VALIDATION OPINION – CREDITING PERIOD RENEWAL

IRANI BIOMASS ELECTRICITY GENERATION PROJECT IN BRAZIL

(UNFCCC Registration Ref. No. 0404)

REPORT NO. 2012-1310

REVISION NO. 01

DNV KEMA ENERGY & SUSTAINABILITY

VALIDATION OPINION – CREDITING PERIOD RENEWAL

Date of first issue: 26 September 2012	ConCert Project No.: PRJC-404193-2012-CCS-BRA
Approved by: Ole A. Flagstad	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: Celulose Irani S.A.	Client ref.: Leandro Alexis Farina

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Summary:

Project Name: Irani biomass electricity generation project
Registration Ref. No.: 0404
Country: Brazil
Methodology: AMS-I.C **Version:** 19 Sectoral scope: 1
GHG reducing Measure/Technology: Thermal energy production with or without energy
ER estimate: 4 778 tCO_2e 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 "Irani biomass electricity generation project" in Brazil, as described in the PDD, version 07 of 21 February 2013, 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.: 2012-1310	Subject Group: Environment
Report title: Irani biomass electricity generation project in Brazil	
Work carried out by: Fernando Sasdelli, Andrea Leiroz	
Work verified by: Astakala Vidyacharan	

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CELESC	Santa Cata rina power plants (from Portuguese Centrais Elétricas de Santa Catarina S.A.)
CH_4	Methane
CL	Clarification request
CM	Combined Margin
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNA	Designated National Authority
DNV	Det Norske Veritas
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LER	Reserve Energy Auction
LoA	Letter of approval
OM	Operating Margin
MoC	Modalities of communication
NGO	Non-governmental Organisation
PDD	Project Design Document
PROINFA	Program of Incentive to Alternative Sources of Electric Energy
PS	Clean Development Mechanism Project Standard
SIN	National Interconnected system
tCO_2e	Tonnes of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation and Verification Standard

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed an assessment of the request by Celulose Irani S.A. to renew the crediting period of CDM project activity 0404 "Irani biomass electricity generation project" in Brazil. The assessment was performed in accordance with the Validation and Verification Standard (Version 02.0) and the CDM Project Standard (Version 01.0) 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 guidance from the Board 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 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/or its update through an assessment. The project correctly applies the latest baseline and monitoring methodology AMS-I.C, version 19 "Thermal energy production with or without electricity".

The total emission reductions from the project are estimated to be on the average 4 778 tCO_{2e} per year over the 2nd renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the CDM project activity 0404 "Irani biomass 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, 21 February 2013

Andrea Leiroz
Validator
DNV Rio de Janeiro, Brazil

Ole A. Flagstad
Approver,
DNV Climate Change Services AS

2 INTRODUCTION

DNV Climate Change Services AS (DNV) was commissioned by Celulose Irani S.A. to perform an assessment of the request by Celulose Irani S.A. to renew the crediting period of CDM project activity 0404 "Irani biomass electricity generation project" in Brazil.

The assessment was performed in accordance with the Validation and Verification Standard (version 03.0) and the CDM Project Standard (version 02.0) 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 guidance from the Board 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.

In an e-mail sent on 29 March 2011 to the CDM Registration and Issuance Team of UNFCCC, the project participants expressed their intention to request a renewal of crediting period for the project activity /27/.

3 METHODOLOGY

The validation consisted of the following three phases:

I document review

II follow-up actions (e.g. on-site visit and telephone or email interviews)

III the closing out of validation findings and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Document Review

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

3.1.1 Documentation provided by the project participants

/1/	Celulose Irani S.A.: *CDM-SSC-PDD for project activity "Irani biomass electricity* generation project*" in Brazil*, version 06 dated 22 August 2012 and version 07 dated 21 February 2013.
/2/	Celulose Irani S.A.: *CDM-SSC-PDD for project activity for the first crediting period "Irani biomass electricity* generation project*" in Brazil*, version 5B dated 24 February 2006.
/3/	Celulose Irani S.A.: *c_CER_01_ExAnteCalculation_WayCarbon_v01_20120720.xlsx*, CERs calculation spreadsheet, version 1 dated 20 July 2012 and *EXANTE_CIRNMDL02_20130221.xlsx* version 2 dated 21 February 2013.
/4/	Celulose Irani S.A.: Internal quality procedure A19P02-MAN-6-300. Revision 000, dated 5 August 2010.
/5/	Celulose Irani S.A.: Report of biomass market developed by Pöyry Silviconsult for the year 2011. Version 2 dated 19 December 2012.

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

/6/	CDM Executive Board: Clean Development Mechanism Validation and Verification Standard, version 03.0.
/7/	CDM Executive Board: Clean Development Mechanism Project Standard, version 02.0.
/8/	CDM Executive Board: Clean Development Mechanism Project Cycle Procedure,

	version 03.0.
/9/	CDM Executive Board: *Thermal energy production with or without electricity* AMS-I.C, version 19 adopted at EB61.
/10/	CDM Executive Board: *Renewable electricity generation for a grid* AMS-I.D, version 7.
/11/	CDM Executive Board: *Avoidance of methane production from biomass decay through controlled combustion* AMS-III.E, version 7.
/12/	CDM Executive Board: *Renewable electricity generation for a grid* AMS-I.D, version 17 adopted at EB61.
/13/	CDM Executive Board: *Renewable electricity generation for captive use and mini-grid* AMS-I.F, version 02.
/14/	CDM Executive Board: Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01, EB39, Annex 7.
/15/	CDM Executive Board: *Project and leakage emissions from road transportation of freight*, version 1.0.0, EB63, Annex 10.
/16/	CDM Executive Board: *Tool to calculate the emission factor an electricity system*, version 2.2.1, EB 63 Annex 19.
/17/	CDM Executive Board: *Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period*, version 3.0.1, EB 66 Annex 47, dated 2 March 2012.
/18/	CDM Executive Board: *General guidance on leakage in biomass project activities*, version 03, EB 47, Annex 28.

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

/19/	DNV Climate Change Service AS: *Validation Report for Irani biomass electricity generation project in* Brazil, version 04 dated 24 February 2006.
/20/	DNV Climate Change Service AS: *Verification Report for verification period from 1 February 2010 to 30 September 2011*. Version 02, dated 4 September 2012.
/21/	IPCC: *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. http://www.ipcc.ch/ (for IPCC default values).
/22/	PROINFA: Creation of PROINFA Program (renewable resources program) through the Law # 10 438 issued on 26 April 2002 and regulated by the Brazilian Decree # 5 025 issued on 30 March 2004, which states that PROINFA aims for the reduction of greenhouse gases as established by the United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto Protocol, contributing to the sustainable development. Therefore, the program is considered as a "Type E-" policy and does not need to be considered in accordance to the "Clarifications on the consideration of national and/or Sectoral policies and circumstances in baseline scenarios (version 02)", Annex 3, EB 22.
/23/	Reserve Energy Auction (*Leilão de Energia de Reserva* - LER). Dated 18 August 2011. Available at: http://www.mme.gov.br/mme/galerias/arquivos/acoes/Energia/Leilxes_de_Geraxo_-_resultados_2011_xfinalx_x4x.pdf.
/24/	Brand, M.A and Hassegawa, M. 2005. Determination of the amount of wood residues generated in the industry that mechanically process wood in a radius of 150 km from the city of Otacílio Costa.
/25/	Interministerial Commission of Global Climate Change (DNA of Brazil) • *Emission factor for power grid of Brazil in 2011*, published in 2012. Available

	at: http://www.mct.gov.br/index.php/content/view/74689.html • *Clarification note on the national grid emission factor calculation*, dated 29 April 2008. Available at: http://www.mct.gov.br/upd_blob/0024/24562.pdf
/26/	BRTUV: ISO 9001:2008 certificate. Dated 3 November 2010 and valid until 18 January 2013.
/27/	E-mail sent by project participant on 29 March 2011 to the CDM Registration and Issuance Team of UNFCCC, expressing their intention to request a renewal of crediting period for the project activity.

3.2 Follow-up actions

On 24 and 25 November 2011, Fernando Sasdelli from DNV visited Celulose Irani S.A. in Vargem Bonita municipality, Santa Catarina State and performed interviews with project stakeholders. All verifications of the first renewable crediting period were done by DNV. The site visit for the renewal crediting period has been conducted along with the site visit carried out on 24 and 25 November 2011 for the 8th verification of emission reductions reported for the last verification of monitoring period 1 February 2010 to 30 September 2011 in the 1st crediting period. The main topics of the interview are summarized below.

	Date / Type of interview	**Name / Organization**	**Topic**
/28/	24 November 2011 ☒ On-site ☐ Face-to-face at office ☐ Telephone ☐ E-mail	Leandro Farina – Quality Manager – Celulose Irani S.A. Ricardo Bernasconi – Environmental Analyst - Celulose Irani S.A. Thiago Viana – Consultant – EcoSecurities Group Plc Helio Laubenheimer – Consultant – EcoSecurities Group Plc	• Baseline scenario and methodology application • Emission factor • Emission calculations • Management system
/29/	25 November 2011 ☒ On-site ☐ Face-to-face at office ☐ Telephone ☐ E-mail		

3.3 Closing out of validation findings

The objective of this phase of the assessment was to resolve any issues which needed be clarified prior to DNV's positive conclusion on the project's compliance with applicable CDM requirements.

