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

CONTENTS

* As contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

SECTION A. General description of the project activity

A.1. Brief description of the project activity

1. This project consists of increasing the efficiency in the Bagasse cogeneration facility at Monte Rosa, a Nicaraguan sugar Mill and thereby reducing GHG emissions by displacing the fossil fuel consumption for electricity generation.
2. The equipments installed at MRBCP, prior and after the start of the project activity, are presented in table 1, below:

Chronogram	**Active / In Operation**			**Deactivated**	Stand-By
Before the Expansion Plan	One 3 MW Backpressure **turbo generator 2** (TG)	One 2.5 MW backpressure turbo generator (TG)	One 1.5 MW backpressure turbo generator (TG)		
	One 13.78 bar **boiler 1** (36 t/h)	One 13.78 bar **boiler 2** (22.67 t/h)	One 13.78 bar boiler (11.33 t/h)		
Phase 1 2001-2002	One 15 MW backpressure extraction turbo generator (TG) May - Dec 2001	One 3 MW Backpressure **turbo generator 2** (TG)		One 2.5 MW backpressure turbo generator (TG) May – Jun 2002	Two 4 MW backpressure turbo generator (1,6) (TG) Jun – Dec 2002
	One 62 bar **boiler 3** (120 t/h) Jan - Dec 2001			One 1.5 MW backpressure turbo generator (TG) May – Jun 2002	
	One 13.78 bar **boiler 1** (36 t/h)	One 13.78 bar **boiler 2** (22.67 t/h)	One 13.78 bar boiler (11.33 t/h)		
Phase 2 2004	One 16.5 MW condensing **turbo generator 4**. Jun-Dec 2004	One 20 MW extraction **turbo generator 3** TG (backpressure). Jun-Nov 2004	One 20 MW extraction **turbo generator 5** TG (backpressure) Jun-Nov 2005	One 15 MW backpressure extraction turbo generator (TG) May - 2005	Two 4 MW backpressure **turbo generator (1,6)** (TG)
	One 62 **boiler 3** (120 t/h)	One 62 **boiler 4** (150 t/h) Oct 2003 - Nov 2004		One 13.78 bar boiler (11.33 t/h)	One 3 MW Backpressure **turbo generator 2** (TG)
					One 13.78 bar **boiler 1** (36 t/h)

					One 13.78 bar **boiler 2** (22.67 t/h)
Phase 3 (validation Period)	One 16.5 MW condensing **turbo generator 4**.	One 20 MW extraction **turbo generator 3** TG (backpressure).	One 20 MW extraction **turbo generator 5** TG (backpressure).	One 15 MW backpressure extraction turbo generator (TG) May - 2005	Two 4 MW backpressure **turbo generator (1,6)** (TG)
	One 62 **boiler 3** (120 t/h)	One 62 **boiler 4** (150 t/h)		One 13.78 bar boiler (11.33 t/h)	One 3 MW Backpressure **turbo generator 2** (TG)
					One 13.78 bar **boiler 1** (36 t/h)
					One 13.78 bar **boiler 2** (22.67 t/h)

Table 1 - Equipments installed in the cogeneration plant prior and after the start of the Monte Rosa bagasse cogeneration project activity

3. The project has the following relevant dates for just active equipments:

Equipment	Capacity	Commissioning	Operation Start
Boiler 1	13.78 bar – 36 t/h	-	-
Boiler 2	13.78 bar – 22.67 t/h	-	-
Boiler 3	62 Bar - 120 t/h	11/2001	12/2001
Boiler 4	63.3 bar - 150 t/h	11/2004	12/2004
Turbo generator 1	4 MW	09/2002	11/2002
Turbo generator 2	3 MW	09/1999	11/1999
Turbo generator 3	20 MW	06/2004	11/2004
Turbo generator 4	16.5 MW	06/2004	12/2004
Turbo generator 5	20 MW	06/2005	11/2005
Turbo generator 6	4 MW	09/2002	11/2002

