VALIDATION OPINION

FOR RENEWAL OF CREDITING PERIOD

"MONTE ROSA BAGASSE COGENERATION PROJECT (MRBCP)"

IN

NICARAGUA

CDM REGISTRATION NUMBER: 0191

REPORT NO. 2008-9281

REVISION NO. 01

VALIDATION OPINION

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Client: Econergy Brasil Ltda.	Client ref.: Flávio Pinheiro

Project Name: "Monte Rosa Bagasse Cogeneration Project (MRBCP)"
UNFCCC Ref No: 0191
Country: Nicaragua
Methodology: ACM0006
Version: 9
GHG reducing Measure/Technology: "*GHG emission reductions from electricity generation from biomass residues*"
ER estimate: 808 563 tCO_2e per year (average) over 7-years
Size
☒ Large Scale
☐ Small Scale

In summary, it is DNV's opinion that the "Monte Rosa Bagasse Cogeneration Project (MRBCP)", as described in the project design document version 3 of 28 October 2009, meets the requirements for the renewal of the crediting period stated in the "Procedures for renewal of a crediting period of a registered CDM project" (version 05). Thus DNV requests the renewal of the crediting period of project activity 0191 entitled "Monte Rosa Bagasse Cogeneration Project (MRBCP)" in Nicaragua.

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Report title:
"Monte Rosa Bagasse Cogeneration Project (MRBCP)" in Nicaragua

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EB	Executive Board
EIA	Environmental Impact Assessment
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MP	Monitoring Plan
MRBCP	Monte Rosa Bagasse Cogeneration Project
OM	Operating Margin
PDD	Project Design Document
PDR	Preliminary Developed Document
PP	Project Participant
UNFCCC	United Nations Framework Convention on Climate Change

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1 EXECUTIVE SUMMARY – RE-VALIDATION OPINION

It is Det Norske Veritas Certification AS (DNV)'s opinion that the "Monte Rosa Bagasse Cogeneration Project (MRBCP)", as described in the project design document version 3 of 28 October 2009, meets the requirements for the renewal of the crediting period stated in the CDM-EB "Procedures for renewal of the crediting period of a registered CDM project activity" (Version 5) /11/. Hence, DNV request the renewal of the crediting period of project activity 0191: "Monte Rosa Bagasse Cogeneration Project (MRBCP)".

2 INTRODUCTION

Econergy Brasil Ltda. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the renewal of crediting period request for "Monte Rosa Bagasse Cogeneration Project (MRBCP)" CDM project, located at El Viejo city, Nicaragua. This validation report summarises the findings of the re-validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board, in particular the "Procedures for renewal of a crediting period of a registered CDM project" (version 05) /11/.

The "Monte Rosa Bagasse Cogeneration Project (MRBCP)" project has been registered as a CDM project having with first renewable 7 years crediting period from 1 March 2002 to 28 February 2009.

3 SCOPE

The scope of this validation is as per the CDM-EB Procedures for Renewal of a Crediting Period of a Registered CDM Project (version 05) /11/. The findings and conclusions on the project's compliance with para 2 and para 7 of the above mentioned procedure is recorded in this document. However, this document must be seen in conjunction with the validation report and protocol for the project (TÛV Report No: 691171) /17/.

4 METHODOLOGY

The re-validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

4.1 Desk Review of the Project Design Documentation

The following table lists the documentation that was reviewed during the validation:

/1/ Econergy Brasil Ltda.: Project Design Document for the "Monte Rosa Bagasse Cogeneration Project (MRBCP)" Version 3 of 28 October 2009 and previous Version 2 of 2 November 2008. UNFCCC registration no 0191.

/2/ Econergy Brasil Ltda.: Project Design Document for the first crediting period of "Monte Rosa Bagasse Cogeneration Project (MRBCP)" Version 2 of 5 December 2005.