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 "Irani biomass electricity generation project" in Brazil is enclosed in Appendix A to this report.

Table 1 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 1 are listed in Table 2 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 2. Table 1 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

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 applicable 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.

The validation identified [seven] CARs, [four] CLs. No FAR was identified. The CARs and CLs were satisfactorily addressed by the project participants by among other revising the PDD (please refer to Table 3 in Appendix A for further details).

Validation Protocol Table 1: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
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	*Gives reference to documents where the answer to the checklist question or item is found.*	*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.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A c**orrective 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.*

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***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here**.***	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

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

Figure 1 Validation protocol tables

3.4 Internal quality control

The 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

				Type of involvement					
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.1 competence
Team leader (Validator)	Leiroz	Andrea	Brazil	✓		✓	✓		
Validator	Sasdelli	Fernando	Brazil	✓	✓	✓			✓
Technical reviewer	Vidyacharan	Astakala	India					✓	✓

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

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation findings relate to the project design as documented and described in the PDD, version 07 dated 21 February 2013 /1/.

4.1 Validity of selected baseline and monitoring methodology

The project was originally registered based on version 7 of AMS-I.D – "Renewable electricity generation for a grid" /10/ and AMS-III.E – "Avoidance of methane production from biomass decay through controlled combustion*"* /11/. The revised CDM-SSC-PDD (version 07 dated 21 February 2013) /1/ applies version 19 of AMS-I.C – "Thermal energy production with or without electricity" /9/. This is appropriate as the latest version of AMS-I.D version 17 /12/ is not applicable to the project activity, since it does cover cogeneration systems that displace electricity consumption from the grid. AMS-I.C version 19 /9/ was the version of the methodology in effect when the CDM-SSC-PDD was submitted for the renewal of the crediting period. Therefore, the project was validated against AMS-I.C version 19 /9/ requirements, as described in the following sections.

The methodology AMS-III.E /11/ was not included since the methane avoidance component was withdrawn.

4.2 Application of selected baseline and monitoring methodology

The project activity is a renewable energy project, comprising a 9.43 MW captive biomass cogeneration plant that currently generates the electricity required by Celulose Irani in the paper manufacturing process, reducing electricity purchases and therefore dependence on the grid located in the city of Vargem Bonita, State of Santa Catarina, Brazil. The project activity displaces more carbon-intensive electricity from the grid with electricity generated by a GHG-neutral option.

The plant consists of a boiler manufactured by Sermatec, model VS 5090/2 with capacity of 84.78 MW, a turbine manufactured by TGM Turbinas, model TME 15000A with capacity of 9.35 MW and a generator manufactured by Weg Indústrias S.A, model SPW 900 with capacity of 9.43 MW, at a nominal tension of 13.8 kV.

As per registered PDD /2/, about 56% of the electricity consumed at the site (all Irani facilities including CDM project and non-CDM project) is produced on-site from their existing two biomass units (4.8 MW) and three small-scale hydro plants (9.7 MW). The remaining 44% of their electricity consumption is imported from Centrais Elétricas de Santa Catarina S.A. (CELESC), the local grid electricity authority, which will be replaced by the CDM project activity. In addition, there is a 1.05 MW diesel-based plant which is used as a back-up system in emergency cases.

The electricity produced by the new cogeneration biomass fired plant only displaces the electricity imported from the grid. The process plant continues to consume electricity from the three hydropower plants and two existing biomass units.

Although the project activity also replaces other existing biomass units that generated only thermal energy, it only accounts for emission reductions from electricity displaced from the grid. The biomass thermal units had reached the end of their operational lifetime and would be replaced by new thermal units. The project participant, aiming to reduce GHG emissions, decided instead to acquire the project activity: a cogeneration plant. The cogeneration plant allowed the project participant to displace part of the grid electricity.

The project design represents good practice. The thermoelectric plant will be fuelled by biomass residues from Irani and complementary suppliers of biomass with high granularity, which is currently dumped on a landfill i.e., residual woodchip and sawdust, woodchips from energetic forests and forest and process residues (e.g. barks). These residues pass through a

new installed shredder to reduce the granularity. A set of sieves will allow to add adequate proportion of sawdust. The biomass is eventually utilized in a boiler to generate electricity. As a result, the project avoids landfilling the biomass residues. However, no emission reductions regarding the methane avoidance is requested.

The project applies the baseline methodology AMS-I.C – "Thermal energy production with or without electricity", version 19 /9/. This methodology is applicable to the Irani biomass electricity generation project in Brazil project as:

a) the project activity uses the biomass as the source for renewable energy generation that supply users with thermal energy as per paragraph 1 of methodology /9/;
b) the project activity is a cogeneration project as the biomass is utilised for thermal and electricity energy generation as per paragraph 2 of methodology /9/;
c) the emission reductions from the biomass cogeneration system are due to electricity energy production for on-site consumption as per paragraph 3 of methodology /9/;
d) since the emission reductions of the cogeneration project activity are solely on account of electrical energy production, paragraph 4 of methodology /9/ is not applicable to the project activity;
e) the project activity is not a co-fired system as per paragraph 5 of methodology /9/;
f) the emission reductions of the cogeneration project activity are solely on account of electrical energy production, the total installed electrical energy generation capacity of the project equipment of the cogeneration unit is 9.43 MW, therefore below the 15 MW limit as per paragraph 6 of methodology /9/;
g) there is no addition of renewable energy unit at existing renewable facility as per paragraph 7 and 8 of methodology /9/;
h) as per PDD, the project activity consists in a greenfield plant as per paragraph 9 /9/;
i) the project activity does not use solid biomass, processed solid biomass fuel or charcoal based biomass for renewable energy generation as per paragraph 10, 11, and 14 of methodology /9/. The biomass residues used in the project activity are residual woodchip and sawdust, woodchips from energetic forests and forest and process residues (e.g. barks);
j) the produced electricity energy from biomass is for own use as per paragraph 12 of methodology /9/; and
k) the project does not recover and utilises biogas for renewable energy generation as per paragraph 13 of methodology /9/.

The compliance of those applicability conditions was confirmed during the site visit /28/ /29/.

The estimated amount of GHG emission reductions from the project is 33 452 tCO_2e during the second crediting period (7 years) from 1 October 2011 to 30 September 2018, resulting in estimated average annual emission reductions of 4 778 tCO_2e. For an assessment of the *ex-ante* emission reductions estimates, please refer to chapter 4.6 of this report.

The assessment of the project's compliance with the applicability criteria of AMS-I.C (version 19) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

The project boundaries have been identified as being the the biomass plant, the industrial facility that consumes the electricity generated by the project activity site, the transportation itineraries of biomass (if it is transported over distances greater than 200 kilometers), all power plants connected physically to the electricity system that the plant is connected to.
GHG sources involved are baseline CO_2 emissions from the grid electricity generation and project/leakage CO_2 emissions from biomass transportation and use of auxiliary vehicles.
This corresponds to paragraph 15 (a) – plants generating power located at the project site, 15 (b) – all power plants connected to the SIC grid, and 15 (c) – "industrial facility consuming energy generated by the system and the process or equipment affected by the project activity".

Since it is estimated that biomass residues and burning residues will be transported over a distance of greater than 200 kilometers, this source of emissions is considered, in line with AMS-I.C requirements paragraph 15 (e). However, transportation distance will be monitored during the crediting period, and in case it does not exceed 200 kilometers leakage emissions will not be considered. No processing of biomass residues nor biogas consumption are applied to the project activity.

The selected sources and gases are justified for the project activity.

The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AMS-I.C (version 19) /9/.

4.3 Validity of the original baseline or its update

DNV confirms that there have been no changes in the relevant national and/or sectoral regulations on thermal generation with biomass since the previous crediting period. On the other hand, the baseline scenario for the biomass based thermal generation was updated according to the latest version of AMS-I.C (version 19) /9/ criteria.

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" /17/ as per CDM-EB "Clean Development Mechanism Validation and Verification Standard" (version 02.0) /6/ were applied:

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

The "Clean Development Mechanism Validation and Verification Standard" /6/ approved by the CDM Executive Board requires assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps:

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

DNV has confirmed that no relevant mandatory national and/or sectoral polices applicable to the project activity came into effect after the submission of the project activity for validation.

The sectoral program release in the period was PROINFA Program (Program of Incentive to Alternative Sources of Electric Energy) /22/ dated 2004 which aims for the reduction of greenhouse gases emissions in the terms of Kyoto Protocol, by providing financial incentives to the production of renewable energy from the aforementioned technologies. Therefore, the program is clearly a "Type E-" policy.

Besides PROINFA, another incentive mechanism for biomass-based electricity generation is the Reserve Energy Auction (*Leilão de Energia de Reserva* - LER), which is organized for the purchase of electricity from wind and biomass sources and small hydroelectric plants to be exported to the National Interconnected system (SIN).

Although national policies favour the development of renewable energy sources, the lack of interest from the biomass sector can be demonstrated. Only 38.30 MW from a potential of 460.40 MW were contracted in a public auction for biomass. In addition, one out of seven biomass plants is based on woodchips /23/.

