



VALIDATION OPINION - CREDITING PERIOD RENEWAL

UTE BARREIRO S.A. RENEWABLE ELECTRICITY GENERATION PROJECT IN BRAZIL

(UNFCCC Registration Ref. No. 0143)

REPORT No. 2011-1164

REVISION No. 02

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Client: V&M do Brasil S.A	Client ref.: Felipe Fleury

Summary:

Project Name: UTE Barreiro S.A. Renewable Electricity Generation Project

Registration Ref. No.: 0143

Country: Brazil

Methodology: AMS-I.F **Version:** 2

GHG reducing Measure/Technology: Renewable electricity generation captive use and mini-grid

ER estimate: 19 336 tCO₂e per year (average)

Size

☐ Large Scale

☒ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☐ Corrective Actions Requested

☐ Clarifications Requested

☒ Full Approval and request for renewal

☐ Rejected

In summary, it is DNV's opinion that the project activity "UTE Barreiro S.A. Renewable Electricity Generation Project" in Brazil, as described in the PDD, version 2.2 of 6 November 2012, meets all relevant UNFCCC requirements for the renewal of the crediting period. Hence DNV requests the renewal of the crediting period of the project.

Report No.: 2011-1164	Subject Group: Environment
Report title: UTE Barreiro S.A. Renewable Electricity Generation Project in Brazil	
Work carried out by: Fernando Sasdelli, Luis Filipe Tavares	
Work verified by: Gong Zheng; Astakala Vidyacharan	
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Clean Development Mechanism

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*Abbreviations*

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEMIG	Power Utility from Minas Gerais State
CER	Certified Emission Reduction(s)
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DNV	DNV Climate Change Services AS
FAR	Forward Action Request
GASMIG	Gas Company from Minas Gerais State
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
tCO ₂ e	Tonnes of CO ₂ equivalents
UNFCCC	United Nations Framework Convention on Climate Change



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed an assessment of the request by V&M do Brasil S.A to renew the crediting period of CDM project activity 0143 “UTE Barreiro S.A. Renewable Electricity Generation Project” in Brazil. The assessment was performed in accordance with the Procedures for renewal of the crediting period of a registered CDM project activity (version 06.0) and included an assessment of:

(a) An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period;

(b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

The project activity is a thermal power plant that uses blast furnace gas and wood tar to generate part of the electricity required by the V&M Barreiro’s Integrated Steel Plant. Consequently this amount of electricity is displaced from the grid reducing emissions. The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the validity of the original baseline and its update through an assessment. The project correctly applies the baseline and monitoring methodology AMS-I.F, version 2 “Renewable electricity generation for captive use and mini-grid”.

In summary, it is DNV’s opinion that the CDM project activity 0143 “UTE Barreiro S.A. Renewable Electricity Generation Project” in Brazil meets all relevant UNFCCC requirements for the renewal of the crediting period. Hence DNV requests the renewal of the crediting period of the project.

Rio de Janeiro and Oslo, 19 November 2012

Luis Filipe Tavares
CDM Validator
DNV Rio de Janeiro, Brazil

Edwin Aalders
Approver,
DNV Climate Change Services AS (DNV)



2 INTRODUCTION

DNV Climate Change Services AS (DNV) was commissioned by V&M do Brasil S.A to perform an assessment of the request by to renew the crediting period of CDM project activity 0143 “UTE Barreiro S.A. Renewable Electricity Generation Project” in Brazil.

The assessment was performed in accordance with the Procedures for renewal of the crediting period of a registered CDM project activity (version 06.0) and included an assessment of:

- (a) An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period;
- (b) The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period.

3 METHODOLOGY

The 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.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

- /1/ KEYASSOCIADOS CONSULTORIA E TREINAMENTO S.A.: *CDM-PDD for project activity “UTE Barreiro S.A. Renewable Electricity Generation Project” in Brazil*, Version 2.2 dated 6 November 2012, version 2 dated 29 September 2011 and Version 1 dated 15 June 2011.
- /2/ KEYASSOCIADOS CONSULTORIA E TREINAMENTO S.A.: CER Spreadsheet Calculation, “CERs Calculation_RPC_v.02.xls”, Version 2 , dated 29 September 2011.
- /3/ EcoSecurities Ltd.: Registered PDD for project activity UTE Barreiro S.A. Renewable Electricity Generation Project” in Brazil, version 4B, dated December 2005.
- /4/ EcoSecurities Ltd.: Letter of intention to request the renewal of the crediting period for UTE Barreiro S.A. Renewable Electricity Generation Project, dated 28 June 2010.
- /5/ V&M do Brasil S.A: Operational Procedures, version A, dated 10 January 2008.
- /6/ V&M do Brasil S.A: Training Procedures for new Operators, version 0, dated 1 February 2010.
- /7/ V&M do Brasil S.A: Operational History, “UTE BARREIRO_Synthesis_2004-10.xlsx”, from year 2004 to year 2010.
- /8/ V&M do Brasil S.A: Commercial contract between electricity supplier (UTE Barreiro



- S.A.) and consumer (V&M do Brasil S.A), dated 2 August 2001.
- /9/ GASMIG: Natural gas net calorific data from 2010, dated January 2011.
 - /10/ V&M do Brasil S.A: Signed Modalities of Communication, stating that V&M do Brasil S.A is the focal point and sole project participant of UTE Barreiro S.A. Renewable Electricity Generation Project, dated 22 May 2012.
 - /11/ V&M do Brasil S.A: *Blast Furnace Gas Analysis*, dated 12 November 2012.
 - /12/ Reinaldo Ferreira da Silva: *Energy and Exergy Analysis at a Carbonization Plant*, dated 2009.