Table 2 - Equipment list with commissioning and operation start data

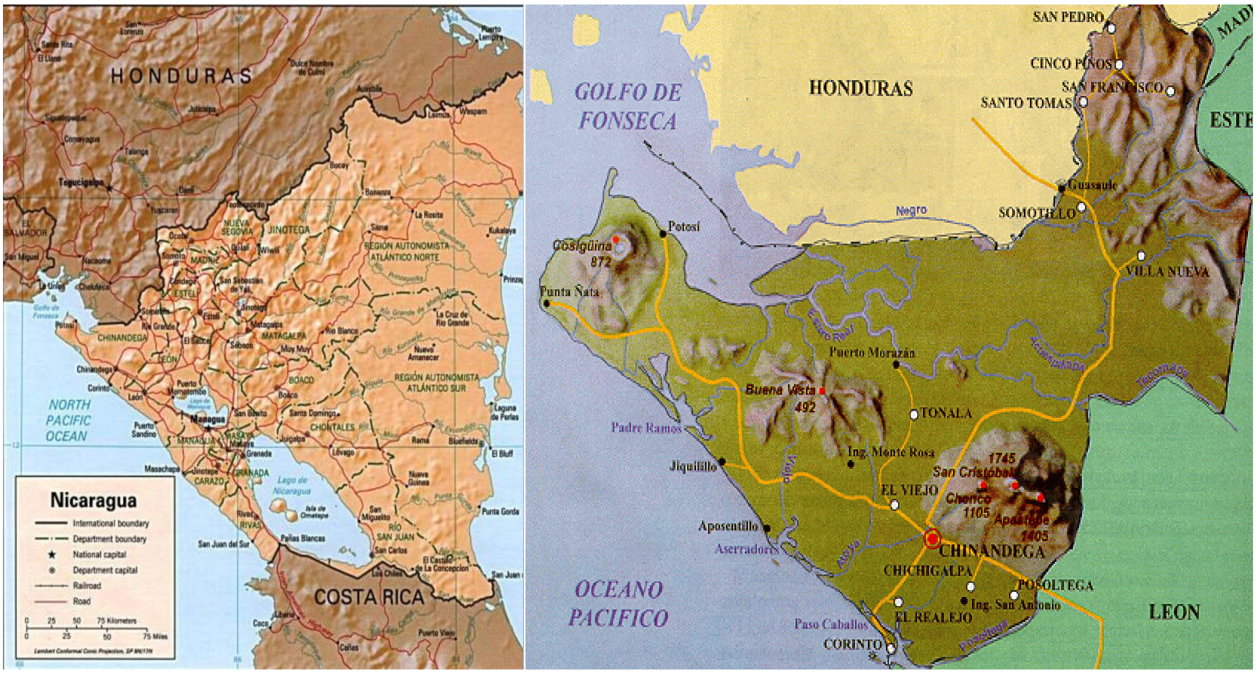
4. Total emission reductions achieved in this monitoring period is **104,447 tCO_2.**

A.2. Project Participants

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Nicaragua (host)	Monte Rosa S.A. (Nicaraguan private entity)	No
Brazil	Econergy Brasil Ltda. (Brazilian private entity)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.3. Location of the project activity:

El Viejo City is located in the northwest of the country. The MRBCP is located in the site of the Monte Rosa Sugar mill, five km away from El Viejo City.
Geographical coordinates: (Latitude 12.700003°, Longitude -87.233336°) [1].



Picture 1 – Monte Rosa Sugar Mill site overview Geographical position of the city of El Viejo

A.4. Technical description of the project

The project uses the steam-Rankine cycle, a world-wide spread technology for generating megawatt (MW) levels of electricity from biomass. The cycle consists of direct combustion of biomass in a boiler to generate steam, which is then expanded through a turbine. Most steam cycle plants are located at industrial sites, where the waste heat from the steam turbine is recovered and used for meeting industrial

[1] Geographical coordinates were changed from degrees, minutes and seconds (as was indicated in the PDD) to decimal degrees. (12º 42’ 00”; -87º 14’ 00”)

process heat needs. Such combined heat and power (CHP), or cogeneration systems provide greater levels of energy services per unit of biomass consumed than systems that generate electric power only.

The steam-Rankine cycle involves heating pressurized water; with the resulting steam expanding to drive a turbine-generator and then condensing back to water for partial or full recycling to the boiler. A heat exchanger is used in some cases to recover heat from flue gases to preheat combustion air and a de-aerator must be used to remove dissolved oxygen from water before it enters the boiler.

Steam turbines are designed as either "backpressure" or "condensing" turbines. CHP applications typically employ backpressure turbines, wherein steam expands to a pressure that is still substantially above ambient pressure. It leaves the turbine still as a vapour and is sent to satisfy industrial heating needs, where it condenses back to water. It is then partially or fully returned to the boiler. Alternatively, if process steam demands can be met using only a portion of the available steam, a condensing-extraction steam turbine (CEST) might be used. This design includes the capability for some steam to be extracted at one or more points along the expansion path for meeting process needs. Steam that is not extracted continues to expand to sub-atmospheric pressures, thereby increasing the amount of electricity generated per unit of steam compared to the backpressure turbine. The non-extracted steam is converted back to liquid water in a condenser that utilizes ambient air and/or a cold water source as the coolant.

