1.07 GWh per year. As it is stated above, an emission factor of 62.86 tCO_2/GWh is used for the Costa Rican grid.

Specifications and breakdown of electricity consumption can be found in Annex 3.

Leakage:
According to Appendix B, I.C., paragraph 17, leakage is to be considered if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. Since this is not the case, the proposed project activity does not quantify leakage effects.

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

>>

Table B.4

Years	**Annual estimation of emission reductions (in tonnes of CO2 e)**
2007	31,971
2008	33,854
2009	35,849
2010	37,959
2011	40,197
2012	42,567
2013	45,090
Total emission reductions (tonnes of CO_2 e)	**267,487**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	38,212

Table B.5. : Baseline emissions

Energy Balance and Baseline Emissions INOLASA												
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Energy Demand (excluding maintenance period)												
Efficiency bunker boiler	75%											
Energy content bunker C	38.39	MJ/liter										
Price bunker C	0.35	US$/liter										
Maintenance for coal or biomass boiler	2	weeks/year										
Bunker C consumption replaced		k liters	9,956	10,544	11,166	11,824	12,522	13,261	14,043	14,871	15,749	16,678
Energy demand INOLASA (wo maintenance)		GJ	275,629	291,890	309,110	327,346	346,658	367,109	388,766	411,702	435,990	461,711
Bunker C cost		k US$	3,485	3,690	3,908	4,139	4,383	4,641	4,915	5,205	5,512	5,837
Coal demand baseline												
Efficiency coal boiler	78%											
Energy content coal	25.73	MJ/kg										
Price coal (including transport)	48.07	US$/t										
Coal demand		t	13,734	14,544	15,402	16,311	17,273	18,292	19,371	20,514	21,724	23,006
Coal cost		k US$	660	699	740	784	830	879	931	986	1,044	1,106
Biomass demand project												
Efficiency biomass boiler	80%											
Energy content Palm Kernel Hulls (dry base)	22.7	MJ/kg										
Energy content Empty Fruit Bunches	17.9	MJ/kg										
Humidity PKH	17%	H2O										
Price PKH and EFB from Palma Tica Quepos	50	US$/t										
Price PKH from Palma Tica Coto	1	US$/t										
Palm kernel hull demand (wet base)		t	18,287	19,365	20,508	21,718	22,999	24,356	25,793	27,314	28,926	30,632
PKH supply from Coto		t	12,751	13,864	15,043	16,365	17,646	19,003	19,875	21,325	22,528	23,140
PKH supply from Palma Tica		t	5,536	5,501	5,465	5,353	5,353	5,353	5,353	5,353	5,353	5,353
EFB supply from Palma Tica		t	0	0	0	0	0	0	595	670	1,100	2,252
Biomass cost		k US$	290	289	288	284	285	287	317	322	345	403
Baseline emissions												
Baseline emissions coal combustion												
Emission factor coal	2.38	tCO2/t coal										
Coal demand		t	13,734	14,544	15,402	16,311	17,273	18,292	19,371	20,514	21,724	23,006
Emissions from coal combustion		tCO2	32,711	34,641	36,685	38,849	41,141	43,568	46,138	48,860	51,743	54,795
Baseline emissions electricity use coal boiler												
Emission factor Costa Rican grid	62.86	tCO2/GWh										
Operating hours per year*		hrs	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23
Electricity consumption		GWh	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Emissions from electricity use coal boiler		tCO2	67.09	67.09	67.09	67.09	67.09	67.09	67.09	67.09	67.09	67.09
Total baseline emissions		tCO2	32,778	34,708	36,752	38,916	41,208	43,635	46,205	48,927	51,810	54,862
Total baseline emissions (10 year period)		tCO2	429,802									

* Excluding maintenance period of two weeks

Project activity emissions

Table B.6. : project activity emissions

			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Electricity consumption biomass boiler												
Emission Factor Costa Rican grid	tCO2/GWh	62.86										
Operating hours per year*	hrs		5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23	5,769.23
Electricity consumption	GWh		2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72
Total emissions from electricy consumption	tCO2/year		171	171	171	171	171	171	171	171	171	171
* Excluding maintenance period of two weeks												
Transportation of Palm Oil Mill biomass												
Truck capacity	tonnes/year	28										
Km - distance Coto 47 to Barranca (two ways)	km/year	680										
Km - distance Quepos (two ways)	km/year	266										
VF - vehicle fuel consumption	l/km	0.60										
CV - calorific value of fuel	MJ/kg	45.91										
D - fuel density	kg/l	0.85										
EF - emission factor of fuel	tCO2/MJ	0.00007										
Load - Coto 47 to Barranca	tonnes/year		12,751	13,864	15,043	16,365	17,646	19,003	19,875	21,325	22,528	23,140
Load - Quepos to Barranca	tonnes/year		5,536	5,501	5,465	5,353	5,353	5,353	5,948	6,023	6,453	7,605
Total distance per year	km		362,254	388,960	417,249	448,285	479,401	512,353	539,172	575,107	608,404	634,214
Total emissions from transportation biomass	tCO2/year		630	676	725	779	833	890	937	999	1,057	1,102
Transportation of residual ash from the biomass boiler to CEMEX plant in Colorado de Abangares												
Truck capacity	tonnes/year	20										
Km - distance to Colorado de Abangares (two ways)	km/year	120										
VF - vehicle fuel consumption	l/km	0.60										
CV - calorific value of fuel	MJ/kg	45.91										
D - fuel density	kg/l	0.85										
EF - emission factor of fuel	tCO2/MJ	0.00007										
Load - Barranca to Colorado de Abangares	tonnes/year		684	684	684	684	684	684	684	684	684	684
Total distance	km/year		4104	4104	4104	4104	4104	4104	4104	4104	4104	4104
Total emissions from transportation ash	tCO2/year		7	7	7	7	7	7	7	7	7	7
Total project activity emissions	tCO2/year		807	854	903	957	1,011	1,068	1,115	1,177	1,235	1,280
Total project activity emissions (10 years)												
Total emissions from electricity consumption (10 years)	tCO2	8,629										
Total transport emissions (10 years)	tCO2	8,700										
Total project activity emissions (10 years)	tCO2	17,329										