3.1.2 Methodologies, tools and other guidance by the CDM Executive Board

- /13/ CDM Executive Board: Procedures for renewal of the crediting period of a registered CDM project activity, Version 06.0.
- /14/ CDM Executive Board: Validation and Verification Manual. Version 01.2
- /15/ CDM Executive Board: Baseline and monitoring methodology AMS-I.F, Renewable electricity generation for captive use and mini-grid, version 2.
- /16/ CDM Executive Board: Tool to calculate the emission factor for an electricity system, version 2.2.1.
- /17/ CDM Executive Board: Tool to calculate project or leakage CO2 emissions from fossil fuel consumption, version 2.
- /18/ CDM Executive Board: Baseline and monitoring methodology AMS-I.D, version 6.
- /19/ CDM Executive Board: Baseline and monitoring methodology AMS-I.D, version 17.
- /20/ CDM Executive Board: Attachment C to Appendix B, Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, EB47, Annex 28.

3.1.3 Documentation used by DNV to validate / cross-check the information provided by the project participants

- /21/ UNFCCC: *Project View Page*, last accessed on 15 September 2011.
<http://cdm.unfccc.int/Projects/DB/DNV-CUK1134505349.88/view>
- /22/ Brazilian Ministry of Science and Technology (Brazilian DNA): *Brazilian Grid Emission Factor*, last accessed on 15 September 2011.
<http://www.mct.gov.br/index.php/content/view/74689.html>
- /23/ IPCC: *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, Volume 2, Energy, Table 2.2.
- /24/ ANEEL: Brazilian Electricity Generation Matrix;
<http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp>

3.2 Follow-up interviews with project stakeholders

On 19 September 2011, Fernando Sasdelli and Luis Filipe Tavares, auditors from DNV, visited the Belo Horizonte, at Minas Gerais State, Brazil and performed interviews with project stakeholders.



	Date	Name	Organization	Topic
/25/	2011-09-19	Felipe Fleury	V&M do Brasil S.A	<ul style="list-style-type: none"> • Site visit • Baseline confirmation • Monitoring plan • Emission reductions estimation
/26/	2011-09-19	Leandro Salvático	Keyassociados Consultoria e Treinamento S.A. (Consulting company)	<ul style="list-style-type: none"> • Environmental Licenses and legal compliance • Stakeholders consultation

3.3 Resolution of outstanding issues

The objective of this phase of the assessment was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design.

In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "UTE Barreiro S.A. Renewable Electricity Generation Project" in Brazil is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.



Validation Protocol Table 1: Requirement Checklist				
Checklist question	Reference	Means of verification (MoV) of	Assessment by DNV	Draft and/or Final Conclusion
<i>The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Means of verification (MoV) are document review (DR), interview (I) or any other follow-up actions (e.g., on site visit and telephone or email interviews) and cross-checking (CC) with available information relating to projects or technologies similar to the proposed CDM project activity under validation.</i>	<i>The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.</i>	<i>OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A corrective action request (CAR) is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A forward action request (FAR) during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.</i>

Validation Protocol Table 2: Resolution of Corrective Action and Clarification Requests			
Corrective action and/or clarification requests	Ref. to checklist question in table 2	Response by project participants	Validation conclusion
<i>The CARs and/or CLs raised in Table 2 are repeated here.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the project participants to address the CARs and/or CLs.</i>	<i>The validation team's assessment and final conclusions of the CARs and/or CLs.</i>

Validation Protocol Table 3: Forward Action Requests		
Forward action request	Ref. to checklist question in table 2	Response by project participants
<i>The FARs raised in Table 2 are repeated here.</i>	<i>Reference to the checklist question number in Table 2 where the FAR is explained.</i>	<i>Response by project participants on how forward action request will be addressed prior to first verification.</i>

Figure 1 Validation protocol tables



3.4 Internal quality control

This validation opinion underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.1 competence
Team leader (Validator)	Tavares	Luis Filipe	Brazil	✓	✓	✓	✓		
Assessor under training	Sasdelli	Fernando	Brazil	✓	✓	✓			✓
Technical reviewer	Gong	Zheng	China					✓	
Technical reviewer	Astakala	Vidyacharan	India					✓	✓

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



4 VALIDATION FINDINGS

During the first crediting period the project was registered using the approved baseline and monitoring methodology AMS-I.D, version 6 /18/. The current CDM-PDD, version 2.2 dated 6 November 2012 /1/, requesting renewal of the crediting period for the project activity, applies AMS-I.F version 2 /15/, as according to Table 2 of the AMS-I.D, version 17 /19/, the project activity fulfils AMS-I.F requirements: “*project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid).*”

As per the “*Procedures for renewal of the crediting period of a registered CDM project activity*” version 06.0 /13/, project participants shall notify the secretariat, through a dedicated web interface, of their intention to request a renewal of a crediting period of the registered CDM project activity by submitting an updated CDM-PDD and informing of their selection of a DOE, within nine to six months prior the date of expiration of the current crediting period.

On 28 June 2010 the project participant have sent a notification letter to UNFCCC declaring their intention to request the renewal of the crediting period of the registered project activity UTE Barreiro S.A. Renewable Electricity Generation Project /4/. It was also informed that DNV was the selected DOE and that the CDM-PDD was under elaboration.

The findings of the validation are stated in the following sections. The final validation findings relate to the project design as documented and described in the PDD, version 2.2 dated 6 November 2012 /1/.

4.1 Participation of project participants

According to project page view at the UNFCCC website /21/, EcoSecurities Ltd. is no longer a project participant from parties United Kingdom of Great Britain and Northern Ireland and Switzerland. The PDD, version 2.2, dated 6 November 2012 and signed MoC /10/ dated 22 May 2012 lists only V&M do Brasil S.A as project participant from host Party Brazil. DNV assessed the revised documentation and confirmed that the only project participant is V&M do Brasil S.A.