The steam-Rankine cycle uses different boiler designs, depending on the scale of the facility and the type of the fuel being used. The initial pressure and temperature of the steam, together with the pressure to which it is expanded, determine the amount of electricity that can be generated per kilogram of steam. In general, the higher the peak pressure and temperature of the steam, the more efficient, sophisticated, and costly the cycle is.

Quantity	Boiler Details	Steam Generation Capacity	Manufacturer	Model
1	62 bar	120 t/h	CALDEMA	AUP-405GI-PSE
1	62 bar	150 t/h	SERMATEC	VS-5150/2

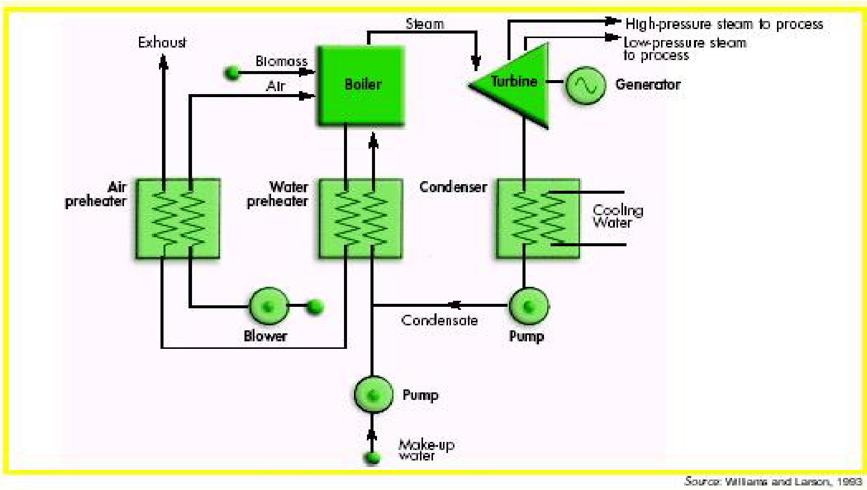
Table 3 – Boilers list

Quantity	Nominal Capacity	Manufacturer	Model
2	22.79 MW - backpressure	TGM	TME 25000
1	16.4 MW - condensing	TGM	TMC 25000
2	4 MW	GMB	SG 49/4/6
1	3 MW	Westinghouse	-

Table 4 – Turbines list

Quantity	Generator Details	Manufacturer	Model
1	20 MW	WEG	SSW1120
1	16.5 MW	WEG	SSW1000
1	20 MW	GEVISA	271R560G1
2	4 MW	VEB	DGK 1538-2
1	3 MW	Westinghouse	IS3IP597

Table 5 – Generators list



Picture 2 – Schematic diagram of a biomass-fired steam-Rankine cycle for cogeneration using a condensing-extraction steam turbine

Picture 3 – MRBCP panoramic photo

Picture 4 – MRBCP Cogeneration sector

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

- ACM0006 ("Consolidated methodology electricity generation from biomass residues") version 09;
    - ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources") version 10;
    - "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" version 04;
    - "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 02;
    - "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01;
    - "Combined tool to identify the baseline scenario and demonstrate additionality" version 02.2;
- "Tool for the demonstration and assessment of additionality" version 05.2;
- "Tool to calculate the emission factor for an electricity system" version 02.

A.6. Registration date of the project activity:

The MRBCP was registered on 22/06/2006 and the valid PDD or this crediting period was registered on 22/11/2010 (Revalidation).

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

The crediting period chosen is seven years, renewable for one more 7 years periods.

The crediting period of MRBCP started on 01/03/2002. The first crediting period finished on 28/02/2009. The crediting period was renewed for more 7 years, and the currently (second) crediting period started 01/03/2009 and will finish 29/02/2016.

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

The contact information of the person responsible for completing the report (CDM-MR) is:

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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

1. The starting date of project activity is 01/03/2002. The project activities achieved in each phase were explained in A.1, Table 1.
2. The plant has generated energy for 266 days along the harvest time, and just 10 interruption days due to maintenance were observed during this time interval. Besides these events, during 08/May/2009 to 16/NOV/2009 and 12/JUN/2010 to 30/JUN/2010 the plant was not operational due to the non-crop season.
3. There are no events or situations that occurred during the monitoring period which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

The PDD registered in the UNFCCC did not suffer reviews. Also, no one changes occurred in the monitoring plan. So, the monitoring plan approved with PDD is the currently version used in the MRBCP.

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

There is no revision of the monitoring plan for the project activity

B.4. Notification or request of approval of changes

There is no notification or request of approval of changes from the project activity as described in the registered CDM-PDD.