Moreover, is important to notice that both incentive mechanisms do not encompass electricity generation for captive consumption.

Thus, it is possible to conclude that no relevant national and/or sectorial policies affected the validity of the project activity baseline.

Step 1.2: Assess the impact of circumstances

The baseline scenario needs to be updated as the project is no longer considering the methane avoidance component. The cancellation of the methane avoidance component will lead to lower ER calculation as no emission reduction from the biomass used for electricity generation would otherwise be disposed with controlled placement, generating methane will be claimed.

For the electricity generation baseline scenario DNV could confirm that the circumstances in Brazil remain the same as the ones valid at project validation time. However, the Brazilian grids were unified into a common grid.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

This step is not applicable as the baseline is not the continuation of the current practice in the sense of the "*Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period"* contained in the "Procedures for renewal of the crediting period of a registered CDM project activity" (version 06).

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

The Brazilian grid emission factor calculated *ex-ante* for the first crediting period needs to be updated, as per the "*Tool to calculate the emission factor for an electricity system*" (version 2.2.1) /16/.

This parameter is properly described in the following section 4.5.1.

Conclusion on step 1

DNV confirms that the current baseline is still valid as per methodology AMS-I.C (version 19) /9/; however the grid emission factor, need to be updated for the subsequent crediting period.

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

Step 2.1: Update the current baseline

According to AMS-I.C, the following alternative baseline scenarios were considered:

(a) Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass.

(b) Electricity is produced in an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid.

(c) A combination of (a) and (b) – this alternative is not feasible since thermal energy is produced using biomass.

(d) Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to a grid/other facilities and/or thermal energy to other facilities) – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid.

(e) Electricity is imported from the grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export of electricity to the grid); steam/heat is produced from biomass – this alternative is plausible since the electricity consumed at the site is imported from the grid and steam/heat is produced from biomass.

(f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid.

(g) Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to

other facilities and without a possibility of export of thermal energy to other facilities) - this alternative is not feasible since electricity is not exported to the grid.

(h) Electricity and/or thermal energy produced in a co-fired system – this alternative is not applicable since the project activity is not a co-fired system.

(i) Electricity is imported from the grid and/or produced in a biomass fired cogeneration unit (with a possibility of export of electricity either to the grid or to other facilities); steam/heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler (with a possibility of export of thermal energy to other facilities). This scenario applies to a project activity that installs a new biomass cogeneration system that displaces electricity which otherwise would have been imported from a grid - this alternative is feasible since electricity is imported from the grid. However, it is not steam/heat is not produced in a biomass fired cogeneration unit and/or a biomass fired boiler. Thus, this alternative is not applicable.

As described in the PDD, the baseline scenario would correspond to alternative (e) – "electricity is imported from the grid and produced in an on-site captive power plant, and steam/heat is produced from biomass".

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted are interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

Step 2.2: Update the data and parameters

The Brazilian grid emission factor will be updated *ex-post*, as described in chapter 4.5 of this report.

The parameters described under step 1.4 were properly updated considering the latest versions of AMS-I.C /9/ and IPCC 2006 Guidelines /21/.

4.4 Validity of monitoring plan

The project applies the approved monitoring methodology AMS-I.C (version 19) – Thermal energy production with or without electricity /9/. The original monitoring plan was updated based in AMS-I.C (version 19) /9/ latest requirements.

The project monitoring plan is in compliance with the monitoring methodology AMS-I.C (version 19) /9/.

It is DNV's opinion, that the project participants are able to implement the monitoring plan.

4.4.1 Parameters determined ex-ante

The following parameters are determined *ex-ante* and will be kept fixed during the crediting period:

- $EF_{CO2,f}$, default CO_2 emission factor for freight transportation activity *f*: 129 gCO_2/ t km for heavy trucks as per tool "*Project and leakage emissions from road transportation of freight*" version 1.0.0 /15/;
- $EF_{grid,BM,y}$, build margin CO_2 emission factor for the project electricity system in year y calculated by the DNA of Brazil /25/ using the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/. The build margin emission factor was calculated *ex-ante* as 0.1056 tCO_2/MWh for the year 2011.

The grid emission factor for the second crediting period is source from the calculation by the Brazilian DNA. DNV has reviewed the calculation and verified that the weightage of w_{OM} = 0.25 and w_{BM} = 0.75 have been applied for this crediting period. This is in accordance to the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/.

Regarding leakage due to competing use of biomass, it was demonstrated in the PDD that the quantity of available biomass in the region is 34.2% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected /5/.

4.4.2 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:

- $D_{f,m}$, return trip road distance between the origin and destination of freight transportation activity *f* in monitoring period *m* is continuously monitored applying road maps.
- FRf,m, total mass of freight transported in freight transportation activity *f* in monitoring period *m* is measured continuously by a scale and data is aggregated monthly and yearly from each supplier and for the whole plant. The scales are calibrated once every 120 days according to internal procedure. The expected accuracies are ±10 kg and 20 kg.
- $EC_{PJ,j,y}$, quantity of electricity consumed by the project electricity consumption source *j* in year *y*, which is determined as the sum of the electricity consumed by the project plant and shredders, is monitored continuously by electricity meters. The readings are aggregated monthly and yearly for each parameter. The electricity meters used to monitor the electricity consumed by the plant and shredders are calibrated according to internal procedure once every three years. The expected accuracy is ±1%.
- $EG_{BL,y}$, quantity of net electricity displaced by the project activity in year *y*, which is determined by the gross electricity generated by the project activity minus the electricity consumed by the project plant and shredders, is monitored continuously by electricity meter. The readings are aggregated monthly and yearly for each parameter. The gross electricity generated by the project is measured by a Weg electricity meter while the electricity consumed by the project plant and shredders is measured by Allen-Bradley electricity meters. The electricity meter used to monitor the gross electricity generated by the project activity is calibrated according to internal procedure once every three years. The expected accuracy is ±2%. Information for the electricity meters used to monitor the electricity consumed by the project plant and shredders is provided above (see $EC_{PJ,j,y}$).
- $TDL_{j,y}$, average technical transmission and distribution losses for providing electricity to source j in year y. The parameter will be monitored annually. Default data of 20% is considered for the *ex-ante* estimations of emission reductions as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/.
- $EF_{grid,OM,y}$, operating margin CO_2 emission factor for the project electricity system in year y calculated by the DNA of Brazil /25/ using the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/.
- $EF_{grid,CM,y}$, combined margin CO_2 emission factor for the project electricity system in year y calculated by the DNA of Brazil /25/ using the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/.

According to the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ the dispatch data analysis OM method was considered by the DNA of Brazil /25/ for the determination of the operating margin (OM). The Brazilian grid emission factor is calculated

and published yearly by the DNA of Brazil following the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/. Thus, the combined margin CO_2 emission factor ($EF_{grid,CM,y}$) will be monitored ex-post. The calculations are based on electricity generation data provided by the Brazilian National Operator of the Electric System (ONS) for the electricity generated in the grid, as described in section 4.7.

4.4.3 Management system and quality assurance

Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports are assured through ISO 9001 certification of Celulose Irani /26/.

As per VVS § 131-133 /6/, monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.5 Algorithms and/or formulae used to determine emission reductions

The various algorithm/formulae for calculating baseline and project emissions have been transparently documented in line with the requirements of AMS-I.C (version 19) /9/.

Baseline emissions for electricity production

For the electricity generation from biomass, baseline emissions are calculated as the product of net quantity of electricity displaced by the project activity multiplied by the CO_2 grid emission factor as per paragraph 21 of AMS-I.C (version 19) /9/. As described in the PDD, baseline emissions are determined as per the procedures detailed in AMS-I.F /13/, which is applicable for project that displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end.

The net electricity generated is calculated as the total electricity produced by the project activity minus the electricity consumed by the shredders and the electricity consumed in the project plant.

Determination of emission factor for electricity

Since the project activity do not displace captive electricity generated by an existing plant but displace grid electricity import, the grid emission factor of the Brazilian grid is calculated as per procedures detailed in AMS-I.D /12/ as per paragraph 25 of AMS-I.C /9/.

The baseline emission factor for the project will be determined *ex-post* as a combined margin (CM), consisting of combination of the monitored parameters operating margin (OM) and build margin (BM) according to "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ for the 7-year renewable crediting period.

The Brazilian grid emission factor is published yearly by the DNA of Brazil /25/. The calculations are based on electricity generation data provided by the Brazilian National Operator of the Electric System (ONS) for the electricity generated in the grid in the year of 2011. This is the most recent information available at the time of the re-validation start.

The system boundary for the grid electricity system affected by the project is defined as the system of the Brazilian grid (SIN).

It has been calculated applying the default weights (w_{OM} = 0.25; w_{BM} = 0.75) of the operating margin and the build margin emission factors for the second crediting period.

Project emissions

Project emissions are considered from the grid electricity consumption and biomass residues transportation.

Project emissions from biomass transportation are determined applying Option B as per tool "*Project and leakage emissions from road transportation of freight*" version 1.0.0 /15/.

The project emissions from electricity consumption are estimated based on the amount of electricity consumed by the project plant and shredders times the grid emission factor and transmission and distribution losses as per "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/. Option A1 is applied to calculate the grid emission factor. A default value for TDL_y of 20% is chosen, as per tool /14/.