/3/ Nicaraguan Energy Institute: letter declaring that the plant installed capacity meets the conditions of the generation license.dated 12 May 2009

/4/ Monte Rosa: "Crecimiento Agrícola" spreadsheet with planned increase of sugarcane plantation areas and productions

/5/ Dedini (boiler supplier): letter dated 15 December 2008

/6/ Evidences that there have been no changes in the relevant national and sectoral regulations:

- Nicaraguan Republic: "Public report of policies and regulations related to energy services, poverty alleviation and renewable resources application at Nicaragua's municipalities" – 5 May 2008

/7/ Econergy Brasil Ltda.: Spreadsheet with ER calculation dated 27 October 2009

/8/ Econergy Brasil Ltda.: Spreadsheet with grid EF calculation dated 30 September 2008

/9/ Econergy Brasil Ltda.: E-mail message to the CDM EB dated 21 August 2008 and confirmation message received in 28 August 2008

/10/ Nicaraguan Energy Institute: electricity generation data for 2005, 2006 and 2007

/11/ CDM EB: Procedures for Renewal of the Crediting Period of a Registered CDM Project Activity. Version 05, Annex 11 of EB 46 report.

/12/ EB 44 Report Annex 3: Validation and Verification Manual Version 01.1 http://cdm.unfccc.int/EB/051/eb51_repan03.pdf

/13/ CDM-EB: ACM0006 – "Consolidated methodology electricity generation from biomass residues". Version 9 of EB 48.

/14/ CDM-EB: ACM0002 – "Consolidated baseline methodology for grid-connected

electricity generation from renewable sources". Version 10 of EB 47.

/15/ CDM-EB: *Tool to calculate the emission factor for an electricity system.* Version 1

/16/ IPCC: *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. http://www.ipcc.ch/

/17/ TÜV-SÜD: Validation Report 691171, Revision 0, dated 20 December 2005

Main changes between the PDD version 01 and the PDD submitted for renewal are:

- Changes related to the Corrective Action Requests (CAR) and Request for Clarification (CL) described in Table 1;
- Updating of the PDD to Version 9 of ACM0006.

4.2 Follow-up Interviews with Project Stakeholders

On 27 September 2008 Mr. Luis Mendez of DNV Mexico has performed the site visit with the project stakeholders to confirm selected information and to resolve issues identified in the document review. After that, during the period March 2009 to April 2010, Mr. Felipe Antunes from DNV had several follow up interviews by phone and e-mail with the project participants. The main topics of the interview are summarized below.

	Date	Name	Organization	Topic
/18/	2008-09-27	Milton O'Conor	Monte Rosa – Cogeneration Chief	• PDD process • The technical issues • The methodology justification • The GHG emission calculation • The Monitoring Plan • The validity of the baseline;
/19/	2008-09-27	Julia Robleto	Monte Rosa – Environmental Management Chief	
/20/	2008-09-27	Dalia Jiménez	Monte Rosa – Environmental Quality	

4.3 Resolution of Outstanding Issues

The objective of this phase of the re-validation was to resolve any outstanding issues regarding the continuation of the baseline scenario, which needed be clarified prior to DNV's positive conclusion on the project design.

Findings established during the re-validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;
ii) CDM and/or methodology specific requirements have not been met; or

iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

The requests for clarifications identified during the validation and the resolution of these requests for clarifications are documented in Appendix A.

4.4 Internal Quality Control

The validation opinion underwent through a technical review before requesting the renewal of the crediting period. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

4.5 Validation Team

The validation team consists of the following personnel:

				Type of involvement					
Role/Qualification	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
CDM validator / Technical team leader	Antunes	Felipe	Brazil	X		X			
GHG Auditor	Godinez	Gloria	Mexico			X			
Auditor	Mendez	Luis	Mexico		X				
Sector expert	Costa	David	Brazil						X
Technical reviewer	Astakala	Vidyacharan	India					X	

The qualification of each individual validation team member is detailed in Appendix B to this report.

5 RE-VALIDATION FINDINGS

The findings of the re-validation are stated in the following sections. The results from the re-validation are documented in more detail in the validation protocol in Appendix A. The validation findings relate to the project design as documented and described in the project design document of version 03 dated 28 October 2009.

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5.1 Application of latest approved version of a baseline and monitoring methodology

The project was originally registered using large scale methodology version 01 of AM0015 – "Bagasse-based cogeneration connected to an electricity grid". The revised CDM-PDD (version 3 dated 28 October 2008) has been based on version 9 of ACM0006 – "Consolidated methodology electricity generation from biomass residues" /13/. This is appropriate as AM0015 has been withdrawn subsequently by executive board by merging it into the consolidated methodology ACM0006; besides, version 6.2 was the version of the methodology in effect when the CDM-PDD version 2 was submitted for the re-validation. The PDD was lately updated to ACM0006 version 9.