4.2 Validity of selected baseline and monitoring methodology

According to the project description, UTE Barreiro S.A. Renewable Electricity Generation Project by using blast furnace gas and wood tar, both by-products of the biomass charcoal, to generate part of the electricity required by V&M Barreiro’s Integrated Steel Plant (Usina Siderúrgica Integrada de Barreiro), the project displaces electricity generation from a more fossil-intensive grid and reduces GHG emissions in the process.

The biomass charcoal in the absence of the project activity would still be used in the facility of V&M Barreiro’s Integrated Steel Plant, therefore leakage is not applicable to this project activity /20/.

DNV visited the project activity installations and assessed the approved monitoring methodologies AMS-I.F version 2 /15/ and AMS-I.D, version 17 /19/ and concluded that according to Table 2 of the AMS-I.D, version 17 /19/, the project activity is no longer applicable under AMS-I.D requirements. Instead it completely fulfils AMS-I.F requirements.



Sections relating to the baseline, estimated emission reductions and the monitoring plan were updated accordingly to AMS-I.F version 2 and *Tool to calculate the emission factor for an electricity system* version 2.2.1, as described in the following sections.

4.3 Applicability of selected baseline and monitoring methodology

The UTE Barreiro S.A. Renewable Electricity Generation Project consists of a thermal power plant with capacity of 12.9 MW that uses blast furnace gas and wood tar to generate part of the electricity required by V&M Barreiro's Integrated Steel Plant (Usina Siderúrgica Integrada de Barreiro). In the baselines, in the absence of the project activity, the blast furnace gas would have continued to be flared; therefore no additional emissions will occur due to the use of blast furnace gas to generate electricity.

The approved consolidated baseline and monitoring methodology AMS-I.F (version 2) /15/ is applicable to the "UTE Barreiro S.A. Renewable Electricity Generation Project in Brazil" as the project activity includes the following activities or combinations of these activities:

- I. *This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to user(s). The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit i.e., in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below:*
 - (a) *A national or a regional grid (grid hereafter);*
 - (b) *Fossil fuel fired captive power plant;*
 - (c) *A carbon intensive mini-grid.*
 - Applicable. Blast furnace gas and wood tar can be considered biomass by-products, once they are residues of charcoal, a renewable biomass that is used in the industry process. In the absence of the project activity blast furnace gas would be flared and electricity would be supplied by the national grid, which according to the Brazilian DNA /22/ has more than one fossil fuel generating unit.
- II. *For the purpose of this methodology, a mini-grid is defined as small-scale power system with a total capacity not exceeding 15 MW (i.e., the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.*
 - Applicable. During site visit, by checking the nameplates of the installed turbine and generator, DNV could confirm that the installed capacity of the generator is 12.9 MW, and therefore lower than 15 MW.
- III. *Project activities or project activity components supplying electricity to a grid shall apply AMS-I.D. Project activities for standalone off-the-grid power systems supplying electricity to households/users included in the boundary are eligible under AMS-I.A.*
 - Not applicable. The project activity will not supply electricity to the grid. The project is displacing electricity from the grid, thus this criteria is not applicable.



- IV. *Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:*
- *The project activity is implemented in an existing reservoir with no change in the volume of reservoir;*
 - *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²;*
 - *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m².*
 - Not applicable as the project activity is a biomass power plant. Blast furnace gas and wood tar are considered biomass by-products, once they are residues of charcoal (renewable biomass).
- V. *For biomass power plants, no other biomass other than renewable biomass is to be used in the project plant.*
- Applicable. During site visit DNV could check the charcoal stocks and charcoal invoices and could confirm that no other than renewable biomass are used in the project plant.
- VI. *This methodology is applicable for project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition, (c) involve a retrofit⁴ of (an) existing plant(s); or (d) involve a replacement⁵ of (an) existing plant(s).*
- Applicable. The project activity is a greenfield plant. There was no renewable energy power plant operating prior to the implementation of the project activity. DNV could confirm this through the registered PDD /3/.
- VII. *In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct⁶ from the existing units.*
- Not applicable, it is a greenfield project.
- VIII. *In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.*
- Not applicable, it is a greenfield project.
- IX. *If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel⁷, the capacity of the entire unit shall not exceed the limit of 15 MW.*
- Not applicable, it is a greenfield project.
- X. *Combined heat and power (co-generation) systems are not eligible under this category.*



- Not applicable. There is no heat utilization by the users. During site visit DNV could confirm that only electricity is supplied to the user.

XI. *In case electricity produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the electricity will have to be entered into specifying that only the facility generating the electricity can claim emission reductions from the electricity displaced.*

- The contract between the supplier UTE Barreiro S.A. and the consumer of electricity, V&M do Brasil S.A, generated in the project activity was presented /8/.

The baseline emissions (BE_y) is calculated by the product of electricity displaced by the project activity ($EG_{BL, y}$) multiplied by the combined margin grid emission factor ($EF_{CO_2, GRID}$).

The combined margin emission factor of Brazilian grid for the second renewable crediting period which is from 1 January 2011 to 31 December 2017 was calculated by the Brazilian DNA /22/, as the weighted average of the “operating margin” and the “build margin” according the option (c) Dispatch data analysis OM *ex-post*, and Option (2) for the BM *ex-ante*, of the *Tool to calculate the emission factor for an electricity system* version 2.2.1 /16/.

The build margin (BM) emission coefficient was determined based on 2010 data and is 0.1404 tCO₂e/MWh. The operating margin (OM) will be monitored ex-post, but for the purpose of forecasting the project’s emission reductions, the OM emission coefficient was determined based on 2010 data of 0.4787 tCO₂e/MWh. The weight applied is 25:75 in line with the the “*Tool to calculate the emission factor for an electricity system*”, version 2.2.1 /16/.