Leakage

Leakage emissions are applicable due to the transportation of biomass to the project site and the transportation of burning residues. Since it is estimated that biomass residues and burning residues will be transported over a distance of less than 200 kilometers, this source of emissions is considered to be nil, in line with AMS-I.C requirements /9/. Anyway, transportation distance will be monitored during the crediting period, and in case it exceeds 200 kilometers leakage emissions will be considered.

Regarding leakage due to competing use of biomass, it was demonstrated in the PDD that the quantity of available biomass in the region is 34.2% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected /5/.

As described in the validation report /19/, in the first crediting period, the project activity also involved methane avoidance from biomass not being landfilled. In the absence of the project the wood residue, which will be used in the thermoelectric plant will continue to be landfilled. However, project participant decided to not claim the credits regarding the methane avoidance component. Thus, in the first crediting period, the *ex-ante* ER was 173 486 tCO_2 per annum /2/ and in the second crediting period, the *ex-ante* ER has dropped to 4 778 tCO_2. This reduction is caused by the cancellation of the methane avoidance component.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 4 778 tCO_2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.6 Estimation of GHG emissions

Emission reductions are directly monitored and calculated *ex-post*, using the approach indicated in the methodology AMS-I.C version 19 /9/.

Baseline emissions for electricity production

As explain in the section above, the net electricity generated is calculated as the total electricity produced by the project activity minus the electricity consumed by the shredders and the electricity consumed in the project plant.

For the ex-ante estimation of baseline emissions, the total electricity produced by the project activity is estimated to be 49 295 MWh. Moreover, the electricity consumed by the shredders and the electricity consumed in the project plant is expected to be 797 MWh and 4 967 MWh, respectively. The values applied *ex-ante* are determined based on monitored data for the period October 2011 to September 2012 as stated in the PDD /1/.

Thus, the net quantity of electricity displaced by the project activity is estimated to be 43 531 MWh.

Determination of emission factor for electricity

As discussed in section 4.6, the Brazilian grid emission factor is published yearly by the DNA of Brazil /25/. The calculations are based on electricity generation data provided by the Brazilian National Operator of the Electric System (ONS) for the electricity generated in the grid in the year of 2011. This is the most recent information available at the time of the re-validation start.

It has been calculated applying the default weights (w_{OM} = 0.25; w_{BM} = 0.75) of the operating margin and the build margin emission factors for the second crediting period.

The method dispatch data analysis OM was chosen by the DNA of Brazil /25/. The Brazilian grid emission factors, OM and BM are published regularly by the Brazilian DNA /25/. The OM for 2011 was calculated as 0.2920 tCO_2/MWh and the BM for 2011 was calculated as 0.1056 tCO_2e/MWh. This results in a combined margin emission factor of 0.1522 tCO_2e/MWh in 2011 /25/. DNV confirms that the database is an official publication of the Brazilian Government for the purpose of CDM baselines and as stated in the Brazilian DNA website it is in line with the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ and according to the *Clarification Note* /25/ the dispatch data method is being used.

For *ex-ante* calculation, the baseline emissions for the electricity displaced in the project activity is 6 624 tCO_2e per year.

Project emissions

Project emissions are considered from the grid electricity consumption and biomass residues transportation.

Project emissions from biomass transportation are estimated to be 1 846 tCO_2e per year as per tool "*Project and leakage emissions from road transportation of freight*" version 1.0.0 /15/. A default CO_2 emission factor for freight transportation activity f of 129 g CO_2/t.km is applied. For the *ex-ante* calculation, the round trip distance from the project plant and the mass of freight were based on monitored data for the period October 2011 to September 2012 and were assumed to be:

Supplier	**$D_{f,m}$ (km)**	**$FR_{f,m}$ (t)**
1	420	1 644.48
2	480	143.58
3	280	20 905.45
4	320	7 291.30
5	310	1 227.20
6	240	121.56
7	415	1 109.15
8	350	5 723.74
9	260	414.04
10	310	1 159.24
11	240	1 040.81
12	380	4 651.60
Total		45 432.15

For *ex-ante* calculation, project emissions from electricity consumption are assumed to be 0 as the amount of electricity consumed by the project plant and shredders do not exceed the

project generation. However, the electricity consumption will be monitored during the crediting period.

Thus, the total project emissions are estimated in 1 846 tCO_2/year.

The project activity is estimated to result in 4 778 tCO_2/year of emission reductions annually throughout the 7 year renewable crediting period.

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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 General description of project activity						
A.1	**Title of the project activity (PS § 31, VVS § 62-63)**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes *If no, list where the PDD is not in accordance:*		OK
B Application of a baseline and monitoring methodology						
B.1	**Methodology applied (VVS para 70-133 and VVS § 150-153 for small-scale project activities, as applicable)**					
B.1.1	Does the project apply an approved methodology and the correct version thereof? *If during the course of validation the originally applied version of the methodology expires, a CAR shall be raised in Table 3 of the validation protocol. Any new requirements of the revised version of the methodology not yet validated in Table 2 of the validation protocol shall be validated in Table 3 as part of the assessment of the CAR raised.*	/1/ /9/ /10/ /11/ /12/	DR	The project was originally registered based on version 7 of AMS-I.D – "Renewable electricity generation for a grid" /10/ and AMS-III.E – "Avoidance of methane production from biomass decay through controlled combustion*"* /11/. The revised CDM-SSC-PDD (version 06 dated 22 August 2012) /1/ applies version 19 of AMS-I.C – "Thermal energy production with or without electricity" /9/. This is appropriate as AMS-I.D version 17 /12/ is not applicable to the project activity, since it does cover cogeneration systems that displace electricity consumption from the		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			grid. AMS-I.C version 19 /9/ was the version of the methodology in effect when the CDM-SSC-PDD was submitted for the renewal of the crediting period. Therefore, the project was validated against AMS-I.C version 19 /9/ requirements, as described in the following sections. The methodology AMS-III.E /11/ was not included since the methane avoidance component was withdrawn.		
B.2 Applicability of methodology (and tools) (VVS § 73-77) *Insert a row for each applicability criteria of the applied methodology (and tools)*					
B.2.1 How was it validated that project complies with the following applicability criteria: biomass-based cogeneration systems are included in this category. For the purpose of this methodology "cogeneration" shall mean the simultaneous generation of thermal energy and electrical energy in one process. Project activities that produce heat and power in separate element processes do not fit under the definition of cogeneration project?	/1/ /9/ /20/	DR	The project activity is a cogeneration project as the biomass is utilised for thermal and electricity energy generation as per paragraph 2 of methodology. This has been confirmed in the previous verification.		OK
B.2.2 How was it validated that project complies with the following applicability criteria: emission reductions from a biomass cogeneration system can accrue from one of the following activities: (a) electricity supply to a grid; (b) electricity and/or thermal energy (steam or heat) production for on-site consumption or for consumption by other facilities; (c) combination of (a) and (b)?	/1/ /9/ /20/	DR	The emission reductions from the biomass cogeneration system are due to electricity energy production for on-site consumption as per paragraph 3 of methodology. This has been confirmed in the previous verification.		OK
B.2.3 How was it validated that project complies with the following applicability criteria: the total installed/rated thermal energy generation capacity of the project equipment	/1/ /9/ /20/	DR	The installed thermal energy generation capacity of the project equipment is 9.43 MW, therefore below the 45 $MW_{thermal}$ limit as per paragraph 4 of		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	is equal to or less than 45 MW thermal?			methodology. This has been confirmed in the previous verification.		
B.2.4	How was it validated that project complies with the following applicability criteria: for co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel, shall not exceed 45 MW thermal?	/1/ /9/ /20/	DR	The project activity is not a co-fired system as per paragraph 5 of methodology. This has been confirmed in the previous verification.		OK
B.2.5	How was it validated that project complies with the following applicability criteria: the following capacity limits apply for biomass cogeneration units: (a) if the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy; (b) if the emission reductions of the cogeneration project activity are solely on account of thermal energy production, the total installed capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; (c) if the emission reductions of the cogeneration project activity are solely on account of electrical energy production, the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW?	/1/ /9/ /20/	DR	The emission reductions of the cogeneration project activity are solely on account of electrical energy production, the total installed electrical energy generation capacity of the project equipment of the cogeneration unit is 9.43 MW, therefore below the 15 MW limit as per paragraph 6 of methodology. This has been confirmed in the previous verification.		OK
B.2.6	How was it validated that project complies with the following applicability criteria: the capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units	/1/ /9/ /20/	DR	There is no addition of renewable energy unit at existing renewable facility as per paragraph 7 and 8 of methodology. This has been confirmed in the previous verification.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	added by the project should comply with capacity limits in paragraphs 4 to 6, and should be physically distinct from the existing units?					
B.2.7	How was it validated that project complies with the following applicability criteria: project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category?	/1/ /9/ /20/	DR	There is no addition of renewable energy unit at existing renewable facility as per paragraph 7 and 8 of methodology. This has been confirmed in the previous verification.		OK
B.2.8	How was it validated that project complies with the following applicability criteria: new facilities (greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "general Guidelines to SSC CDM methodologies"?	/1/ /9/	DR	As per PDD, the project activity consists in a greenfield plant. However, further clarification should be provided regarding the definition of the project activity since site encompasses two existing biomass plants.	~~CL 1~~	OK
B.2.9	How was it validated that project complies with the following applicability criteria: if the solid biomass fuel is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in the emissions reduction calculation?	/1/ /9/ /20/	DR	The project activity does not use solid biomass, processed solid biomass fuel or charcoal based biomass for renewable energy generation as per paragraph 10, 11, and 14 of methodology. This has been confirmed in the previous verification.		OK
B.2.10	How was it validated that project complies with the following applicability criteria: where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are bound by a contract that shall enable the project participant to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emission reductions?	/1/ /9/ /20/	DR	The project activity does not use solid biomass, processed solid biomass fuel or charcoal based biomass for renewable energy generation as per paragraph 10, 11, and 14 of methodology. This has been confirmed in the previous verification.		OK
B.2.11	How was it validated that project complies with the following applicability criteria: if electricity and/or steam/heat produced by the project activity is delivered to a	/1/ /9/ /20/	DR	The produced electricity energy from biomass is for own use as per paragraph 12 of methodology. This has been confirmed in the previous		OK