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	Fss_i
Data unit:	kg/yr
Description:	is the steam flow monitored, during year y
Source of data to be used:	Project owner
Value of data	
Description of measurement methods and procedures to be applied:	m(1) and c(2) (1) Steam output flow meter (2) Flow of steam in tonnes/yr is converted to TJ by calculation Recorded monthly and summed for each year.
QA/QC procedures to be applied:	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. (see table in Annex 4).
Any comment:	

Data / Parameter:	$trucks_{i,y}$
Data unit:	Number
Description:	No. of trucks + origin
Source of data to be used:	Project owner
Value of data	
Description of measurement methods and procedures to be applied:	The origin of each truck arriving with biomass is recorded
QA/QC procedures to be applied:	The recorded data will be crosschecked on a regular basis with the invoices from the transportation service provider.
Any comment:	

Data / Parameter:	EU_y
Data unit:	GWh/year
Description:	Electricity consumption biomass boiler in the project scenario
Source of data to be used:	Project Owner
Value of data	
Description of measurement methods and procedures to be	Measured and recorded monthly

applied:	
QA/QC procedures to be applied:	The kWh meter will be calibrated periodically by the supplying firm
Any comment:	

Note: In Annex 4 a detailed overview is presented on accuracy level, calibration procedure, quality assurance and quality control of the monitoring process.

B.7.2 Description of the monitoring plan:

>>
Title of monitoring methodology: "*Thermal energy for the user with or without electricity*", Type I.C in Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities, Version 10_Scope 1_May 2007.

The energy output of the new biomass boiler has an energy output of 27 $MW_{thermal}$. Since this is below the threshold of 45MW thermal specified in methodology type I.C "*Thermal energy for the user with or without electricity*", the project is eligible for the use of this monitoring methodology.

Monitoring methodology I.C prescribes that monitoring shall consist of metering the energy produced by a sample of systems where the simplified baseline is based on the energy produced multiplied by an emission coefficient. In the project activity the amount of energy produced is measured with a steam flow meter.

The project activity emissions consist of the emissions from transportation of the biomass and emissions from the electricity consumed by the project. The emissions from transportation of the biomass are determined by multiplying the amount of trucks from each palm oil mill with an emission coefficient. The emissions from electricity usage are determined by multiplying the amount of electricity consumed by the emission factor for the Costa Rican grid, obtained from registered CDM projects.
INOLASA is responsible for the operation of the biomass boiler and administration of the data, also for the costs of the operation and maintenance of the boiler's control system.

The commissioning of the boiler is done by the technology provider PETRA. INOLASA will be responsible for the installed technology. INOLASAs personnel will be trained by PETRA that afterwards will support INOLASA's technical team. A training plan is carried out by PETRA during the first weeks of operation.

INOLASA will be in charge of monitoring the performance of the project activity related to carbon emission. Since no leakeage is expected from the project activity, the emission reductions will be monitored by installing the adequate and calibrated meters according to the standards of Costa Rica.
The procedures for data collection and monitoring management will include:

- Management structure for monitoring
    - Monitoring team
    - Changes in monitoring team
- Introduction to baseline calculations
- Project Management calculations:

  - Data collection for monitoring
  - Data record and storage
  - Emission reduction calculation
- Procedures
  - Monitoring
  - Calibration
- Reporting
  - Monitoring reporting
  - Regular manual update

Internal Auditing: Procedures for internal auditing will be implemented in order to assure that the monitoring methodology is being performed in the correct manner, describing the non-conformities and proposing correctives measures when needed. The person in charge of following these auditing procedures will be determined with the monitoring team.
Since the monitoring equipment is the same as the Operation equipment, the maintenance will be performed in the same way. Specific training for the Monitoring Team will be provided prior to the boiler's operation.

Annex 4

MONITORING INFORMATION

Calibration and Quality Assurance monitoring equipment

Table 5

	Equipment or method (e.g. signed lists) used for measuring (manufacturer if possible)	Continuous or sample	Will data be checked by a third entity?	Accuracy level	Calibration procedure	Quality assurance	Quality control
Heat generation							
Steam generated (tonnes/hour)	*Steam flow indicator and recorder a DP transmitter c/w square root extractor 0-100 kPa, 200 mm steam flow orifice plate, SIEMENS SITRANS pressure transmitter*	Continous	STEAM BOILER INSPECTOR AUTHORIZED BY MINISTERIO DEL TRABAJO	*±5% error*	As indicated by manufacturer	Provided by Supplier PETRA BOILERS SDN.BHD.	*calibration and Maintenance by Inolasa Oficials*
Electricity consume plant + auxiliary systems + biomass management	*ICE.(Instituto Costarricense de Electricidad) KWH meter site 132181200208 - #0003171, Pegasys data adquisition software*	Continous	I.C.E.	N.A.	As indicated by manufacturer	Provided by Power Supplier	*calibration and Maintenance by suppliers*