4.4 Validity of baseline

The current baseline is valid for the next crediting period once the project activity applies methodology AMS-I.F, version 2 which has the same baseline emissions calculation as the methodology AMS-I.D, version 6, used for the first crediting period when considering the project configuration. According to both methodologies; AMS-I.F, version 2, paragraph 14 and AMS-I.D, version 6, paragraph 11; the baseline emissions are calculated as the product of the electricity displaced with the electricity produced by the renewable generating unit and a grid emission factor.

It’s DNV opinion that the current baseline is valid for the second crediting period.

This is demonstrated in the following steps:

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

The validity of the current baseline was assessed using the following sub-steps:

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

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Although national policies favour the development



of renewable energy sources, total renewable resource based power generation account for only 6.92% of total installed capacity /24/. DNV was able to confirm that electricity projects generation fuelled with blast furnace gas and wood tar are not common practice in Brazil.

Step 1.2: Assess the impact of circumstances

DNV confirms that no changes in relevant circumstances applicable to the project activity came into effect after the submission of the project activity for validation.

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

The baseline as per the methodology AMS-I.D, version 6 in the first crediting period was the quantity of net electricity supplied to the Brazilian interconnected grid. Considering the baseline as per the current methodology AMS-I.F, version 2 is the displacement of equivalent amount of electricity from the Brazilian interconnected grid and since no national and/or sectoral policies were implemented in the Brazilian interconnected grid with impact to the project activity, therefore the continuation of the baseline selected for the first crediting period is technically possible.

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

The combined margin grid emission factor ($EF_{CO_2,GRID}$) was correctly calculated in the presented PDD, version 2.2, dated 6 November 2012. The build margin emission factor ($EF_{CO_2,OM}$) is determined *ex ante* and the operating margin emission factor ($EF_{CO_2,OM}$) is determined *ex post*.

By applying the steps and formulas from the “*Tool to calculate the emission factor for an electricity system*” version 2.2.1 /16/ the calculations considered to baseline estimation are:

- Operating margin emission factor ($EF_{CO_2, OM} = 0.4787 \text{ tCO}_2/\text{MWh}$;
- Build margin emission factor ($EF_{CO_2, BM} = 0.1404 \text{ tCO}_2/\text{MWh}$;

Combined Margin emission factor ($EF_{CO_2, GRID} = 0.4787 \times 0.25 + 0.1404 \times 0.75 = 0.2250 \text{ tCO}_2/\text{MWh}$).

The natural gas emission factor (EF_{NG}) was properly updated according to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy, Table 2.2 /23/. Also the natural gas net calorific value (NCV_{NG}) was updated based on the average data from year 2010 provided by the fuel supplier (GASMIG) /9/.

Conclusion on step 1

No change in regulation policies have occurred with significant impact in the current baseline. DNV assures the validity of the current baseline is granted for the next period

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

The update of the current baseline was assessed using the following sub-steps:

Step 2.1: Update the current baseline

Considering that the current applied methodology AMS-I.F, version 2 and the methodology applied in the first crediting period AMS-I.D, version 6 have the same baseline for the type of project of UTE Barreiro S.A. Renewable Electricity Generation Project, there is no need to update the current baseline. Both methodologies state that the baseline emissions are calculated as the product of the amount of energy displaced from the grid by the in-site electricity generation of the project activity and a grid emission factor.



Step 2.2: Update the data and parameters

The grid emission factors were correctly updated for year 2010, which is most recent available data. Both, operating margin and build margin emission factor were obtained through official data from the Brazilian DNA /22/. The operation margin and grid emission factors will be updated *ex post* annually for the rest of the crediting period.

4.5 Validity of monitoring plan

The project applies the approved consolidated monitoring methodology AMS-I.F, version 2 – Renewable electricity generation for captive use and mini-grid /15/ in combination with “*Tool to calculate the emission factor for an electricity system*” version 2.2.1 for the grid emission factor.

In order to stabilize the net calorific value of the fuels used in the boiler to generate electricity, some fossil fuels, such as natural gas and coke may be used during the project activity. This amount represents around 5.8% of the total energy input /2/. The project emissions calculation is in accordance to AMS-I.F version 2 /15/ and the Tool to calculate project or leakage CO₂ emissions from fossil fuel consumption, version 2. The project emission is calculated by the product of the CO₂ emission coefficient of each fuel type (COEF_{i,y}), the correspondent net calorific value of the fuel (NCV_i) and the correspondent CO₂ emission factor of the fossil fuel (EF_i).

The natural gas parameters, quantity of natural gas consumed, NCV_{NG}, COEF_{NG,y} and EF_{NG} are being properly monitored.

Concerning leakage and according to AMS-I.F version 2 /15/, the equipment used to generate electricity were not transferred from another project activity; therefore leakage is zero for the project activity.

The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

4.5.1 Parameters determined ex-ante

The parameter used emission reduction calculations available *ex ante* is:

- **EF_{BM,GRID}**: build margin emission factor. Determined *ex ante* only for CER estimative purposes at the current PDD. This parameter is obtained through official data from the Brazilian DNA /22/.
- **Moisture content of the Blast Furnace Gas**: Determined *ex ante* only since, as per AMS-I.F version 2 /15/, in case of dry biomass monitoring is not necessary. Parameter was obtained through internal analysis of the composition of blast furnace gas /11/.

The presented parameter is in accordance to the applied methodology AMS-I.F version 2 /15/.

4.5.2 Parameters monitored ex-post

The parameters used emission reduction calculations monitored *ex post* are:

- **EG_{BL,y}**: quantity of net electricity displaced as a result of the implementation of the CDM project activity. This parameter is continuously measured through energy meters.
- **FC_{NG,y}**: quantity of natural gas consumed. This parameter is continuously measured through a flowmeter.