In line with the CDM-EB "Procedures for renewal of the crediting period of a registered CDM project activity" (Version 5) /11/, the project proponent requested the CDM EB by e-mail message the renewal of the crediting period in 21 August 2008, which was confirmed by the CDM EB in 28 August 2008 /9/.

5.2 The project activity

The "Monte Rosa Bagasse Cogeneration Project (MRBCP)" has increased the efficiency of the bagasse (a residue from sugarcane processing) cogeneration facility of Monte Rosa, S.A., a Nicaraguan sugar mill. Monte Rosa, S.A. had secured an agreement to sell a very small amount of generation to the spot market in Nicaragua followed by a power purchase agreement to sell entire generated electricity though the Nicaraguan grid to Distribuidora de Electricidad del Sur, S.A. (DISSUR) and Distribuidora de Electricidad del Norte, S.A (DISNORTE) and just before this agreement, displacing energy generated by marginal fossil-fuel based power plants, thus avoiding GHG emissions from fossil fuel combustion.

The project uses the steam-Rankine cycle, a world-wide spread technology for generating megawatt (MW) levels of electricity from biomass. The project activity is based on an operation of a grid-connected and biomass residue fired electricity cogeneration power plant located in an agro-industrial plant generating the biomass residues. The cogeneration power plant is fired with the same type of biomass residues but with a higher efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector).
The installed capacity prior to the implementation of the project (March 1, 2002) was 7 MW.

Pre-Project: Prior to the implementation of the cogeneration project activity (2001-2002 cane season), the operations of the Monte Rosa plant were having with three backpressure turbo generators (one 1.5 MW, one 2.5 MW, one 3 MW capacity) and three 13.78 bar pressure boilers with different capacities. In total this adds up to an installed capacity of 7 MW. At the beginning of phase I of the project, the only turbo generator that is left in operation is the 3 MW backpressure turbo generator; the other two turbo generators were removed between May and June 2002.

Phase I of Project: During 2001, the first phase of the cogeneration project began. One 15 MW extraction turbo generator (TG) and one 62 bar pressure boiler were installed in order for these to start operating during the 2001-2002 cane season (March 2002). At the end of 2002 the installation of two 4 MW backpressure turbo generator (TG) was finished; these serve as

back up for the 15 MW turbo installed in 2001. One 2.5 MW backpressure TG and one 1.5 MW backpressure TG that were part of the old equipment installed before the project were disabled. At this point the plant has an installed capacity of 26 MW, of which 18 MW were used and 8 MW were on stand by.

Phase II: During the second phase (2004) of the cogeneration project the following activities were carried out: One 3 MW turbo generator (TG) is put on standby together with the three 13.78 bar pressure boilers and in this phase one condensing turbo generator with a 16.5 MW nominal capacity is installed; this turbo is operated at an approximate average ratio of 15 MW. Two 20 MW extraction turbo generator (TG) and one 62 bar pressure boiler are also installed. During this phase one 15 MW backpressure turbo generator (TG) is disabled.

The following table shows the configuration, nominal capacity, dates of entry and exit in operation, as well as the status of the equipment before and after the project.

	Operation / Installation			***Deactivation***	***Stand-by***
Before the expansion project	One 3 MW backpressure turbo generator (TG)	One 2.5 MW backpressure turbo generator (TG)	One 1.5 MW backpressure turbo generator (TG)		
	One 13.78 bar boiler (36 tv/h)	One 13.78 bar boiler (22.67 tv/h)	One 13.78 bar boiler (11.33 tv/h)		
Phase 1 *2001-2002*	One 15 MW backpressure extraction turbo generator (TG). *May – Dec 2001*	One 3 MW backpressure turbo generator (TG)		One 2.5 MW backpressure turbo generator (TG) *May – Jun 2002*	*Two 4 MW backpressure turbo generator (TG). Jun – Dec 2002*
	One 62 bar boiler. (120 tv/h) Jan-Dec 2001	One 13.78 bar boiler *(36 tv/h)*		One 1.5 MW backpressure turbo generator (TG) May – Jun 2002	
		One 13.78 bar boiler *(22.67 tv/h)*	One 13.78 bar boiler *(11.33 tv/h)*		
Phase 2 *2004*	One 16.5 MW condensing turbo generator. *Jun – Dec 2004*	*One 20 MW extraction turbo generator TG (backpressure). Jun – Nov 2004*	*One 20 MW extraction turbo generator TG (backpressure). Jun – Nov 2005*	*One15 MW extraction turbo generator TG (backpressure). Mayo 2005*	*Two 4 MW backpressure turbo generator (TG).*
	One 62 bar boiler (120 tv/h)	*One 62. bar boiler (150 tv/h) Oct 2003 – Nov 2004*			*One 3 MW backpressure turbo generator (TG)*
					One 13.78 bar boiler (36 tv/h)
					One 13.78 bar boiler (22.67

					tv/h)