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

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emission reductions?			verification.		
B.2.12	How was it validated that project complies with the following applicability criteria: if the project activity recovers and utilizes biogas for power/heat production and applies this methodology on a stand alone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to implementation of the project activity, shall be taken into account either as project or leakage emission?	/1/ /9/ /20/	DR	The project does not recover and utilises biogas for renewable energy generation as per paragraph 13 of methodology. This has been confirmed in the previous verification.		OK
B.2.13	How was it validated that project complies with the following applicability criteria: charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: (a) charcoal is produced in kilns equipped with methane recovery and destruction facility; or (b) if charcoal is produced in kilns not equipped with methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature?	/1/ /9/ /20/	DR	The project activity does not use solid biomass, processed solid biomass fuel or charcoal based biomass for renewable energy generation as per paragraph 10, 11, and 14 of methodology. This has been confirmed in the previous verification.		OK
B.2.14	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the	/1/ /9/	DR	The applicability criteria included in the PDD "In the case of retrofit or replacement, to qualify as a	~~CAR 1~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	methodology?			small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW" is not part of methodology AMS-I.C version 19.		
B.3	**Project boundary (VVS § 82-87)**					
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/	DR	The project boundaries have been identified as being the the biomass plant, the industrial facility that consumes the electricity generated by the project activity site and the transportation itineraries of biomass (if it is transported over distances greater than 200 kilometers). However, as per AMS-I.C version 19, the project boundary also encompasses all power plants connected physically to the electricity system that the plant is connected to. In addition, it is not clearly described in section B.3 of the PDD whether the biomass plant includes the two existing biomass plants or not.	~~CAR 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	GHG sources involved are baseline CO_2 emissions from the grid electricity generation and project/leakage CO_2 emissions from biomass transportation and use of auxiliary vehicles. This corresponds to paragraph 15 (a) – plants generating power located at the project site, 15 (b) – all power plants connected to the SIC grid, and 15 (c) – "industrial facility consuming energy generated by the system and the process or equipment affected by the project activity". Since it is estimated that biomass residues and burning residues will be transported over a distance of less than 200 kilometers, this source of emissions is considered to be nil, in line with		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			AMS-I.C requirements paragraph 15 (e). However, transportation distance will be monitored during the crediting period, and in case it exceeds 200 kilometers leakage emissions will be considered. No processing of biomass residues nor biogas consumption are applied to the project activity. The selected sources and gases are justified for the project 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/ /9/	DR	The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AMS-I.C (version 19).		OK
B.4 Baseline scenario determination and description (VVS § 88-95 / Identification of alternatives to the project activity (VVS § 113-116) *Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.*					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete? Does the list include as one of the options that the project activity is undertaken without being registered as a proposed project activity? Does the list	/1/	DR	According to AMS-I.C, the following alternative baseline scenarios were considered: (a) Electricity is imported from the grid and	~~CL 2~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
contains all plausible alternatives which are iable means of supplying the comparable outputs or services that are to be supplied by the proposed project activity?			thermal energy (steam/heat) is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass. (b) Electricity is produced in an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid. (c) A combination of (a) and (b) – this alternative is not feasible since thermal energy is produced using biomass. (d) Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to a grid/other facilities and/or thermal energy to other facilities) – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid. (e) Electricity is imported from the grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export of electricity to the grid); steam/heat is produced from biomass – this alternative is plausible since the electricity consumed at the site is imported from the grid. However, it is not clearly described in the PDD that heat		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			is produced from biomass. (f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel – this alternative is not feasible since thermal energy is produced using biomass and electricity is imported from the grid. (g) Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to other facilities and without a possibility of export of thermal energy to other facilities) - this alternative is not feasible since electricity is imported from the grid. (h) Electricity and/or thermal energy produced in a co-fired system – this alternative is not applicable since the project activity is not a co-fired system. (i) Electricity is imported from the grid and/or produced in a biomass fired cogeneration unit (with a possibility of export of electricity either to the grid or to other facilities); steam/heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler (with a possibility of export of thermal energy to other facilities). This scenario applies to a project activity that installs a new biomass cogeneration system that		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				displaces electricity which otherwise would have been imported from a grid - this alternative is feasible since electricity is imported from the grid. However, it is not clearly described in the PDD that heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler. Thus, further clarification regarding the source of the thermal energy should be provided in order to determine the baseline scenario.		
B.4.2	Could the project activity in absence of the CDM or other baseline alternatives also be implemented by other entities than the CDM project participants? If so, has this also been included in the list of baseline scenarios?	/1/	DR	Only the project participant could implement the project activity as all equipment are within Irani area.		OK
B.4.3	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	Not applicable as the demonstration of the validity of the original baseline or its update does not require a reassessment of the baseline scenario as per "Procedures for renewal of the crediting period of a registered CDM project activity".		OK
B.4.4	What is the baseline scenario?	/1/	DR	As described in the PDD, the baseline scenario would correspond to alternative (e) – "electricity is imported from the grid and produced in an on-site captive power plant, and steam/heat is produced from biomass". However, further clarification regarding the source of the thermal energy should be provided in order to determine the baseline scenario.	~~CL 2~~	OK
B.4.5	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	Yes, the determination of the baseline scenario is totally in line with the methodology.		OK
B.4.6	Has the baseline scenario been determined using	/1/	DR	The baseline scenario was not determined using	~~CL 2~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	conservative assumptions where possible?			conservative assumptions. For further information, please refer to B.4.1.		
B.4.7	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies? Does the baseline scenario comply with all applicable and enforced legislation?	/1/	DR	The baseline scenario does not take sufficiently into account relevant national and/or sectoral policies, macro-economic trends and political aspirations. For further information, please refer to B.4.1.	~~CL 2~~	OK
B.4.8	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	The baseline scenario determination was not compatible with the available data and all literature and sources are not clearly referenced. For further information, please refer to B.4.1.	~~CL 2~~	OK
B.4.9	Is the baseline determination adequately documented in the PDD? • 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. • 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	/1/		The baseline determination was not adequately documented in the PDD. For further information, please refer to B.4.1.	~~CL 2~~	OK
B.5	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVS § 96-100)					
B.5.1	How was the default CO_2 emission factor for freight	/1/	DR	Default CO_2 emission factor for freight		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	transportation activity *f* verified?	/15/		transportation activity *f*: 129 gCO_2/ t km for heavy trucks as per tool "*Project and leakage emissions from road transportation of freight*" version 1.0.0.		
B.5.2	How was the build margin emission factor verified?	/1/ /16/	DR	According to the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1, the build margin emission factor shall be calculated *ex-ante*. However, as per section B.7.1 of the PDD, this parameter will be updated annually. Thus, the option chose for the calculation of the build margin is not according to the tool's requirement for the second crediting period.	~~CAR 3~~	OK
	Baseline emissions (VVS § 96-100)					
B.5.3	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /9/ /12/ /13/ /16/ /25/	DR	Baseline emissions for electricity production For the electricity generation from biomass, baseline emissions are calculated as the product of net quantity of electricity displaced by the project activity multiplied by the CO_2 grid emission factor as per paragraph 21 of AMS-I.C (version 19) /9/. As described in the PDD, baseline emissions are determined as per the procedures detailed in AMS-I.F /13/, which is applicable for project that displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end. The net electricity generated is calculated as the total electricity produced by the project activity minus the electricity consumed by the shredders and the electricity consumed in the project plant. Determination of emission factor for electricity		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Since the project activity do not displace captive electricity generated by an existing plant but displace grid electricity import, the grid emission factor of the Brazilian grid is calculated as per procedures detailed in AMS-I.D /12/ as per paragraph 25 of AMS-I.C /9/. The baseline emission factor for the project will be determined *ex-post* as a combined margin (CM), consisting of combination of the monitored parameters operating margin (OM) and build margin (BM) according to "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ for the 7-year renewable crediting period. The Brazilian grid emission factor is published yearly by the DNA of Brazil /25/. The calculations are based on electricity generation data provided by the Brazilian National Operator of the Electric System (ONS) for the electricity generated in the grid in the year of 2011. This is the most recent information available at the time of the re-validation start. The system boundary for the grid electricity system affected by the project is defined as the system of the Brazilian grid (SIN). It has been calculated applying the default weights (W_{OM} = 0.25; W_{BM} = 0.75) of the operating margin and the build margin emission factors for the second crediting period. The method dispatch data analysis OM was chosen by the DNA of Brazil /25/. The Brazilian grid emission factors, OM and BM are published		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				regularly by the Brazilian DNA /25/. The OM for 2011 was calculated as 0.2920 tCO_2/MWh and the BM for 2011 was calculated as 0.1056 tCO_2e/MWh. This results in a combined margin emission factor of 0.1522 tCO_2e/MWh in 2011 /25/. DNV confirms that the database is an official publication of the Brazilian Government for the purpose of CDM baselines and as stated in the Brazilian DNA website it is in line with the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ and according to the *Clarification Note* /25/ the dispatch data method is being used. For *ex-ante* calculation, the baseline emissions for the electricity displaced in the project activity is 6 624 tCO_2e per year.		
B.5.4	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /9/ /12/ /13/ /16/ /25/	DR	Yes. Conservative assumptions have been used when calculating the baseline emissions. For further information, please refer to B.5.3.		OK
B.5.5	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /9/ /12/ /13/ /16/ /25/	DR	Yes. Uncertainties in the baseline emission estimates are properly addressed. For further information, please refer to B.5.3.		OK
	Project emissions (VVS § 96-100)					
B.5.6	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /14/ /15/	DR	Project emissions are considered from the grid electricity consumption and biomass residues transportation.	~~CAR 4~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Project emissions from biomass transportation are determined applying Option B as per tool "*Project and leakage emissions from road transportation of freight*" version 1.0.0 /15/. For *ex-ante* calculation, these project emissions are assumed to be 0 as the distance is less than 200 km. However, the distance for biomass transportation will be monitored during the crediting period. The project emissions from electricity consumption are estimated based on the amount of electricity consumed by the project plant and shredders times the grid emission factor and transmission and distribution losses as per "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/. Option A1 is applied to calculate the grid emission factor. A default value for TDL_y of 20% is chosen, as per tool /14/. Regarding on project emission due to transportation of biomass, it was not demonstrated in the PDD that the distance is less than 200 km. In addition, no information is provided in section B.6.3 of the PDD for the project emissions due to electricity consumption.		
B.5.7	Have conservative assumptions been used when calculating the project emissions?	/1/ /14/ /15/	DR	Conservative assumptions have not been used when calculating the project emissions. For further information, please r Refer to B.5.6.	~~CAR 4~~	OK
B.5.8	Are uncertainties in the project emission estimates properly addressed?	/1/ /14/ /15/	DR	Uncertainties in the project emission estimates are not properly addressed. For further information, please rRefer to B.5.6.	~~CAR 4~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Leakage (VVS § 96-100)					
B.5.9	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /9/ /18/ /24/	DR	Leakage emissions are applicable due to the transportation of biomass to the project site and the transportation of burning residues. Since it is estimated that biomass residues and burning residues will be transported over a distance of less than 200 kilometers, this source of emissions is considered to be nil, in line with AMS-I.C requirements /9/. Anyway, transportation distance will be monitored during the crediting period, and in case it exceeds 200 kilometers leakage emissions will be considered. It was demonstrated in the PDD that the quantity of available biomass in the region is 67% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected. However, the study presented was developed in 2005 /24/. According to the "*General guidance on leakage in biomass project activities*" (version 03) /18/, project participant is requested to evaluate at the beginning of each crediting period if there is a surplus of the biomass in the region of the project activity, which is not utilized. Thus, the study developed in 2005 is no more valid.	~~CAR 5~~	OK
B.5.10	Have conservative assumptions been used when calculating the leakage emissions?	/1/ /9/ /18/ /24/	DR	Conservative assumptions have not been used when calculating the leakage emissions. For further information, please r efer to B.5.11.	~~CAR 5~~	OK
B.5.11	Are uncertainties in the leakage emission estimates properly addressed?	/1/ /9/ /18/ /24/	DR	Uncertainties in the leakage emission estimates are not properly addressed. For further information, please refer to B.5.11.	~~CAR 5~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Emission Reductions (VVS § 96-100)					
B.5.12 Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • 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.	/1/ /9/ /12/ /13/ /14/ /15/ /16/ /18/ /24/ /25/	DR	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are not listed in the PDD and related document submitted for registration. The data are not properly referenced; • All documentation is not correctly quoted and interpreted; • All values used cannot be deemed reasonable in the context of the project activity; • The methodology has not been correctly applied to calculate the emission reductions and this cannot be replicated by the data provided in the PDD and supporting files to be submitted for registration. For further information, please refer to B.5.3 to B.5.11.	~~CAR 4~~ ~~CAR 5~~	OK
B.6 Monitoring plan (VVS § 131-133)					
Data and parameters monitored					
B.6.1 Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/ /9/	DR	The monitoring parameters described in section B.7 of the PDD are not in accordance to the AMS-I.C version 19. Refer to B.6.2.	~~CAR 6~~	OK
B.6.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/ /14/ /16/ /25/	DR	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: • $D_{f,m}$, return trip road distance between the	~~CAR 6~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			origin and destination of freight transportation activity *f* in monitoring period *m* is continuously monitored applying road maps. • FRf,m, total mass of freight transported in freight transportation activity *f* in monitoring period *m* is measured continuously by a scale. No information regarding how data is aggregated, equipment accuracy and calibration frequency is provided in the monitoring plan. • $EC_{PJ,j,y}$, quantity of electricity consumed by the project electricity consumption source *j* in year *y* is monitored continuously by electricity meter. No information regarding how data is recorded and aggregated, equipment accuracy and calibration frequency is provided. • $EG_{BL,y}$, quantity of net electricity displaced by the project activity in year *y*, which is determined by the gross electricity generated by the project activity minus the electricity consumed by the project plant and shredders, is monitored continuously by electricity meter. The readings are aggregated monthly and yearly for each parameter. The gross electricity generated by the project is measured by a Weg electricity meter while the electricity consumed by		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			the project plant and shredders is measured by Allen-Bradley electricity meters. No information regarding equipment accuracy and calibration frequency is provided. • $EF_{grid,OM,y}$, operating margin CO_2 emission factor for the project electricity system in year y calculated by the DNA of Brazil /25/ using the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/. • $EF_{grid,CM,y}$, combined margin CO_2 emission factor for the project electricity system in year y calculated by the DNA of Brazil /25/ using the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/. According to the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/ the dispatch data analysis OM method was considered by the DNA of Brazil /25/ for the determination of the operating margin (OM). The Brazilian grid emission factor is calculated and published yearly by the DNA of Brazil following the latest version of the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1 /16/. Thus, the combined margin CO_2 emission factor ($EF_{grid,CM,y}$) will be monitored ex-post. The calculations are based on electricity generation data provided by the Brazilian National Operator of the Electric System (ONS) for the electricity generated in the grid, as		