- **FC_{BFG,y}**: quantity of blast furnace gas consumed. This parameter is continuously measured through a flowmeter.
- **FC_{TAR,y}**: quantity of wood tar consumed. This parameter is continuously measured through a flowmeter.
- Moisture content of the Wood Tar. This parameter is analysed through external laboratories. For estimative purposes a scientific publication was used as reference /12/.
- **NCV_{NG}**: net calorific value of the natural gas. This parameter is obtained through data provided by the local natural gas supplier.
- **NCV_{BFG}**: This parameter will be measured quarterly in laboratories using at least three samples per measurement. For estimative purposes historical data was used to determine the parameter value /7/.
- **NCV_{WOOD TAR}**: This parameter will be measured in external laboratories. For estimative purposes a scientific publication was used as reference /12/.
- **EF_{NG}**: CO₂ emission factor of the natural gas. This parameter is obtained through official data from 2006 IPCC Guidelines /23/.
- **EF_{OM,GRID}**: operating margin emission factor. Determined *ex ante* only for CER estimative purposes at the current PDD. This parameter is obtained through official data from the Brazilian DNA /22/.
- **EF_{CO2,GRID}**: grid emission factor. Is the weighted average of the operating margin emission factor and the build margin emission factor, considering weight 0.25 and 0.75 respectively.

The presented parameters are sufficient to correct monitor the project activity and all data will be kept for two years after the end of the last crediting period

4.5.3 Management system and quality assurance

Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports and calibration, have been developed and were assured by the project participants operational procedures /5/.

The monitoring plan contains all necessary parameters described in accordance with the monitoring methodology. The monitoring plan, including data management and QA/QC procedures, will give opportunity for real measurements of achieved emission reductions, which can hence be reported *ex post* and verified. The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.6 Estimation of GHG emissions

The emissions reductions are calculated as the baseline emissions subtracted by project emissions and leakage emission. As presented, according to the applied methodology AMS-I.F version 2 /15/, leakage is zero to the project activity.

Baseline emissions are calculated by the product of quantity of energy generated by the project activity ($EG_{BL,y}$) and the grid emission factor ($EF_{CO2,GRID}$). For estimation purposes



$EG_{BL,y}$ equals to 100 267 MWh and EF_{CO_2} equals to 0.2250 tCO₂/MWh. Therefore baseline emissions are 22 557 tCO₂.

Project emissions are calculated by the amount of natural gas burned in the boiler, multiplied by the net correspondent net calorific value and the emission factor of the natural gas, resulting in 3 220 tCO₂. Therefore the estimated emission reductions are 19 336 tCO₂ per year during the second crediting period (7 years) from 1 January 2011 to 31 December 2017.

As a complement the quantity of biomass consumed in the plant will be cross-checked with the annual energy balance plan.

The CER calculation spreadsheet "CERs Calculation_RPC_v.02.xls" Version 2 /2/ was provided and checked to confirm the estimated emission reductions of the project activity.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.1 Participation requirements (VVM para 51-54, 123-125) – To be completed only for Parties and project participants which were added in association with requesting the renewal of the crediting period		/1/				
A.1.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	According to the “Procedures for Renewal of the Crediting Period of a Registered CDM Project Activity” project participants shall notify the UNFCCC secretariat of their intention. The confirmation of this notification to UNFCCC was not presented. The project participants listed in the PDD, version 1, dated 15 June 2010 is not in accordance to the project participants listed in the project’s page view at the UNFCCC website.	CAR-1 CAR-2	OK
			Brazil			
	a) Party has ratified the Kyoto Protocol		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	b) Party has designated a Designated National Authority		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
A.1.2	c) The assigned amount has been determined		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	Do the letters of approval meet the following requirements?	/1/	DR			OK
			Brazil			
	a) LoA confirms that Party has ratified the Kyoto Protocol		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	b) LoA confirms that participation is voluntary		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	c) The LoA refers to the precise project activity title in the PDD		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	d) The LoA is unconditional with respect to (a) to (d) above		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	e) The LoA is issued by the respective Party’s DNA		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	f) The LoA was received directly by the DNA or the PP		<input checked="" type="checkbox"/> DNA <input type="checkbox"/> PP			
	g) In case of doubt regarding the authenticity of the letter of approval,					