5.3 The validity of the original baseline scenario or its update

DNV confirms that there have been no changes in the relevant national and/or sectoral regulations since the previous crediting period. In the other hand, the baseline scenario was updated according to ACM0006 criteria, considering that as per the withdrawn methodology AM0015 the original baseline scenario was that "electricity would in the absence of the project activity have been generated by the operation of grid-connected power plants and by the addition of new generation sources".

The following steps from the "Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" from the CDM-EB "Procedures for renewal of the crediting period of a registered CDM project activity" (Version 5) /11/ were applied:

Step 1 – Assess the validity of the current baseline for the next crediting period

Step 1.1 – Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

DNV confirmed by assessing recent literature /6/ that no relevant mandatory national and/or sectoral policies applicable to the project activity came into effect after the submission of the project activity for validation.

Step 1.2 – Assess the impact of circumstances

Based on an assessment of legal constrains, historical practice of electricity generation, and barriers /6/, it has been confirmed that the circumstances in Nicaragua remain the same as the ones valid at project validation time.

Step 1.3 – Assess whether the continuation of the use of current baseline equipment(s) is technically possible

Not applicable, since the baseline is not the continuation of current practice.

Step 1.4 – Assessment of the validity of the data and parameters

The baseline Nicaraguan grid emission factor calculated *ex-ante* for the first crediting period was updated /8/, as per the Tool to calculate the emission factor for an electricity system (Version 01) /15/.

Step 2 – Update the current baseline and the data and parameters

Step 2.1 – Update the current baseline

Based in ACM0006, the following alternative baseline scenarios for power generation (P), heat generation (H) and biomass use (B) are discussed:

P1: The proposed project activity not undertaken as a CDM project activity;

P2: The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-) fired in the project activity;

P3: The generation of power in an existing captive power plant , using only fossil fuels;

P4: The generation of power in the grid;

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P5: The installation of a new biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case;

P6: The installation of a new biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity. Therefore, the power output is the same as in the project case;

P7: The retrofitting of an existing biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case;

P8: The retrofitting of an existing biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity;

P9: The installation of a new fossil fuel fired captive power plant at the project site;

P10: The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;

P11: The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.

During the site visit DNV confirmed that i) the existing biomass cogeneration units before the implementation of the project activity were different from the existing power plant, ii) only biomass residues are used as a fuel, and iii) the amount of biomass residues used is the same one as before the project activity implementation. Therefore, the feasible alternative scenarios for power generation would be P4 and P7.

H1: The proposed project activity not undertaken as a CDM project activity;

H2: The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass residues but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector);

H3: The generation of heat in an existing captive , cogeneration plant, using only fossil fuels;

H4: The generation of heat in boilers using the same type of biomass residues;

H5: The continuation of heat generation in an existing biomass residue fired cogeneration plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity;

H6: The generation of heat in boilers using fossil fuels;

H7: The use of heat from external sources, such as district heat;

H8: Other heat generation technologies (e.g. heat pumps or solar energy);

H9: The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;

H10: The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.

During the site visit DNV confirmed that i) only biomass residues are fired, ii) there is no district heat available in the region, iii) there are no other heat generation technologies available at the site, iv) the amount of biomass residues used is the same one as before the project activity implementation and v) the baseline plant involves the retrofit of the original biomass power plant. Therefore, the feasible alternative scenario for heat generation would be H2.

B1: The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields;

B2: The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled2 or left to decay on fields;

B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes;

B4: The biomass residues are used for heat and/or electricity generation at the project site;

B5: The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants;3

B6: The biomass residues are used for heat generation in other existing or new boilers at other sites;

B7: The biomass residues are used for other energy purposes, such as the generation of biofuels;

B8: The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry).

During the site visit DNV confirmed that all biomass would be used for energy process in the baseline scenario. Therefore, the feasible alternative scenario for biomass residues is B4.