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				described in section 4.7. According to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/, the parameter "average technical transmission and distribution losses for providing electricity to source j in year y" needs to be monitored. However, this parameter was not correctly included in section B.7.1 of the PDD.		
B.6.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/ /14/ /16/ /25/	DR	Measurement equipment is not described for all parameters. For further information, please refer to B.6.2.	~~CAR 6~~	OK
B.6.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/ /14/ /16/ /25/	DR	Accuracy is not addressed for all equipment. For further information, please refer to B.6.2.	~~CAR 6~~	OK
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/ /14/ /16/ /25/	DR	Requirements for maintenance and calibration of measurement equipment are not described in the PDD. For further information, please refer to B.6.2.	~~CAR 6~~	OK
B.6.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/ /14/ /16/ /25/	DR	Monitoring frequency is not adequate for all monitoring parameters. For further information, please refer to B.6.2.	~~CAR 6~~	OK
B.6.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/ /14/ /16/ /25/	DR	Recording frequency is not adequate for all monitoring parameters. For further information, please refer to B.6.2.	~~CAR 6~~	OK
	Ability of project participants to implement monitoring plan					
B.6.8	How has it been assessed that the monitoring arrangements	/1/	DR	The monitoring set up is simple, based on DNV		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	described in the monitoring plan are feasible within the project design?			expertise of similar projects and sectoral expertise, the monitoring plan is considered feasible within the project design.		
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	Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports are assured through ISO 9001 certification of Celulose Irani. Evidence should be provided in order to demonstrate that Celulose Irani has ISO 9001 certification.	~~CL 4~~	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	Detailed monitoring procedures, including responsibilities for project management, procedures for QA/QC of monitoring reports are assured through ISO 9001 certification of Celulose Irani. Evidence should be provided in order to demonstrate that Celulose Irani has ISO 9001 certification.	~~CL 4~~	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 occurs later?	/1/ /6/	DR	As per VVS § 131-133 /6/, monitored data required for verification and issuance shall be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later. However, no information is provided in the monitoring plan.	~~CAR 7~~	OK