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
describe how it was verified that the letter of approval is authentic						
A.1.3	Have all private/public project participants been authorized by an involved Party?	/1/	DR	The project participants listed in the PDD, version 1, dated 15 June 2010 is not in accordance to the project participants listed in the project's page view at the UNFCCC website.	CAR-2	OK
A.2 Public funding of the project activity - To be completed only for Parties and project participants which were added in association with requesting the renewal of the crediting period		/1/				
A.2.1	In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR	There is no Annex I public funding involved in the project activity.		OK
		/1/				
B Application of a baseline and monitoring methodology						
B.1 Methodology applied (VVM para 65-76)		/1/				
B.1.1	Does the project apply an approved methodology and the correct version thereof?	/1/ /15/	DR	Yes, the project applies an approved methodology, AMS-I.F, Version 2 "Renewable electricity generation for captive use and mini-grid" in combination with the " <i>Tool to calculate the emission factor for an electricity system</i> ", version 2.2.1		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76)						
B.2.1	How was it validated that project complies with the following applicability criteria:	/1/ /22/	DR	In absence of the project activity electricity would be supplied by the national grid, which		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<p><i>The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit i.e., in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below:</i></p> <p>(a) A national or a regional grid (grid hereafter);</p> <p>(b) Fossil fuel fired captive power plant;¹</p> <p>(c) A carbon intensive mini-grid</p>			according to the Brazilian DNA has at least one fossil fuel generating unit.		
<p>B.2.2 How was it validated that project complies with the following applicability criteria:</p> <p><i>For the purpose of this methodology, a mini-grid is defined as small-scale power system with a total capacity not exceeding 15 MW (i.e., the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.</i></p>	/1/	DR	During site visit DNV assessed the turbine and generator nameplates and confirmed that the installed capacity of the generator is 12.9 MW, and therefore lower than 15 MW.		OK
<p>B.2.3 How was it validated that project complies with the following applicability criteria:</p> <p><i>Project activities or project activity components supplying electricity to a grid shall apply AMS-I.D. Project activities for standalone off-the-grid power systems supplying electricity to households/users included in the boundary are eligible under AMS-I.A.</i></p>	/1/	DR	The project activity will not supply electricity to the grid. The project is displacing electricity from the grid, thus this criteria is no applicable.		OK
<p>B.2.4 How was it validated that project complies with the following applicability criteria:</p> <p><i>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</i></p> <ul style="list-style-type: none"> <i>• The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</i> <i>• The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²;</i> <i>• The project activity results in new reservoirs and the power</i> 	/1/	DR	Not applicable. Blast furnace gas and wood tar can be considered biomass by-products, once they are residues of charcoal, a renewable biomass that is used in the industry process. The project activity is a biomass power plant.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m².</i>					
B.2.5 How was it validated that project complies with the following applicability criteria: <i>For biomass power plants, no other biomass other than renewable biomass are to be used in the project plant.</i>	/1/ /7/	DR	During site visit DNV could check the biomass stocks and biomass invoices and could confirm that no other than renewable biomass are used in the project plant.		OK
B.2.6 How was it validated that project complies with the following applicability criteria: <i>This methodology is applicable for project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition,³ (c) involve a retrofit⁴ of (an) existing plant(s); or (d) involve a replacement⁵ of (an) existing plant(s).</i>	/1/ /3/	DR	The project activity is a greenfield plant. There was no renewable energy power plant operating prior to the implementation of the project activity. DNV could confirm this through the registered PDD.		OK
B.2.7 How was it validated that project complies with the following applicability criteria: <i>In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct⁶ from the existing units.</i>	/1/	DR	Not applicable. See B.2.6.		OK
B.2.8 How was it validated that project complies with the following applicability criteria: <i>In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.</i>	/1/	DR	Not applicable. See B.2.6.		OK
B.2.9 How was it validated that project complies with the following applicability criteria: <i>If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel⁷, the capacity of the entire unit</i>	/1/	DR	Not applicable. See B.2.6.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>shall not exceed the limit of 15 MW.</i>					
B.2.10 How was it validated that project complies with the following applicability criteria: <i>Combined heat and power (co-generation) systems are not eligible under this category.</i>	/1/	DR	During site visit DNV assessed the power plant and verify that there is no heat utilization by the users. During the same site visit DNV could confirm that only electricity is supplied to the user.		OK
B.2.11 How was it validated that project complies with the following applicability criteria: <i>In case electricity produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the electricity will have to be entered into specifying that only the facility generating the electricity can claim emission reductions from the electricity displaced.</i>	/1/ /8/	DR	The contract between the supplier UTE Barreiro S.A. and the consumer of electricity, V&M do Brasil S.A, generated in the project activity was presented.		OK
B.2.12 Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /15/	DR	Yes, the applicability criteria from the selected baseline and monitoring methodology AMS-I.F, Version 2 are properly satisfied by UTE Barreiro S.A. Renewable Electricity Generation Project in Brazil.		OK
B.3 Project boundary (VVM para 77-79)					
B.3.1 What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/ /15/	DR	According to the chosen methodology the project boundary is the physical, geographical site of the renewable generation source. The project's system boundaries (components and facilities used to mitigate GHGs) are clearly defined and in accordance with the methodology AMS-I.F, 2.		OK
B.3.2 Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	Only CO ₂ emissions were identified for the project activity, as electricity will be displaced from the national grid, a more carbon intensive source. Methane emission due to the burn of blast furnace gas at the boiler would also occur in the baseline and are not claimed in the project		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				activity.		
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/ /15/	DR	The project does not involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology AMS-I.F, Version 2.		OK
B.4 Baseline scenario determination (VVM para 80-87, 103-105)						
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	The identified baseline is the purchase of all electricity from the local power utility, CEMIG.		OK
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	There is only one baseline scenario listed in the PDD.		OK
B.4.3	What is the baseline scenario?	/1/	DR	See B.4.1		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	The methodology AMS-I.F, version 2, does not provide guidance in determination of the baseline scenario.		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes, conservative assumptions were used to determine the baseline scenario.		OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes, the baseline has considered environmental, social and economic sustainability.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes, the baseline scenario is compatible with the available data and all literature and sources are clearly referenced.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. 	/1/	DR	Yes, the baseline is adequately documented.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity 					
B.5 Calculations of GHG emission reductions					
Data and parameters that are available at validation and that are not monitored (VVM para 198-200)					
B.5.1 How was the $EF_{CO_2, BM}$ verified?	/1/	DR	The operating margin emission factor and the build margin emission factor were not calculated according to the option (c) “Dispatch data analysis” of Step 2 of <i>Tool to calculate the emission factor for an electricity system</i> , version 2 mainly with respect the last availability data and weights of OM (25%) and BM (75%).	CAR-3	OK
Baseline emissions (VVM para 88-92)					
B.5.2 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The operating margin emission factor and the build margin emission factor were not calculated according to the option (c) “Dispatch data analysis” of Step 2 of <i>Tool to calculate the emission factor for an electricity system</i> , version 2 mainly with respect the last availability data and weights of OM (25%) and BM (75%). The combined margin weights presented in the documents provided are not consistent.	CAR-3 CAR-4	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.3	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	No, see B.5.2.	CAR-3 CAR-4	OK
B.5.4	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	No, see B.5.2	CAR-3 CAR-4	OK
Project emissions (VVM para 88-92)						
B.5.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The net calorific value of the natural gas presented in the PDD, version 1, dated 15 June 2010, is not in accordance to the reference presented from the natural gas supplier (Gasmig). The emission factor of the natural gas presented at the PDD is not in accordance to the type of gas used at the project activity..	CAR-5 CAR-6	OK
B.5.6	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	No, see B.5.5	CAR-5 CAR-6	OK
B.5.7	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	No, see B.5.5	CAR-5 CAR-6	OK
Leakage (VVM para 88-92)						
B.5.8	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	There is no equipment transferred from another activity. Therefore leakage is zero.		OK
B.5.9	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	See B.5.8.		OK
B.5.10	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	See B.5.8.		OK
Emission Reductions (VVM para 88-92)						
B.5.11	Algorithms and/or formulae used to determine emission reductions: <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document submitted for 	/1/	DR	The references presented in the CER spreadsheet calculation needs to be sufficient. The project participants have not presented sufficient references for the emission reduction estimative.	CL-1	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
registration. The data are properly referenced <ul style="list-style-type: none"> • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration. 						
B.6 Monitoring plan (VVM para 120-122)						
Data and parameters monitored						
B.6.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	Yes, the monitoring plan complies with the approved monitoring methodology AMS-IF version 2.		OK
B.6.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	No. Parameters $EF_{CO_2, OM}$ and $EF_{CO_2, GRID}$ are missing. The operating margin emission factor and the build margin emission factor were not calculated according to the option (c) “Dispatch data analysis” of Step 2 of <i>Tool to calculate the emission factor for an electricity system</i> , version 2 mainly with respect the last availability data and weights of OM (25%) and BM (75%).	CAR-3	OK
B.6.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	The monitored parameters must contain details about the meter equipment, calibration frequency and accuracy. The information presented for the monitored parameters in section B.7.1 are not sufficient.	CL-3	OK
B.6.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each	/1/	DR	The monitored parameters must contain details about the meter equipment, calibration frequency	CL-3	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
relevant parameter.				and accuracy. The information presented for the monitored parameters in section B.7.1 are not sufficient.		
B.6.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	The monitored parameters must contain details about the meter equipment, calibration frequency and accuracy. The information presented for the monitored parameters in section B.7.1 are not sufficient.	CL3	OK
B.6.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	<p>Yes, monitoring frequency is adequate for all monitoring parameters.</p> <ul style="list-style-type: none"> • $EG_{BL,y}$ (quantity of net electricity displaced): continuously • $FC_{NG,y}$ (quantity of natural gas consumed): continuously • $FC_{BFG,y}$ (quantity of blast furnace gas consumed): continuously • $FC_{TAR,y}$ (quantity of wood tar consumed): continuously • NCV_{NG}: (net calorific value of the natural gas) monthly • EF_{NG} (CO₂ emission factor of the natural gas): latest data published by IPCC. 		OK
B.6.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	<p>Yes, recording frequency is adequate for all monitoring parameters.</p> <ul style="list-style-type: none"> • $EG_{BL,y}$ (quantity of net electricity displaced): monthly 		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				<ul style="list-style-type: none"> • $FC_{NG, y}$ (quantity of natural gas consumed): monthly • $FC_{BFG, y}$ (quantity of blast furnace gas consumed): monthly • $FC_{TAR, y}$ (quantity of wood tar consumed): monthly • NCV_{NG}: (net calorific value of the natural gas) monthly • EF_{NG} (CO₂ emission factor of the natural gas): latest data published by IPCC. 		
Ability of project participants to implement monitoring plan						
B.6.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	During the site visit DNV checked the company's infrastructure, the already installed and in operation monitoring equipment, and interviewed the responsible monitoring people. DNV considers the monitoring plan feasible.		OK
B.6.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/	DR	Yes. All monitoring parameters will be kept for two years after the crediting period.		OK
B.6.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Yes. The data electronic recorded will be cross checked with physical available data and electricity sales receipts.		OK
B.6.11	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever	/1/	DR	Yes. All monitoring parameters will be kept for two years after the crediting period.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
occurs later?					