SECTION C. Description of the monitoring system

Monitoring processes must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reduction for the proposed project is monitored and reported.

- **Data Collection**:

The net quantity of electricity generated in the project plant was calculated by means of the subtraction of the energy consumed by auxiliary equipments to the monitored energy in the generators. The energy meters installed at the generators and the software that controls the operation of the power plant.
The entrance and exit of surplus bagasse in the boilers are monitored using weigh meters. During this monitoring period there was no use of straw, but the possibility is still available for future monitoring periods.

The bagasse produced in the mill can also be determined using the formula below (in order to cross-check the bagasse weighed):

$$\%bagasseinsugarcane = \frac{\%fiberinsugarcane}{(100 - \left(moistureofbagasse + \left(\frac{sacaroseinbagasse}{purityoftheresidualjuice} \right) * 100 \right)) * 100}$$ [2]

$$bagasse_{moistmass} = sugarcaneprocessed * \%bagasseinsugarcane$$

$$bagasse_{drymass} = bagasse_{moistmass} * (1 - moisturecontent_{bagasse})$$

The moisture content of biomass residue (%) was continuously monitored by Monte Rosa laboratory and used to determine the quantity of dry biomass.

The Net Calorific Value (NCV) of biomass residues was monitored by Monte Rosa laboratory, at least every six months, taking at least three samples for each measurement. Actually this parameter is monitored weekly and presented in the harvest bulletins.

Environmental impacts were monitored according to the requirements of the environmental license N° 06-2005.

- **Equipment Calibration:**

The metering equipments are periodically calibrated according to the manufacturer specification and/or sector regulation. All records were documented and archived in soft and hard copies, as is showed in table 7.

Bascules calibration
The Bascule calibration is been made for Monte Rosa every 15 days through weight patterns. These weight patterns are calibrated annually by LANAMET, which is a qualified laboratory in metrology.

Energy meters calibration
All energy meters are calibrated each two years owing to sector regulations of the public entity ENATREL.

Moisture meter calibration
The moisture meter calibration is requested for Monte Rosa annually. This calibration was made by IPROCEM, which is a recommended laboratory in Nicaragua for Sartorius equipments.

POL meter calibration
The POL meter calibration is requested for Monte Rosa annually. This calibration was made by ORGOMA, which is a recommended laboratory in Nicaragua for Rudolph equipments.

Monte Rosa has evidence of all equipments calibrations, which are available for whom concern.

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[2] Source: Manual de azúcar de caña: para fabricantes de azúcar de caña y químicos especializados; James C. P. Chen; Editorial Limusa, S.A. de C.V; 1999.

- **Data Recording:**

Data collected was recorded into an electronic spreadsheet administered by the manager of Monte Rosa CDM project and stored at Monte Rosa server.

- **Data Archives:**

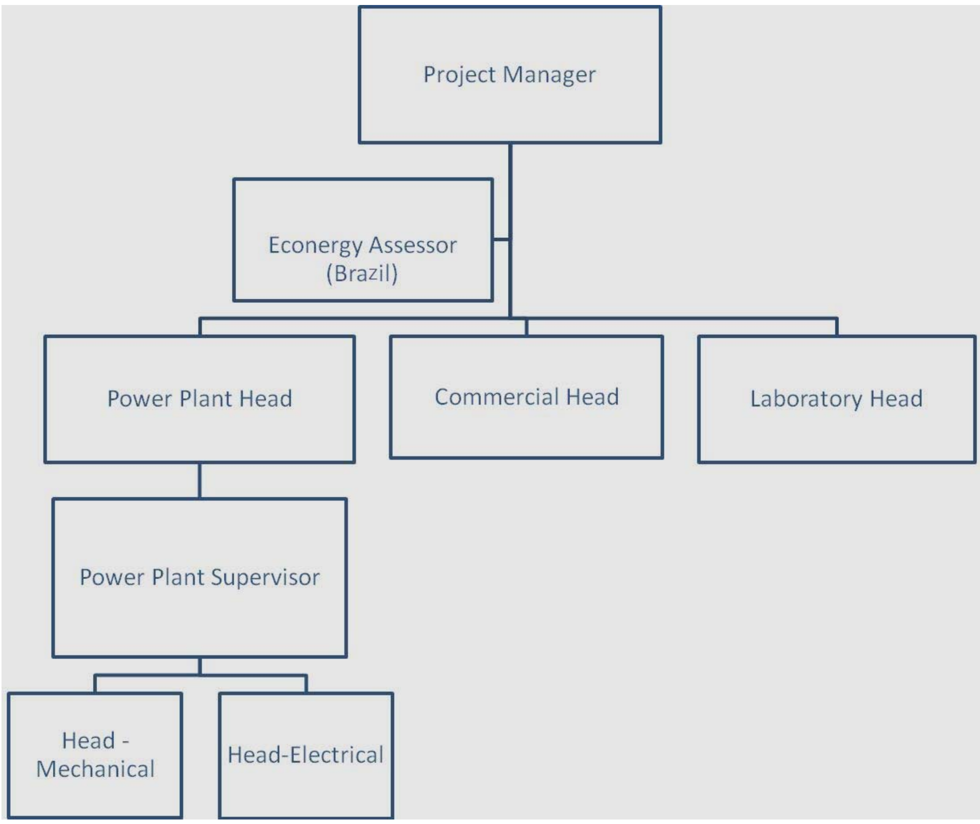
Data reports were archived and kept at least for two years after the end of the crediting period or the last issuance of CERs for this proposed project activity, whatever occurs later. There are two types of reports in Monte Rosa. One of them is made for the laboratory head and other one for the Power Plant Head as seem in the picture 5 structure. These reports are made for each crop day.