DNV considers the list of realistic and credible alternatives to be complete.

The chosen baseline scenario corresponds to scenario n° 19, which is a combination of the following baseline scenarios given in ACM0006:

For power generation: The generation of power partly in the grid-connected power plants (P4) and partly in the retrofitted baseline power plant (“reference plant”, P7);

For heat generation: The generation of heat in the reference plant (H2);

For biomass use: The same amount of biomass would be used as in the project plant (B4).

Step 2.2 – Update the data and parameters

In accordance with ACM0006, an electricity baseline emission factor is calculated in accordance with ACM0002 and the Tool to calculate the emission factor for an electricity

system (Version 01) /15/ as a combined margin emission coefficient, consisting of the combination of a simple adjusted operating margin (OM) emission coefficient and a build margin (BM) emission coefficient (see section 5.7). Both, the OM and BM emission coefficient will be fixed based on *ex-ante* calculation based on the electricity generation data at grid plants for 2005 – 2007, which correspond to the most recent data that were available at the submission of the revised PDD for revalidation. The electricity system selected to determine the combined margin emission coefficient is the Nicaraguan grid.

The reference plant was selected based in the "Crecimiento Agrícola" spreadsheet /4/ with planned increase of sugarcane plantation areas and productions until 2016. According to this planning, for the 2014 crop season Monte Rosa will require 16 MW for internal consumption and 230 ton steam/h and will consume 622,773 ton biomass residue in moist mass during 174 days. Based on this, a possible co-generation plant would consist of on 20 MW turbo-generator and four 13.78 bar boilers producing 55 ton steam per hour. DNV confirms that this selection is reasonable to provide all the sugar mill energy needs.

5.4 An impact of new relevant national and/or sectoral policies and circumstances on the baseline scenario:

See previous section 5.3.

5.5 Correctness of the application of the approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the respective crediting period

The project applies the Approved Consolidated Baseline Methodology ACM0006 (Version 9) – "Consolidated methodology electricity generation from biomass residues /13/. The project also applies ACM0002 (Version 10) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" /14/ in combination with "Tool to calculate the emission factor of an electricity system" /15/ for the grid emission factor calculation.

This methodology is applicable to the "Monte Rosa Bagasse Cogeneration Project (MRBCP)" as this project consists of a renewable energy generation plant for supplying electricity to the Nicaraguan grid. DNV confirmed during the site visit that the project meets the applicability conditions of ACM0006 as i) biomass residues generated in the project site are used in the cogeneration plant; no other type of fuel is used; ii) no major process change or substantial changes in processing capacities were envisaged due to project activity, since Monte Rosa is increasing its production due to the increase in sugar demand in the market; iii) the biomass residues are stored at Monte Rosa power plant for less than one year, as confirmed in the site visit and iv) no energy is required to prepare the biomass residues for combustion.

The estimated amount of GHG emission reductions from the project is 808 563 tCO_2e during the second crediting period (7 years) from 01 March 2009 to 29 February 2016, resulting in estimated average annual emission reductions of 115 509 tCO_2e. For an assessment of the *ex-ante* emission reductions estimates, please refer to chapter 5.7 of this report.

5.6 Monitoring

The project applies the approved monitoring methodology Approved Consolidated Baseline Methodology ACM0006 (Version 9) – "Consolidated methodology electricity generation from biomass residues /13/.

5.6.1 Parameters determined ex-ante

The Nicaraguan electricity grid emission factor was calculated *ex-ante* for the second crediting period, as well as the average net energy efficiency of electricity generation in the retrofitted reference power plant. For an assessment of the calculus, please refer to chapter B.7 of this report.

5.6.2 Parameters monitored ex-post

The monitoring plan allows for collection and archiving of the following key parameters related to the determination of emission reductions resulting from the project activity:

- $EG_{project\ plant}$: Net quantity of electricity generated in the project plant.
- $BF_{k,y}$: Quantity of biomass residue combusted in the project plant.
- NCV_k: Net calorific value of biomass residue.
- Moisture content of biomass residue.
- Average net efficiency of electricity generation in the project plant.

5.6.3 Management system and quality assurance

Details of data to be collected, frequency of data recording and data recording format are described in the PDD.

All data will be kept for two years after the end of the last crediting period.

Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports and calibration, have been developed in the PDD.