Table 2 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
CAR 1 According to the “Procedures for Renewal of the Crediting Period of a Registered CDM Project Activity” project participants shall notify the UNFCCC secretariat of their intention. The confirmation of this notification to UNFCCC was not presented.	A.1.1	The Notification Letter was sent to DOE.	DNV received the letter declaring the intention of the project participants to request renewal of the crediting period./4/ Therefore this CAR is closed.
CAR 2 The project participants listed in the PDD, version 1, dated 15 June 2010 is not in accordance to the project participants listed in the project’s page view at the UNFCCC website.	A.1.1 A.1.3	The Modalities of Communication (MoC) was updated in order to the Project Participant listed in the PDD version 01 to be listed in the project’s page.	DNV received the signed MoC stating V&M do Brasil S.A as the focal point and sole project participant, which is now in line with the revised PDD. Therefore this CAR is closed.
CAR 3 The operating margin emission factor and the build margin emission factor were not calculated according to the option (c) “Dispatch data analysis” of Step 2 of <i>Tool to calculate the emission factor for an electricity system</i> , version 2 mainly with respect the last availability data and weights of OM (25%) and BM (75%).	B.5.1 B.5.2 B.5.3 B.5.4 B.6.2	The emission factor of the grid was recalculated in the PDD version 02 to be in compliance with the “Tool to calculate the emission factor for an electricity system, version 2”.	DNV could assess the Excel file “CERs Calculation_RPC_v.02.xls” /2/ and confirmed that the combined margin emission factor was weighted correctly and the build margin emission factor value was in accordance to the latest available data from the Brazilian DNA /22/. Therefore this CAR is closed.
CAR 4 The combined margin weights presented in the documents provided are not consistent.	B.5.2 B.5.3 B.5.4	The CER spreadsheet v.02 was updated based on the changes generated by the CARs #3, #5, and #6, and CL #1.	The revised CER spread sheet was assessed /2/ and found to be correct. Therefore this CAR is closed.
CAR 5 The net calorific value of the natural gas	B.5.5 B.5.6	The NCV of the Natural Gas was corrected to apply a 1 year historical	The revised PDD and CER spread sheet were assessed by DNV and the net