In order to guaranty quality assurance, the monitoring staff assessed the appropriateness of the monitoring processes, including:

- Data collection procedures;
- Quality of metering / calibration method;
- General quality and accuracy of the collected data.

All people that participate in the monitoring process is suitably qualified and trained in the operation and maintenance of the plant, due to the fact that MRBCP has ISO9001 accreditation. They also received instructions of the monitoring plan of MRBCP.

Organizational structure



Picture 5 – Organizational structure of CDM projects in MRBCP

Roles and Responsibilities

Designation	Responsibility
Project Manager	Overall responsibility of CDM Project. 1. Ensure the adequate resources for the operation of the project. 2. Take decision of hiring an external consultancy to assist MRBCP during the project. 3. Communicate to everyone involved with the project the goals, objectives and results of the project operation. 4. Establish process necessary objectives of the project to achieve planned results. 5. Review results of conducted internal and external audits. 6. Continuous assessment of process efficiency and correct functioning. 7. Taking decisions to ensure the correct decisions in order to improve the project efficiency.
Econergy Assessor	Support in elaboration of CDM projects (Project design document, monitoring report and CERs calculation) and verification process. • Facilitator for the efforts of the CDM Project. • Monte Rosa adviser on methodology updates for meet UNFCCC requirements. • Keeping Monte Rosa informed on CDM developments.
Power Plant Head	Monitoring of various operations at the power plant and keeping all generation records. 1. Responsible for electric energy generations to satisfy the domestic demand during crop season and sell of the energy surplus to the market energy agents. 2. Elaborate and execute maintenance plants during no crop season and guaranteed the correct functioning of the generation power plant. 3. Planning system records (evidence) needed to demonstrate the results of the operation of the process. 4. Ensure that they are recovering and archiving all the reading of the power meters.
Commercial Head	Monitoring of CERs obtained within monitoring period
Laboratory Head	Monitoring of various chemical properties readings of sugar cane and bagasse and keeping all laboratory records. Responsible to check the validity of calibrating certificates for laboratory equipments.

Power Plant Supervisor	Taking readings of Power generations. Responsible to check the validity of calibrating certificates for electrical and mechanical measure equipment.
Head-Electrical	Monitoring of various instruments used in measurements of electrical variables.
Head-Mechanical	Monitoring of various instruments used in measurements of energy variables.

Table 6 – Roles and professionals

Emergency procedures

The plant maintains the laboratory reports in both hard and soft copy formats at Monte Rosa´s server. The reports could be generated again whether they are required from the laboratory system. The Monte Rosa server receives a daily revision for avoid malfunctions or information losses.