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 The applicability criteria included in the PDD "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" is not part of methodology AMS-I.C version 19.	B.2.14	Such applicability condition has been deleted from the PDD, as it is not part of methodology AMS-I.C version 19.	Ok. DNV assessed the revised PDD and confirmed that the applicability criteria included are all part of methodology AMS-I.C version 19. Therefore, the CAR is closed.
CAR 2 The project boundaries have been identified as being the biomass plant, the industrial facility that consumes the electricity generated by the project activity site and the transportation itineraries of biomass (if it is transported over distances greater than 200 kilometers). However, as per AMS-I.C version 19, the project boundary also encompasses all power plants connected physically to the electricity system that the plant is connected to. In addition, it is not clearly described in section B.3 of the PDD whether the biomass plant includes the two existing biomass plants or not.	B.3.1	Section B.3 was updated. As per AMS-I.C version 19 the project boundary now clearly includes all power plants connected physically to the electricity system that the plant is connected to (i.e. SIN). A new diagram is presented in the PDD to clearly demonstrate the project boundary. In addition, it is clarified that the two biomass plants and three hydro power plants, which are located in the project site, are not included in the project boundary because they continue to operate as they did before the implementation of the project activity.	Ok. DNV assessed the revised PDD and confirmed that the project boundary has been correctly identified as per methodology AMS-I.C version 19. Besides the biomass plant, the industrial facility that consumes the electricity generated by the project activity site and the transportation itineraries of biomass (if it is transported over distances greater than 200 kilometers), all power plants connected physically to the electricity system that the plant is connected to were also included. The two existing biomass plants and the three hydropower plants were not included in the project boundary these plants continuous to operate as they did prior to the project activity implementation. Therefore, the CAR is closed.
CAR 3 According to the "*Tool to calculate the emission factor an electricity system"*, version 2.2.1, the build margin emission factor shall be calculated *ex-ante*. However, as per section B.7.1 of the PDD, this parameter will be updated annually. Thus, the option chose for the calculation of the build margin is not according to the tool's	B.5.2	According to the tool, the build margin emissions factor shall be calculated ex-ante for the second crediting period. In that sense, such parameter has been moved from section B.7.1 to B.6.2, clarifying that it is fixed ex-ante instead of updated annually.	Ok. DNV assessed the revised PDD and confirmed that the calculation of the build margin is according to the tool's requirement for the second crediting period. The build margin emission factor was calculated *ex-ante* and was included in section B.6.2. Therefore, the CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
requirement for the second crediting period.			
CAR 4 Regarding on project emission due to transportation of biomass, it was not demonstrated in the PDD that the distance is less than 200 km. In addition, no information is provided in section B.6.3 of the PDD for the project emissions due to electricity consumption.	B.5.6 B.5.7 B.5.8 B.5.12	Project emissions due to electricity consumption have been neglected, as the PP intends to generate enough electricity to supply its demand (plant and shredders) and a surplus to export to the grid. Such clarification has been included in section B.6.3 of the PDD. Project emissions due to transportation of biomass through distances over 200 km have been included in the PDD, as the project participant has now been able to consolidate its monitoring data. Evidences for the distances and biomass transported, including a map of suppliers, have been sent attached. It is also important to note that net electricity displaced from the grid has been modified, considering monitored values (first year of second crediting period - October 2011 to September 2012) instead of average values from the first crediting period. Such electricity values and the new spreadsheet of ex-ante estimation of emissions reductions (considering new project emissions from biomass transport and new baseline emissions from displaced electricity) have also been sent attached.	Ok. DNV assessed the revised PDD and confirmed that project emission due to transportation of biomass was considered since there are biomass suppliers that distant over 200 km from the project plant. The parameter "Return trip road distance between the origin and destination of freight transportation activity *f* in monitoring period *m*" will be monitored and whenever the round trip distance exceeds 200 km of distance from the project activity site, these project emissions will be considered. Regarding project emissions due to electricity consumption, it is stated in the revised PDD that it is expected to generate enough electricity to supply the plant and the shredders and to export electricity to the grid. Thus, project emissions related to electricity consumption are neglected. However, the electricity consumption and generation will be monitored. Whenever in case that electricity consumption exceed the projects generation the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"/version 01 will be applied. Therefore, the CAR is closed.
CAR 5 Leakage emissions are applicable due to the	B.5.9 B.5.10	Section B.6.1, sub-section Leakage Emissions was updated with a more recent	Regarding leakage due to competing use of biomass, it was demonstrated in

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
transportation of biomass to the project site and the transportation of burning residues. Since it is estimated that biomass residues and burning residues will be transported over a distance of less than 200 kilometers, this source of emissions is considered to be nil, in line with AMS-I.C requirements /9/. Anyway, transportation distance will be monitored during the crediting period, and in case it exceeds 200 kilometers leakage emissions will be considered. It was demonstrated in the PDD that the quantity of available biomass in the region is 67% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected. However, the study presented was developed in 2005 /24/. According to the "*General guidance on leakage in biomass project activities*" (version 03) /18/, project participant is requested to evaluate at the beginning of each crediting period if there is a surplus of the biomass in the region of the project activity, which is not utilized. Thus, the study developed in 2005 is no more valid.	B.5.11 B.5.12	study developed by Pöyry Silbiconsult (2012) with data collected from January 2011 to December 2011. The above-mentioned study indicates a surplus of woody residues in the neighboring region of Vargem Bonita (project activity site). The study evaluated the region and has obtained data from industries that mechanically process wood. The results indicated the existence of available biomass that could be sold and used for energy purposes. Their study assumes conservative approaches based on a sample of approximately 95% of potential woody residues consumer industries in the region covered by the survey, The study is provided to the DOE team.	the PDD that the quantity of available biomass in the region is 34.2% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected /5/. Therefore, the CAR is closed.
CAR 6 The monitoring plan described in section B.7 of the PDD are not in accordance to the AMS-I.C version 19: • FRf,m, total mass of freight transported in freight transportation activity *f* in monitoring period *m*. No information regarding how data is aggregated, equipment accuracy and calibration frequency is provided in the monitoring plan.	B.6.1 B.6.2 B.6.3 B.6.4 B.6.5 B.6.6 B.6.7	The parameter "average technical transmission and distribution losses for providing electricity to source j in year y" has been moved from section B.6.2 to B.7.1, clarifying that it is updated annually instead of fixed ex-ante. Information regarding how data is recorded and aggregated, equipment accuracy and calibration frequency was provided for the three parameters, in section B.7.1. To evidence such information, please find attached the latest calibration certificates	Ok. DNV assessed the revised PDD and verified the following: • FRf,m, total mass of freight transported in freight transportation activity *f* in monitoring period *m*. Information regarding how data is aggregated is provided in the monitoring plan. Information about equipment accuracy and calibration frequency was included in section B.7. Data is aggregated monthly

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
• $EC_{PJ,j,y}$, quantity of electricity consumed by the project electricity consumption source *j* in year *y*. No information regarding how data is recorded and aggregated, equipment accuracy and calibration frequency is provided. • $EG_{BL,y}$, quantity of net electricity displaced by the project activity in year *y*. No information regarding equipment accuracy and calibration frequency is provided. According to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/, the parameter "average technical transmission and distribution losses for providing electricity to source j in year y" needs to be monitored. However, this parameter was not correctly included in section B.7.1 of the PDD.		for the referred equipment and internal Quality Procedure A19P02-MAN-6-300.	and yearly from each supplier and for the whole plant. The scales are calibrated once every 120 days according to internal procedure /4/. The expected accuracies are ±10 kg and 20 kg. • $EC_{PJ,j,y}$, quantity of electricity consumed by the project electricity consumption source *j* in year *y*. Information regarding how data is recorded and aggregated, equipment accuracy and calibration frequency is provided. Data is aggregated monthly and yearly. The electricity meters used to monitor the electricity consumed by the plant and shredders are calibrated according to internal procedure once every three years. The expected accuracy is ±1%. • $EG_{BL,y}$, quantity of net electricity displaced by the project activity in year *y*. Information regarding equipment accuracy and calibration frequency is provided. The electricity meter used to monitor the electricity generated by the project activity is calibrated according to internal procedure once every three years. The expected accuracy is ±2%. According to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" version 01 /14/, the parameter "average technical

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
			transmission and distribution losses for providing electricity to source j in year y" was included in section B.7.1 of the revised PDD. Therefore, the CAR is closed.
CAR 7 As per VVS § 131-133 /6/, monitored data required for verification and issuance shall be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later. However, no information is provided in the monitoring plan.	B.6.11	Such requirement regarding monitored data has been included in the PDD, in section B.7.3 of the monitoring plan.	Ok. DNV assessed the revised PDD and confirmed that according to VVS § 131-133 /6/, monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later. Therefore, the CAR is closed.
CL 1 As per PDD, the project activity consists in a greenfield plant. However, further clarification should be provided regarding the definition of the project activity since site encompasses two existing biomass plants.	B.2.8	Although site encompasses two existing biomass plants (and three hydro plants), their operation shall continue as prior to the implementation of the project activity. The project activity does not involve any replacement, retrofit or any alterations to the existing plants; therefore they do not have direct relation to the project activity. The project activity consists in the addition of a new (greenfield) biomass plant, which shall displace electricity consumption from the grid and not from any of the existing biomass or hydro plants. Also, although the project activity replaces other existing biomass units that generated only thermal energy, it only accounts for emission reductions from electricity displaced from the grid (as better described in CL 2).	Ok. DNV assessed the revised PDD and confirmed that additional information was included under section B.2 to demonstrate that the project activity consists in a greenfield plant. Therefore, the CL is closed.
CL 2 According to AMS-I.C, the following alternative baseline scenarios were considered: (e) Electricity is imported from the grid	B.4.1 B.4.4 B.4.6 B.4.7	In the baseline scenario, thermal energy was generated from biomass units, without export to other facilities - baseline scenario (e). Those units generated only thermal	The alternative (e) selected by project participant to define the baseline scenario is not correct. According to AMS-I.C, alternative (e) is described as: electricity is