5.7 Estimate of GHG Emissions

The various algorithm/formulae for calculating baseline and project emissions have been transparently documented in line with the requirements of ACM0006.

The emission reductions are calculated as the difference between project emissions, leakage emissions and baseline emissions. The baseline emissions are due to the displacement of electricity generation with fossil fuels.

The project emissions are considered to be zero, since there is no transportation of biomass residues to the project site, no on-site consumption of fossil fuels due to the project activity, no consumption of electricity, and no CH_4 emissions from the combustion of biomass residues. DNV could confirm this information during the site visit.

As per ACM0006, leakage dos not need to be considered in scenario 19 since the diversion of biomass residues to the project activity is already considered in the calculation of baseline reductions.

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According to scenario 19, the net quantity of increased electricity generation as a result of the project activity shall be determined as follows:

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

The average net energy efficiency of electricity generation in the reference plant ($\varepsilon_{el,baseline\ plant,y}$) was estimated by dividing the electricity generation during the year *y* by the sum of biomass residue, expressed in energy units. For the reference plant it was considered the average of net electric generation only for internal consumption from 2010 to 2015. The average net efficiency of electricity generation in the reference plant was calculated to be 4.1%.

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

The system boundary for the grid electricity system affected by the project is defined as the the Nicaraguan grid. The combined margin emission coefficient for the grid is calculated and fixed *ex-ante* in accordance with ACM0002 (Version 10) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" /14/ and the "Tool to calculate the emission factor of an electricity system" /15/. The grid EF calculation are based on electricity generation data provided by the Nicaraguan Energy Institute for the electricity generated in grid in the years 2005, 2006 and 2007 /10/, which correspond to the most recent data that were available at the submission of the revised PDD for revalidation. The build margin emission coefficient (BM) was calculated considering the five most recent power plants capacity additions (in MWh) in the electricity system. The operating margin (OM) emission coefficient is calculated using the simple OM method, and is found to be 0.7790 tCO_2e/MWh and the build margin (BM) emission coefficient is 0.6902 tCO_2e/MWh, resulting in a combined margin emission coefficient of 0.7124 tCO_2e/MWh (average of the build and operating margin, with 0.75 and 0.25 weights, respectively) /8/.

As for heat generation, the thermal efficiency of the project plant is similar compared with the thermal efficiency of the reference plant considered in baseline scenario. As a result, the proposed project activity does not imply any displacement of heat and, therefore, does not claim emission reductions due to this source.

The estimated amount of GHG emission reductions from the project is calculated to be 808 563 tCO_2e over a 7 years crediting period, resulting in estimated average annual emission reductions of 115 509 tCO_2e.

The emission reduction calculation were provided in a spreadsheet /7/, and it can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. The data sources mentioned have been verified by DNV.

In summary, the GHG calculations are complete and transparent, and their accuracy has been verified. No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology have been found.

APPENDIX A

RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Table 1 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
CAR 1 The PDD of the second crediting period considers the implementation of a third phase that was not considered in the PDD of the first crediting period. Changes in the registered PDD are not allowed by the EB; therefore, the emission reductions associated to the equipment installed in the third phase shall not be considered, and the monitoring plan should ensure that the emission reductions due to the first and second phase equipments can be monitored independently.	The third phase was excluded from the PDD.	The project third phase was excluded from the PDD. Therefore this CAR is closed
CAR 2 As since 2005 the project has operated at up to 67,5 MW, the project proponent should conduct an additional EIA and seek its approval from Nicaraguan Energy Institute.	Nowadays, the installed capacity of Monte Rosa is 67.5 MW: 11 MW is in stand by position and 56.5 MW corresponds to equipments installed between 2004 and 2005, when the new license was required. The electricity generated by the power plant is nearly 46 MW. Monte Rosa has never reached 60 MW, as indicated in the license. This license covers the generation capacity of Monte Rosa power plant. The Nicaraguan Energy Institute wrote a declaration in order to clarify this issue. This letter was sent to DNV.	The letter provided from the Nicaraguan Energy Institute /3/ clearly declares that the installed capacity meets the conditions of the generation license. Therefore this CAR is closed
CAR 3 DNV requests the project proponent to present in the PDD the complete assessment of the baseline according to the "procedures for renewal of the	The PDD follows the "procedures for renewal of the crediting period of a registered CDM project activity", version 05 as indicated in section B.2 of the PDD.	DNV acknowledges that the "tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" is mandatory for the