Process	Variable	Documentation	Type of registry	Disponibility of the information	Notes
Laboratory	Sugar cane fiber	1LA-R026	Hard copy	Hard and Soft copies	Three times per day
	Bagasse moisture	1LA-R015	Hard copy	Hard and Soft copies	
	Bagasse Pol	1LA-R011	Hard copy	Hard and Soft copies	
	Residual juice POL	1LA-R011	Hard copy	Hard and Soft copies	
	% brix Residual juice	1LA-R011	Hard copy	Hard and Soft copies	
	Residual juice purity	1LA-R011	Hard copy	Hard and Soft copies	
	NCV	1LA-R027	Hard copy	Hard and Soft copies	The NCV is determined in laboratory with the simple taken at mill 5 output
	GCV	1LA-R027	Hard copy	Hard and Soft copies	
	Weight measurement for bagasse at mill 5 output (A)	1LA-R054	Hard copy	Hard and Soft copies	
	Weight measurement for claimed bagasse (B)	1LA-R054	Hard copy	Hard and Soft copies	
	Weight measurement for refused bagasse (C)	1LA-R054	Hard copy	Hard and Soft copies	
	% Bagasse obtained from sugar cane vs Weight measurement for bagasse at mill 5 output		Excel Spreadsheet	Soft copy	The daily values reported by automation area are compared with the values determined by the laboratory
Energy	Meter calibration	Calibrated and certificated by ENATREL	Hard copy	Hard copy	Each two years
	Electric generation for each turbine	6EN-R004	Hard Copy	Hard and Soft copies	These values are avaliable in the daily energy report
Automation	Bagasse weight control	Excel spreadsheets	Soft copy	Soft copy	All information is reported to the laboratory each day at 6 am, indicating the bagasse weight for different conditions (Generated, claimed, refused and fired)
	Calibration of bagasse scales	Register 6AU-R025	Hard Copy	Hard Copy	Calibrations are performed every 15 days, through the

				plant stops
Calibration of patterns for scale calibration	Calibrated and certified by LANAMET (National Laboratory of Metrology)	Hard copy	Hard and Soft copies	The pattern´s calibration take place annually

Table 7 – Emergency procedures for measured information and calibration certificates

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:	$EF_{grid,2005-2007}$
Data unit:	tCO_2 / MWh
Description:	CO_2 emission factor for the Nicaraguan grid electricity
Source of data used:	Calculated
Value applied:	0.7124
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data will be archived electronically and according to internal procedures, until 2 years after the end of the crediting period.
Any comment:	Calculated as weighted sum of the OM and BM emission factors, as explained in section B.6.3. and fixed for the second crediting period.

Data / Parameter:	$\varepsilon_{el,reference\ retrofit\ plant}$
Data unit:	-
Description:	Average net energy efficiency of electricity generation in the reference power plant after the retrofit that would take place in the absence of the project activity.
Source of data used:	Calculated
Value applied:	4.1 %
Justification of the choice of data or description of measurement methods and procedures actually applied :	The efficiency was calculated as described in section B.4, as the efficiency that would apply for the Monte Rosa mill in the baseline scenario. There is no available source of information in the respective industry sector.
Any comment:	Applicable to scenario 19

D.2. Data and parameters monitored

Data / Parameter:	$EG_{project\ plant,y}$
Data unit:	MWh/yr
Description:	Net quantity of electricity generated in the project plant during the year y
Measured /Calculated /Default:	Measured and Calculated
Source of data:	Monte Rosa
Value(s) of monitored parameter:	Various: Values in MWh **2009***: 106,141 **2010**: 117,528
Indicate what the data are used for (Baseline/ Project/ Leakage	Baseline emissions

emission calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Energy meter, Calibration frequency: once in 2 years **Serial No.** | **Accuracy Class** | **Calibration date** | **Valid until** PQ-0108A043-03 | 0.2% | 21/12/2009 | 21/12/2011 PT-0903A432-01 | 0.2% | 21/12/2009 | 21/12/2011 PS-0407A141-01 | 0.2% | 24/02/2009 | 24/02/2011 PQ-0406A208-03 | 0.2% | 25/02/2009 | 25/02/2011 PQ-0409A042-03 | 0.2% | 29/02/2009 | 29/02/2011
Measuring/ Reading/ Recording frequency:	The total generated energy is recorded by the energy meters and the total value is presented daily in every crop bulletin. This is not yet the net quantity of electricity.
Calculation method (if applicable):	On the other hand, the auxiliary equipments consumption is estimated by Monte Rosa Ingenio professionals for the whole monitoring period. In order to do that, the net quantity of electricity is calculated by subtraction of this estimated energy to the accumulated measured energy in the whole monitoring period.
QA/QC procedures applied:	This is crosschecked with the period energy balance based on the NCV and quantity of biomass utilised in the project activity.