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export of electricity to the grid); steam/heat is produced from biomass – this alternative is plausible since the electricity consumed at the site is imported from the grid. However, it is not clearly described in the PDD that heat is produced from biomass. (i) Electricity is imported from the grid and/or produced in a biomass fired cogeneration unit (with a possibility of export of electricity either to the grid or to other facilities); steam/heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler (with a possibility of export of thermal energy to other facilities). This scenario applies to a project activity that installs a new biomass cogeneration system that displaces electricity which otherwise would have been imported from a grid - this alternative is feasible since electricity is imported from the grid. However, it is not clearly described in the PDD that heat is produced in a biomass fired cogeneration unit and/or a biomass fired boiler. Thus, further clarification regarding the source of the thermal energy should be provided in order to determine the baseline scenario.	B.4.8 B.4.9	energy, not including electricity generation as the project activity. The biomass thermal units had reached the end of their operational lifetime and would be replaced by new thermal units. The project participant, aiming to reduce GHG emissions, decided instead to acquire the project activity: a cogeneration plant. The cogeneration plant allowed the project participant to displace part of the grid electricity. It is important to note that the project activity only accounts for emissions reductions from displaced electricity, therefore consisting in a greenfield project (there was no previous unit generating such electricity).	imported from the grid and/or produced in an on-site captive power plant using fossil fuels and steam/heat is produced from biomass. As per registered PDD, about 56% of the electricity consumed at the site is produced on-site from their existing two biomass units (4.8 MW) and three small-scale hydro plants (9.7 MW). The remaining 44% of their electricity consumption is imported from Centrais Elétricas de Santa Catarina S.A. (CELESC), the local grid electricity authority. The two existing biomass plants also generate the thermal energy consumed by the project plant. Thus, the two existing biomass plants are cogeneration units. The baseline scenario should be clearly defined in section B.4 of the PDD. Further explanation regarding the connection point of the small-scale hydro plant to the project activity should be provided (see below). It is not clear in which item of paragraph 15 (Project Boundary) of AMS-I.C the hydro plants are listed.
CL 2 (cont.) The alternative (e) selected by project participant to define the baseline scenario is not correct. According to AMS-I.C, alternative (e) is described as: electricity is imported from the grid		The alternative (e) selected by project participant to define the baseline scenario is not correct. According to AMS-I.C, alternative (e) is described as: electricity is imported from the grid and/or produced in	Ok. DNV assessed the revised PDD and the baseline scenario selection is now clearly described in section B.4. Therefore, the CL is closed.

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
and/or produced in an on-site captive power plant using fossil fuels and steam/heat is produced from biomass. As per registered PDD, about 56% of the electricity consumed at the site is produced on-site from their existing two biomass units (4.8 MW) and three small-scale hydro plants (9.7 MW). The remaining 44% of their electricity consumption is imported from Centrais Elétricas de Santa Catarina S.A. (CELESC), the local grid electricity authority. The two existing biomass plants also generate the thermal energy consumed by the project plant. Thus, the two existing biomass plants are cogeneration units. The baseline scenario should be clearly defined in section B.4 of the PDD. Further explanation regarding the connection point of the small-scale hydro plant to the project activity should be provided. It is not clear in which item of paragraph 15 (Project Boundary) of AMS-I.C the hydro plants are listed.		an on-site captive power plant using fossil fuels and steam/heat is produced from biomass. As per registered PDD, about 56% of the electricity consumed at the site is produced on-site from their existing two biomass units (4.8 MW) and three small-scale hydro plants (9.7 MW). The remaining 44% of their electricity consumption is imported from Centrais Elétricas de Santa Catarina S.A. (CELESC), the local grid electricity authority. The two existing biomass plants also generate the thermal energy consumed by the project plant. Thus, the two existing biomass plants are cogeneration units. The baseline scenario should be clearly defined in section B.4 of the PDD. Further explanation regarding the connection point of the small-scale hydro plant to the project activity should be provided. It is not clear in which item of paragraph 15 (Project Boundary) of AMS-I.C the hydro plants are listed. Prior to the implementation of the project activity, part of the electricity consumed at the site was generated at on-site captive power plants (2 biomass units and 3 small-scale hydro plants - A and B) and the rest was imported from CELESC (C). The thermal energy was generated by on-site captive biomass plants (D), different from the 2 biomass units aforementioned that produced electricity (A). In the baseline scenario, the electricity	

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
		would still be generated by the 3 hydro (B) and 2 biomass power units (A) and by the grid (C). The thermal energy would still be generated by on-site captive biomass plants, but those would be new thermal plants (F) instead of the old ones (D), as the old ones (D) reached the end of their operational lifetime. In the project scenario, the PP decided to acquire a cogeneration plant (E) instead of the new biomass thermal units (F) to replace the old biomass thermal units (D), so that it would also reduce GHG emissions through displacing electricity consume from the grid (C). Only the electricity before imported from the grid (C) and the thermal energy before produced by the old thermal units (D) were replaced by the cogeneration unit (E), as the 2 biomass (A) and 3 hydro (B) units continued its normal operation. The following table shows the energy sources for electricity and thermal energy in the three scenarios (prior to the project, baseline and project).	

Energy Source	Scenario prior to the project activity		Baseline Scenario		Project Scenario	
	Electricity	Thermal	Electricity	Thermal	Electricity	Thermal
A - 2 biomass power units	x		x		x	
B - 3 small hydro power units	x		x		x	

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
		<table><tr><td>C - Grid</td><td>X</td><td></td><td>X</td><td></td><td></td><td></td></tr><tr><td>D - Old biomass thermal units</td><td></td><td>X</td><td></td><td></td><td></td><td></td></tr><tr><td>E - New biomass cogeneration unit</td><td></td><td></td><td></td><td></td><td>X</td><td>X</td></tr><tr><td>F - New biomass thermal units</td><td></td><td></td><td></td><td>X</td><td></td><td></td></tr></table> In that sense, the baseline scenario, which must be applied only to the electricity accounted for in the PDD (amount that moved from C in the baseline to E in the project), would be: electricity is imported from the grid and heat is produced from biomass. Such scenario is in accordance with the description provided in alternative (e). Finally, the hydro plants are located in the project plant and they are directly connected to it. They work just like the biomass plants, providing electricity directly to the PP without intermediation from the grid. Considering the clarifications above, the PP shall wait for a decision from the DOE on how to better describe the scenarios in the PDD, in order to clarify the definition of the project activity under alternative (e).	
CL 3 As per registered PDD /2/, about 56% of the electricity consumed at the site is produced on-site		Section A.1 of the PDD has been modified in order to inform that, prior to the implementation of the project activity,	Ok. DNV assessed the revised PDD and confirmed that the description of the electricity consumption at the site prior to

Corrective action and/ or clarification requests	Reference to Table 1	Response by project participants	Validation conclusion
from their existing two biomass units and three small-scale hydro plants. The remaining 44% of their electricity consumption is imported from Centrais Elétricas de Santa Catarina S.A. (CELESC), the local grid electricity authority. However, it is not clearly described in section A.1 of the PDD submitted for renewal of the crediting period /1/ that Celulose Irani also consumed the electricity generated by the two existing biomass plants. In addition, no information is provided about the 1.05 MW diesel-based plant which is used as a back-up system in emergency cases.		Celulose Irani consumed electricity from its own hydropower and biomass plants, from a back-up diesel-based plant and from the grid. The section now also clarifies that such plants shall continue to work normally.	the project activity implementation is now clear and according to the registered PDD /2/. Therefore, the CL is closed.
CL 4 Evidence should be provided in order to demonstrate that Celulose Irani has ISO 9001 certification.	B.6.9 B.6.10	ISO 9001 certification for Celulose Irani has been sent to the DOE.	Ok. A copy of the ISO 9001 certificate /26/ was provided to DNV. Therefore, the CL is closed.

Table 3 Forward action requests

Forward action request	Reference to Table 1	Response by project participants
No FAR was identified.		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

MRS. ANDREA LEIROZ holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering having an overall experience of around thirteen years. She has experience of around 6 years in validation and verification of numerous CDM projects in DNV, both in Brazil & abroad.

Her qualification, experience in CDM demonstrates her sufficient sectoral competence in Energy Generation from renewable energy sources, Waste handling and disposal and Animal waste management.

MR. FERNANDO SASDELLI holds a Bachelor's Degree in Mechanical Engineering from University of Sao Paulo and has a Specialisation in Business Administration from FGV. Prior to joining DNV, Fernando has four years of experiences 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 biomass and fossil fuels.

MR. 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."