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
crediting period of a registered CDM project activity", version 05.	The "tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" in annex 1 shall be followed by the DOE.	DOE, not for the project participant. Therefore this CAR is closed
CL 1 DNV requires evidence on the applicability conditions of ACM0006, specifically that the implementation of the project will not result in an increase of the processing capacity, and that the biomass residues used will not be stored for more than one year.	There is a table "Crecimiento Agrícola", the data available shows an increase on the productivity due to more productive areas (ha), increase productivity ton sugar cane / ha. Increase cane season from April to finish on May. This growing is not a result of the implementation of the project, but as an improvement for Monte Rosa Sugar mill itself. The biomass residues are fired in the boilers for cogeneration of electricity. The biomass residue is not stored, just for the beginning of the next cane season (harvest) less than 8 months. This was confirmed during the visit. Once it was not cane season, there was a few biomass residues.	As per the table presented /4/ and information assessed during the site visit, the applicability conditions of ACM0006 are met. Therefore this CL is closed.
CL 2 DNV requests information of how was determined the reference plant and its efficiency.	This information is indicated in section a.4.3 of the PDD.	The PDD was revised accordingly including more information on the reference plant.. Therefore this CL is closed
CL 3 According to ACM0006, the PDD shall document	The quantity of fuel that are planned to be used in the project activity is indicated in	The PDD was revised as required. Therefore this CL is closed

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
the quantity of fuel that are planned to be used and the quantity of fuel that would be used in the reference plant.	section b.6.3 table 6. The quantity of fuel that would be used in the reference plant is indicated in section a.4.3 table 2.	
CL 4 DNV requests the project proponent to discuss all baseline alternatives presented in ACM0006 for power, heat and biomass residues.	This information was included in section b.4 of the PDD.	The revised PDD presents the discussion of all baseline alternatives from ACM0006. Therefore this CL is closed
CL 5 The project proponent is required to demonstrate that the thermal efficiency of the project plant is similar compared with the thermal efficiency of the reference plant considered in baseline scenario.	The efficiency of a low pressure boiler of 13.78 bar are similar compared with the thermal efficiency of a 62 bar boiler. The boiler efficiencies are around 87%.	According to the e-mail message received from the supplier /5/, the thermal efficiency of a 13.78 bar is similar compared with the thermal efficiency of a 62 bar boiler. Therefore this CL is closed
CL 6 DNV requests evidence that there have been no changes in the relevant national and/or sectoral regulations between the crediting periods.	According to Rodriguez, there is limited availibility of commercial energy contracts, The sugar mill sector does not have motivation to invest in a process, because of the political and regulatory uncertainty. Also, according to Quiroz & Asociados, there is a lack of interest from Nicaraguan utilities to sign new energy contracts with energy generators, insufficient legislation promoting development of renewable sources of energy. The “Public report of policies and regulations related to energy services,	The literature provided /6/ confirms that there have been no changes in the relevant national and/or sectoral regulations. Therefore this CL is closed.

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
	poverty alleviation and renewable resources application at Nicaragua's municipalities" confirms that these barriers were still in place in 2008. The goverment just wants to regulate the price of the electricity to protect fuel electricity generation industry. The baseline is Scenario 19: The project activity involves the improvement of energy efficiency by retrofitting an existing biomass residue fired power plant by retrofit. The scenarios are in compliance with all mandatory applicable legal and regulatory requirements of Nicaragua. Bagasse cogeneration has been practiced without legal hurdles, meaning year-round generation would face no legislative problems as well. Purchase of electricity is a normal procedure in industrial facilities and no legal barriers would be imposed under this scenario.	
CL 7 DNV requests a spreadsheet with the calculation of emission reductions and grid emission factor.	The emission reductions and emission factor spreadsheets were sent to DNV.	The required spreadsheets /7//8/ were provided and assessed by DNV, confirming the PDD assumptions and calculus. Therefore this CL is closed