Data / Parameter:	$BF_{k,y}$
Data unit:	tons of dry matter
Description:	Quantity of biomass residue type k combusted in the project plant during the year *y*
Measured /Calculated /Default:	Measured and calculated
Source of data:	Monte Rosa: Mill output
Value(s) of monitored parameter:	Various: Bagasse: Dry tons **2009** | **2010** 161,032 | 187,604 Straw: Along the conducted monitoring period there was not straw combustion
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Bascule, Calibration Frequency: 15 days. Serial No. | Accuracy Class | Calibration 131246-01A-INTE | ±0.002 mV/V | Continuously 131106-02B-INTE | 0.02% | Continuously 131106-02A-INTE | 0.02% | Continuously
Measuring/ Reading/ Recording frequency:	Continuously along the production process. The day accumulated is recorded in the crop bulletin.
Calculation method (if applicable):	The quantity of biomass residue consumed was directly measured in dry base, using weigh meters. The moisture content is used to determine the quantity of water contained in this bagasse, and subtracted in order to calculate the dry bagasse weight.
QA/QC procedures	Croschecked with the quantity of processed sugar cane.

applied:	

Data / Parameter:	NCV_k
Data unit:	GJ/ton of dry matter
Description:	Net calorific value of biomass residue type k
Measured /Calculated /Default:	Measured
Source of data:	Monte Rosa Laboratory
Value(s) of monitored parameter:	Bagasse: 19.40
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Isoperibol bomb Calorimeter. Calibration: Manufacturer specification. Serial No.: 774-208-150; Accuracy class: ±9 calories/gram
Measuring/ Reading/ Recording frequency:	Measure the NCV based on dry biomass. Monitoring of this parameter is made weekly.
Calculation method (if applicable):	-
QA/QC procedures applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory). If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass.

Data / Parameter:	Moisture content of the biomass residues
Data unit:	% water content
Description:	Moisture content in the bagasse
Measured /Calculated /Default:	Measured
Source of data:	Monte Rosa
Value(s) of monitored parameter:	Bagasse: 49.29% (from 2009 to 2010 crop seasons)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Precision weight meter, Calibration frequency: Annual Serial No: TE3102S; Accuracy class: 0.006 g; Calibration date: 30/08/2010; Valid until: 30/08/2011
Measuring/ Reading/ Recording frequency:	Laboratory measuring for each crop day
Calculation method (if applicable):	-
QA/QC procedures	Check the consistency of the measurements by comparing the measurement

applied:	results with measurements from previous years, relevant data sources (e.g. values in the literature). If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements.

Data / Parameter:	$\varepsilon_{el,project\ plant,y}$
Data unit:	ratio
Description:	Average net efficiency of electricity generation in the project plant in year y
Measured /Calculated /Default:	Calculated
Source of data:	Monte Rosa
Value(s) of monitored parameter:	Various: This value was calculated for the monitoring period: 11.90%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	This value is calculated using measured information ($EG_{project\ plant,y}$, NCV_k, $BF_{k,y}$), by means the following equation: $\varepsilon_{el,project\ plant,y} = \frac{EG_{project\ plant,y}}{\sum_k NCV_k \cdot BF_{k,y}}$
QA/QC procedures applied:	Check consistency with the previous monitoring reports.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The project activity mainly reduces CO_2 emissions through substitution of power generation with fossil fuels by energy generation with biomass residues. A general formula of the emission reduction calculation is shown below:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

Where:

ER_y = Emissions reductions of the project activity during the year *y* (tCO_2/yr);
$ER_{electricity,y}$ = Emission reductions due to displacement of electricity during the year *y* (tCO_2/yr);
$ER_{heat,y}$ = Emission reductions due to displacement of heat during the year *y* (tCO_2/yr);
$BE_{biomass,y}$ = Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2e/yr);
PE_y = Project emissions during the year *y* (tCO_2/yr);
L_y = Leakage emissions during the year *y* (tCO_2/yr).

The emission reductions due to displacement of heat is assumed as zero ($ER_{heat,y}$=0) because the thermal efficiency of the project plant is similar compared with the thermal efficiency of the reference plant considered in baseline scenario.

As $ER_{heat,y}$ can be estimated as zero, according with ACM0006 version 09, the variables $Q_{project\ plant,\ y}$ (net quantity of heat generated from firing biomass in the project plant), ε_{boiler} (Average net energy efficiency of heat generation in the boiler that is operated next to the project plant) do not need to be monitored on the project activity.

The baseline emissions due to uncontrolled burning or decay of the biomass residues are zero ($BE_{Biomass,y}$ = 0), since in this case the biomass residues would not decay or be burnt in the absence of the project activity.

Emission reductions due to the displacement of electricity are calculated by multiplying the net quantity of increased electricity generated with biomass residues as a result of the project activity (EG_y) with the CO_2 baseline emission factor for the electricity displaced due to the project ($EF_{electricity,y}$), as follows:

$$ER_{electricity,y} = EG_y \cdot EF_{electricity,y}$$

Where:

$ER_{electricity,y}$	=	Emission reductions due to displacement of electricity during the year *y* (tCO_2/yr);
EG_y	=	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year *y* (MWh);
$EF_{electricity,y}$	=	CO_2 emission factor for the electricity displaced due to the project activity during the year *y* (tCO_2/MWh).