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
presented in the PDD, version 1, dated 15 June 2010, is not in accordance to the reference presented from the natural gas supplier (Gasmig).	B.5.7	value (2010) instead a 1 month that had been used. The PDD v.02 and CER Spreadsheet v.02 were updated.	calorific value of the natural gas was found to be correct. Therefore this CAR is closed.
CAR 6 The emission factor of the natural gas presented at the PDD is not in accordance to the type of gas used at the project activity..	B.5.5 B.5.6 B.5.7	The IPCC Emission Factor of the Natural Gas was corrected to apply the correct value. The PDD v.02 and CER Spreadsheet v.02 were updated.	The revised PDD and CER spread sheet were assessed by DNV and the emission factor of the natural gas was found to be in accordance to 2006 IPCC Guidelines. Therefore this CAR is closed.
CAR 7 As per paragraph 169 of the VVM, project participants shall use the latest applicable version of approved methodology. The latest version of methodology AMS-I.F was not used in PDD version 2	Raised after draft report	The PP revised the PDD version 2.1 in order to apply the methodology AMS-I.F version 02	DNV assessed the revised PDD and confirmed that the project is using the latest applicable version of the methodology AMS-I.F. Therefore this CAR is closed.
CL 1 The references presented in the CER spreadsheet calculation needs to be sufficient. The project participants have not presented sufficient references for the emission reduction estimative.	B.5.11	All needed references were added to the CERs Calculation Spreadsheet v.02 that was presented to DOE in order to close it.	All references were presented in the revised CER spread sheet. DNV consider the references sufficient. Therefore this CL is closed.
CL 2 The PDD content need to be in English. The Figure 6 presented in the PDD, version 1, dated 15 June 2010 is in Portuguese.	-	The Figure 6 was modified in order to present its information in the English language and the PDD v.02 was updated.	The revised PDD was assessed and figure 6 was found to be correct. Therefore this CL is closed.
CL 3 The monitored parameters must contain details about the meter equipment, calibration frequency and accuracy. The information presented for the monitored parameters in	B.6.3 B.6.4 B.6.5	The monitoring details of equipment and parameters raised by the DOE were added in the section B.7.1 of the PDD v.02.	Details about meter equipment, calibration frequency and accuracy were provided under section B.7.1. of the revised PDD. Therefore this CL closed.

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
section B.7.1 are not sufficient.			
CL 4 Text at section E.1 seems to be incomplete and is not conclusive.	-	The mentioned paragraph in the section E.1 was excluded as it was not necessary for the section understanding.	The revised PDD was assessed and section E.1 was found to be correct. Therefore this CL is closed.
CL 5 Training procedures for operators and quality management systems certificated of the project activities shall be presented. Those references were not presented by the project participants.	-	The training procedures and some personal certificates were sent to DOE.	Operational Procedures /5/ and Training Procedures for new Operators /6/ for the project activity were presented by the project participants. Therefore this CL is closed.
CL 6 According to Option (c) of the “Tool to determine the remaining lifetime of equipment” the operation and maintenance history of the equipment shall be presented in order to confirm the default value of technical lifetime. The project participants have not presented this information.	-	The information about the remaining lifetime was presented to DOE in order to demonstrate the compliance with the Option (c) Use Default - of the mentioned Tool.	The operational history of the power plant was presented /7/. DNV assessed this information and operation of the power plant was found to be stable. Emissions of NOx, SO2 and particulate were found to be below the local environmental requirements, indicating that the equipment maintenance is in order. Thus DNV concludes that the technical lifetimes of the installed equipment are not reduced. Therefore this CL is closed.

Table 3 Forward action requests

Forward action request	Reference to Table 1	Response by project participants
FAR Not applicable		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Fernando Sasdelli

Fernando Sasdelli holds a Bachelor's Degree in Mechanical Engineering from University of São Paulo and has a Specialization in Business Administration from FGV.

Prior to joining DNV Fernando has four years of experience in cogeneration projects, including project design and development for biomass and natural gas power plants. Fernando has worked in middle and large size cogeneration projects, from hotels and commercial buildings to chemical industries and large sugar cane mills.

His qualification and industrial experience demonstrate his sufficient sectoral competence in thermal energy generation from fossil fuels and biomass.

Luis Filipe Aboim Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering. Having an overall experience of thirty three years. Prior to joining DNV having around twenty three years of experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control. He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Gong Zheng

Gong Zheng: holds a Bachelor and a Master Degree in Chemical Engineering. Having an overall experience of around five years. Prior to joining DNV, having more than three years experience in project operation and pre-planning experience in the operation of energy plants and he was involved in energy design and supply. His experience also covers the fields of project management and cleaner production in chemical industries.

He has experience of around 2 years in validation and verification of numerous CDM projects in DNV. All these projects are located in China.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in "Energy Generation from Renewable Energy Sources".

Astakala Vidyacharan

Astakala Vidyacharan is a chemical engineer and prior to joining DNV in 2005, has had 11 years of direct work experience in various chemical industries. His work experience covers 4 years in project implementations in pesticide and fine chemical industries , including environment management activities; 7 years in process operations of pesticide, natural products and fine chemical industries.

He has received extensive training in the CDM validation and verification process. He is an appointed validator for the CDM validation and verification program of DNV and has performed validation of several CDM projects. He is also a trained auditor for GHG accounting standards and involved audit of Corporate GHG accounting. He is a qualified ISO9001, ISO 14001 Lead auditor and OHSAS 18001 auditor who has performed several audits for various industrial sectors under these management systems.

His qualification, industrial experience and experience in CDM facilitate him to assess renewable energy based on Hydro and Biomass, Energy Efficiency sectors, in particular to sufficient degree."