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
CL 8 The project proponent is requested to demonstrate that project emissions are zero, in particular emissions from on-site fossil fuel and electricity consumption, off-site transportation of residues, and wastewater from the treatment of biomass residues. This last component should be included also in the PDD section b.3.	There is no consumption of on-site fossil fuel. The emissions from electricity consumption and off-site transportation of residues are the same that would occur in the baseline scenario. There is no wastewater from the treatment of biomass residue. This information was included in section b.3 of PDD.	Clarifications were provided confirming that project emissions are zero. Therefore this CL is closed
CL 9 The project proponent is required to confirm that the quantity of bagasse will be directly measured as per ACM0006 requirements.	The quantity of biomass residue consumed will be directly measured, using weigh meters. The moisture content of the biomass residue will be used to determine the quantity of dry biomass. This information was added in section B.7.2 of the PDD.	The PDD was revised as requested. Therefore this CL is closed
CL 10 The authority and responsibility of project management and of monitoring procedures have not been identified. Procedures for training of monitoring personnel have not been identified. Procedures for emergency preparedness for cases where emergencies can cause unintended emissions have not been identified. Procedures for internal audits of ghg project compliance with operational requirements as applicable have not been identified.	The authority and responsibility of the project management and the procedures required above were sent to DNV.	The procedures required were presented in the revised PDD. Therefore this CL is closed

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
Procedures for project performance reviews have not been identified. Procedures for corrective actions have not been identified.		
CL 11 The dates in PDD are not correct. There will only be 28 days in February 2009 and 29 days in February 2016 so the second crediting period dates should be 1.3.2009 – 29.2.2016. Please amend.	The PDD was revised accordingly.	The PDD was revised accordingly. Therefore this CL is closed.
CL 12 The project activity consists of new addition of turbines and boilers, and this is not considered as a retrofit. Therefore, the applicability of scenario 19 is required to be revised.	The phase 3 was excluded from the PDD. The applicable scenario is 19, as it involves the improvement of energy efficiency by retrofitting an existing biomass residue fired power plant. The existing equipments can continue to operate and only the existing 2.5 MW and 1.5 MW backpressure turbo-generators were disabled. It is not considered a replacement as some existing equipments will continue to operate. According to the glossary of CDM terms, to retrofit is to modify existing industrial, commercial and residential facilities, automobiles, energy conversion systems etc., which are already in service using new, improved or more efficient parts and equipment developed or made available after the time of original manufacture or installation of the facility.	According to DNV's sector expert inputs, it is not clear if scenario 18 allows partial replacements of equipments in the power plant – if not, scenario 19 is really the applicable one. Anyway, this won't affect neither the emission reduction calculation neither the monitoring plan. Based on this, DNV decided to accept the applicability of scenario 19. Therefore this CL is closed.

Draft report clarifications and corrective action requests by validation team	Summary of project owner response	Validation team conclusion
CL 13 DNV requests evidence of the notification to the CDM secretariat of the intention to request a renewal of the project crediting period.	The email sent by Econergy to CDM secretariat was sent to DNV.	Evidence was provided as required. Therefore this CL is closed.

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Felipe Antunes

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas			Sept 2009			
Renewables	*Hydro power*	Jan 2009	Sept 2009		Jan 2009	Jan 2009
	Wind power		Sept 2009			
	Other renewable		Sept 2009			
Biomass		Jan 2009	Jan 2009			
Grid connection of isolated system			Sept 2009			
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management		Jan 2009	Jan 2009			
Waste / wastewater treatment		Jan 2009	Jan 2009			
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal			Sept 2009			
CO_2 recovery						
Transport						
Non-renewable biomass			Sept 2009			
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 1 September 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Gloria Godinez

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1))

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas			Sept 2009			
Renewables	*Hydro power*					
	Wind power					
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement				July 2009		
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management			Aug 2009			
Waste / wastewater treatment			Sept 2009			
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 1 September 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

David Costa

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*	Jan 2009	Jan 2009			
	Wind power		Sept 2009			
	Other renewable		Sept 2009			
Biomass				Jan 2009		
Grid connection of isolated system			Sept 2009			
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 1 September 2009

Michael Lehmann

Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Vidyacharan Astakala

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*	Jan 2009	Jan 2009			
	Wind power		Sept 2009			
	Other renewable		Sept 2009			
Biomass		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Grid connection of isolated system			Sept 2009			
Cement						
Waste-heat / waste-gas recovery			Sept 2009			
Efficiency of thermal power plants			Sept 2009			
Coal mine methane						
Fuel switch			Sept 2009			
Manure management						
Waste / wastewater treatment						
Energy efficiency		Jul 2009	Jul 2009			
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal			Sept 2009			
CO_2 recovery			Sept 2009			
Transport						
Non-renewable biomass			Sept 2009			Aug 2009
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 1 Sept 2009

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