The emission factor for the displacement of electricity should correspond to the grid emission factor ($EF_{electricity,y} = EF_{grid,y}$) and $EF_{grid,y}$ is determined in section B.6.3.

According to scenario 19, EG_y is determined based on the average efficiency of electricity generation in the reference plant (after retrofit) with a lower efficiency of electricity generation than with the retrofit in the project activity ($\varepsilon_{el,baseline\ plant} = \varepsilon_{el,reference\ retrofit\ plant}$) and the average net efficiency of electricity generation in the project plant after project implementation $\varepsilon_{el,project\ plant,y}$, as follows:

$$EG_y = EG_{project\ plant,y} \cdot \left(1 - \frac{\varepsilon_{el,baseline\ plant}}{\varepsilon_{el,project\ plant,y}}\right)$$

Where:

EG_y	=	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year *y* (MWh);
$EG_{project\ plant,y}$	=	Net quantity of electricity generated in the project plant during the year *y* (MWh);
$\varepsilon_{el,\ baseline\ plant}$	=	Average efficiency of electricity generation in the baseline plant ($MWh_{el}/MWh_{biomass}$);
$\varepsilon_{el,project\ plant,y}$	=	Average efficiency of electricity generation in the project plant ($MWh_{el}/MWh_{biomass}$).

The average net efficiency of electricity generation in the project plant ($\varepsilon_{el,project\ plant,y}$) should be calculated by dividing the electricity generation during the year *y* by the sum of biomass residue, expressed in energy units, as follows:

$$\varepsilon_{el,project\ plant,y} = \frac{EG_{project\ plant,y}}{\sum_k NCV_k \cdot BF_{k,y}}$$

Where:

$\varepsilon_{el,project\ plant,y}$	=	Average net energy efficiency of electricity generation in the project plant;
$EG_{project\ plant,y}$	=	Net quantity of electricity generated in the project plant during the year *y* (MWh);

$BF_{k,y}$	=	Quantity of biomass residue combusted in the project plant during the year *y* (tons of dry matter or liter);
NCV_k	=	Net calorific value of the biomass residue (MWh/ton of dry matter or GJ/liter).

E.2. Project emissions calculation

Project emissions were not considered, because there was no transportation of biomass residues to the project site ($PET_y=0$), no on-site consumption of fossil fuels due to the project activity ($PEFF_y=0$), no consumption of electricity ($PE_{EC,y}=0$) and no CH_4 emissions from the combustion of biomass residues ($PE_{Biomass,CH4,y}=0$). Thus, $PE_y=0$.

E.3. Leakage calculation

The diversion of biomass residues to the project activity is already considered in the calculation of baseline reductions. Then, leakage effects do not need to be addressed (L_y. = 0).

Thus, $ER_y = ER_{electricity,y}$.

E.4. Emission reductions calculation / table

The formulae to calculate the emission reduction is:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

$$ER_y = 0 + ER_{electricity,y} + 0 - 0 - 0$$

$$ER_Y = ER_{electricity,y} = EG_y \cdot EF_{electricity,y}$$

Monitoring Report Period	01/03/2009 - 31/06/2010	
Parameters	**Values**	**Units**
Period Energy Generation	242.109,91	MWh
Process Equipments consumption	18.441,08	MWh
Net Quantity of Electricity	223.668,82	MWh
Quantity of processed sugar cane	2.504.605,69	tons
Quantity of produced bagasse (wet base)	691.571,48	tons
Quantity of produced bagasse (dry base)	348.636,23	tons
Net Calorific Value (NCV)	19,40	GJ/ton
∑NCV x BFky	1.879.399,90	MWh
Average net energy efficiency of electricity generation in the project plant (εel, projectplant)	11,90%	%
Average net energy efficiency of electricity generation in the baseline plant (εel, baselineplant)	4,10%	%
EF2005-2007	0,7124	tCO_2/MWh
EGy	146.613,43	MWh
EReletricity	104.447,41	tCO_2
PEy (Trasporte de bagaço)	0,00	tCO_2
ERy=EReletricity - Pe_y - L_y	104.447,41	tCO_2
Period months	12 months, 1 year	

Emissions Reduction	**104,447**

L_y	Not need to be addressed, because it was considered in baseline emissions

Table 8 – Emission reduction calculations

$ER_Y = EG_y \cdot EF_{electricity,y}$ = **104,447** tCO_2/period

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

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This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered 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)	**109,049 tCO2**	**104,447 tCO2**

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

There is no difference between the emission reductions presented in this monitoring report and the CMD-PDD.

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